

# Package ‘CPSM’

April 2, 2026

**Type** Package

**Title** CPSM: Cancer patient survival model

**Version** 1.2.0

**Description** CPSM provides a comprehensive computational pipeline for predicting survival probability and risk groups in cancer patients. The package includes steps for data preprocessing, training/test split, and normalization. It enables feature selection using univariate survival analysis and computes a LASSO-based prognostic index (PI) score. CPSM supports the development of predictive models using various feature sets and offers a suite of visualization tools, including survival curves based on predicted probabilities, barplots for predicted mean and median survival times, KM plots overlaid with individual survival predictions, and nomograms for estimating 1-, 3-, 5-, and 10-year survival probabilities. This makes CPSM a versatile tool for survival analysis in cancer research.

**License** GPL-3 | file LICENSE

**Encoding** UTF-8

**Roxygen** list(markdown = TRUE)

**RoxygenNote** 7.3.2

**Imports** SummarizedExperiment, grDevices, reshape2, survival, survminer, ggplot2, MTLR, glmnet, rms, preprocessCore, Matrix, stats, Hmisc, ggfortify, randomForestSRC, caret, SurvMetrics, MASS,

**Suggests** knitr, rmarkdown, testthat (>= 3.0.0), BiocStyle

**URL** <https://github.com/hks5august/CPSM/>

**BugReports** <https://github.com/hks5august/CPSM/issues>

**VignetteBuilder** knitr

**Config/testthat/edition** 3

**biocViews** Normalization, Survival, GeneExpression, Preprocessing, FeatureExtraction, Software, Visualization

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data_process_f	<i>Data Processing function</i>
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**Description**

This function converting OS time (in days) into months and removing samples where OS time information is missing. Note: In the Example data OS time labelled is "OS.time" and OS event labelled as "OS"

**Arguments**

data	A data frame containing clinical and expression data.
col_num	An integer indicating the column number where expression data starts.
surv_time	A character string specifying the name of the survival time column in the data.

**Value**

A data frame combining processed clinical and expression data. Includes a new column OS\_month for survival time in months, and retains only rows with positive OS\_month.

**Examples**

```
library(SummarizedExperiment)
data(Example_TCGA_LGG_FPKM_data, package = "CPSM")
combined_df <- cbind(as.data.frame(colData(Example_TCGA_LGG_FPKM_data))
[, -ncol(colData(Example_TCGA_LGG_FPKM_data))],
t(as.data.frame(assay(Example_TCGA_LGG_FPKM_data, "expression"))))
data_process_f(data = combined_df,
  col_num = 20, surv_time = "OS.time"
)
```

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Example_TCGA_LGG_FPKM_data	<i>Example TCGA LGG FPKM data</i>
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**Description**

This is a data set used for the package example.

**Usage**

```
data("Example_TCGA_LGG_FPKM_data")
```

**Format**

A data frame with 184 observations on the following 2024 variables.

Age a numeric vector  
subtype a character vector  
gender a character vector  
race a character vector  
ajcc\_pathologic\_tumor\_stage a logical vector  
histological\_type a character vector  
histological\_grade a character vector  
treatment\_outcome\_first\_course a character vector  
radiation\_treatment\_adjuvant a character vector  
sample\_type a character vector  
type a character vector  
OS a numeric vector  
OS.time a numeric vector  
DSS a numeric vector  
DSS.time a numeric vector  
DFI a numeric vector  
DFI.time a numeric vector  
PFI a numeric vector  
PFI.time a numeric vector  
A1BG a numeric vector  
A1CF a numeric vector  
A2M a numeric vector  
A2ML1 a numeric vector  
A3GALT2 a numeric vector  
A4GALT a numeric vector  
A4GNT a numeric vector  
AAAS a numeric vector  
AACS a numeric vector  
AADAC a numeric vector  
AADACL2 a numeric vector  
AADACL3 a numeric vector  
AADACL4 a numeric vector  
AADAT a numeric vector  
AAGAB a numeric vector  
AAK1 a numeric vector  
AAMDC a numeric vector  
AAMP a numeric vector  
AANAT a numeric vector

AAR2 a numeric vector  
AARD a numeric vector  
AARS1 a numeric vector  
AARS2 a numeric vector  
AARSD1 a numeric vector  
AASDH a numeric vector  
AASDHPPT a numeric vector  
AASS a numeric vector  
AATF a numeric vector  
AATK a numeric vector  
ABAT a numeric vector  
ABCA1 a numeric vector  
ABCA10 a numeric vector  
ABCA12 a numeric vector  
ABCA13 a numeric vector  
ABCA2 a numeric vector  
ABCA3 a numeric vector  
ABCA4 a numeric vector  
ABCA5 a numeric vector  
ABCA6 a numeric vector  
ABCA7 a numeric vector  
ABCA8 a numeric vector  
ABCA9 a numeric vector  
ABCB1 a numeric vector  
ABCB10 a numeric vector  
ABCB11 a numeric vector  
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ABCB6 a numeric vector  
ABCB7 a numeric vector  
ABCB8 a numeric vector  
ABCB9 a numeric vector  
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ABCC9 a numeric vector  
ABCD1 a numeric vector  
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ABCD3 a numeric vector  
ABCD4 a numeric vector  
ABCE1 a numeric vector  
ABCF1 a numeric vector  
ABCF2 a numeric vector  
'ABCF2-H2BE1' a numeric vector  
ABCF3 a numeric vector  
ABCG1 a numeric vector  
ABCG2 a numeric vector  
ABCG4 a numeric vector  
ABCG5 a numeric vector  
ABCG8 a numeric vector  
ABHD1 a numeric vector  
ABHD10 a numeric vector  
ABHD11 a numeric vector  
ABHD12 a numeric vector  
ABHD12B a numeric vector  
ABHD13 a numeric vector  
ABHD14A a numeric vector  
'ABHD14A-ACY1' a numeric vector  
ABHD14B a numeric vector  
ABHD15 a numeric vector  
ABHD16A a numeric vector  
ABHD16B a numeric vector  
ABHD17A a numeric vector  
ABHD17B a numeric vector  
ABHD17C a numeric vector  
ABHD18 a numeric vector  
ABHD2 a numeric vector  
ABHD3 a numeric vector  
ABHD4 a numeric vector  
ABHD5 a numeric vector  
ABHD6 a numeric vector  
ABHD8 a numeric vector  
ABI1 a numeric vector

ABI2 a numeric vector  
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ABI3BP a numeric vector  
ABITRAM a numeric vector  
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ABLIM3 a numeric vector  
ABO a numeric vector  
ABR a numeric vector  
ABRA a numeric vector  
ABRACL a numeric vector  
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AC132217.2 a numeric vector  
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ACBD7 a numeric vector  
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ACE a numeric vector  
ACE2 a numeric vector  
ACER1 a numeric vector  
ACER2 a numeric vector  
ACER3 a numeric vector  
ACHE a numeric vector  
ACIN1 a numeric vector  
ACKR1 a numeric vector  
ACKR2 a numeric vector  
ACKR3 a numeric vector  
ACKR4 a numeric vector  
ACLY a numeric vector  
ACMSD a numeric vector  
ACO1 a numeric vector

ACO2 a numeric vector  
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ACP4 a numeric vector  
ACP5 a numeric vector  
ACP6 a numeric vector  
ACP7 a numeric vector  
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ACRBP a numeric vector  
ACRV1 a numeric vector  
ACSBG1 a numeric vector  
ACSBG2 a numeric vector  
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ACSL3 a numeric vector  
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ACSL5 a numeric vector  
ACSL6 a numeric vector  
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ACSM2B a numeric vector  
ACSM3 a numeric vector  
ACSM4 a numeric vector

ACSM5 a numeric vector  
ACSM6 a numeric vector  
ACSS1 a numeric vector  
ACSS2 a numeric vector  
ACSS3 a numeric vector  
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ACTA2 a numeric vector  
ACTB a numeric vector  
ACTBL2 a numeric vector  
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ACTG1 a numeric vector  
ACTG2 a numeric vector  
ACTL10 a numeric vector  
ACTL6A a numeric vector  
ACTL6B a numeric vector  
ACTL7A a numeric vector  
ACTL7B a numeric vector  
ACTL8 a numeric vector  
ACTL9 a numeric vector  
ACTN1 a numeric vector  
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APOE a numeric vector  
APOF a numeric vector  
APOH a numeric vector  
APOL1 a numeric vector  
APOL2 a numeric vector  
APOL3 a numeric vector  
APOL4 a numeric vector  
APOL5 a numeric vector  
APOL6 a numeric vector  
APOLD1 a numeric vector  
APOM a numeric vector  
APOO a numeric vector  
APOOL a numeric vector  
APP a numeric vector  
APPBP2 a numeric vector  
APPL1 a numeric vector  
APPL2 a numeric vector  
APRT a numeric vector  
APTX a numeric vector  
AQP1 a numeric vector  
AQP10 a numeric vector  
AQP11 a numeric vector  
AQP12A a numeric vector

AQP12B a numeric vector  
AQP2 a numeric vector  
AQP3 a numeric vector  
AQP4 a numeric vector  
AQP5 a numeric vector  
AQP6 a numeric vector  
AQP7 a numeric vector  
AQP8 a numeric vector  
AQP9 a numeric vector  
AQR a numeric vector  
AR a numeric vector  
ARAF a numeric vector  
ARAP1 a numeric vector  
ARAP2 a numeric vector  
ARAP3 a numeric vector  
ARC a numeric vector  
ARCN1 a numeric vector  
AREG a numeric vector  
AREL1 a numeric vector  
ARF1 a numeric vector  
ARF3 a numeric vector  
ARF4 a numeric vector  
ARF5 a numeric vector  
ARF6 a numeric vector  
ARFGAP1 a numeric vector  
ARFGAP2 a numeric vector  
ARFGAP3 a numeric vector  
ARFGEF1 a numeric vector  
ARFGEF2 a numeric vector  
ARFGEF3 a numeric vector  
ARFIP1 a numeric vector  
ARFIP2 a numeric vector  
ARFRP1 a numeric vector  
ARG1 a numeric vector  
ARG2 a numeric vector  
ARGFX a numeric vector  
ARGLU1 a numeric vector  
ARHGAP1 a numeric vector  
ARHGAP10 a numeric vector  
ARHGAP11A a numeric vector

ARHGAP11B a numeric vector  
ARHGAP12 a numeric vector  
ARHGAP15 a numeric vector  
ARHGAP17 a numeric vector  
ARHGAP18 a numeric vector  
ARHGAP19 a numeric vector  
'ARHGAP19-SLIT1' a numeric vector  
ARHGAP20 a numeric vector  
ARHGAP21 a numeric vector  
ARHGAP22 a numeric vector  
ARHGAP23 a numeric vector  
ARHGAP24 a numeric vector  
ARHGAP25 a numeric vector  
ARHGAP26 a numeric vector  
ARHGAP27 a numeric vector  
ARHGAP28 a numeric vector  
ARHGAP29 a numeric vector  
ARHGAP30 a numeric vector  
ARHGAP31 a numeric vector  
ARHGAP32 a numeric vector  
ARHGAP33 a numeric vector  
ARHGAP35 a numeric vector  
ARHGAP36 a numeric vector  
ARHGAP39 a numeric vector  
ARHGAP4 a numeric vector  
ARHGAP40 a numeric vector  
ARHGAP42 a numeric vector  
ARHGAP44 a numeric vector  
ARHGAP45 a numeric vector  
ARHGAP5 a numeric vector  
ARHGAP6 a numeric vector  
ARHGAP8 a numeric vector  
ARHGAP9 a numeric vector  
ARHGDIA a numeric vector  
ARHGDIB a numeric vector  
ARHGDIG a numeric vector  
ARHGEF1 a numeric vector  
ARHGEF10 a numeric vector  
ARHGEF10L a numeric vector  
ARHGEF11 a numeric vector

ARHGEF12 a numeric vector  
ARHGEF15 a numeric vector  
ARHGEF16 a numeric vector  
ARHGEF17 a numeric vector  
ARHGEF18 a numeric vector  
ARHGEF19 a numeric vector  
ARHGEF2 a numeric vector  
ARHGEF25 a numeric vector  
ARHGEF26 a numeric vector  
ARHGEF28 a numeric vector  
ARHGEF3 a numeric vector  
ARHGEF33 a numeric vector  
ARHGEF35 a numeric vector  
ARHGEF37 a numeric vector  
ARHGEF38 a numeric vector  
ARHGEF39 a numeric vector  
ARHGEF4 a numeric vector  
ARHGEF40 a numeric vector  
ARHGEF5 a numeric vector  
ARHGEF6 a numeric vector  
ARHGEF7 a numeric vector  
ARHGEF9 a numeric vector  
ARID1A a numeric vector  
ARID1B a numeric vector  
ARID2 a numeric vector  
ARID3A a numeric vector  
ARID3B a numeric vector  
ARID3BP1 a numeric vector  
ARID3C a numeric vector  
ARID4A a numeric vector  
ARID4B a numeric vector  
ARID5A a numeric vector  
ARID5B a numeric vector  
ARIH1 a numeric vector  
ARIH2 a numeric vector  
ARL1 a numeric vector  
ARL10 a numeric vector  
ARL11 a numeric vector  
ARL13A a numeric vector  
ARL13B a numeric vector

ARL14 a numeric vector  
ARL14EP a numeric vector  
ARL14EPL a numeric vector  
ARL15 a numeric vector  
ARL16 a numeric vector  
ARL17A a numeric vector  
ARL17B a numeric vector  
ARL2 a numeric vector  
'ARL2-SNX15' a numeric vector  
ARL2BP a numeric vector  
ARL3 a numeric vector  
ARL4A a numeric vector  
ARL4C a numeric vector  
ARL4D a numeric vector  
ARL5A a numeric vector  
ARL5B a numeric vector  
ARL5C a numeric vector  
ARL6 a numeric vector  
ARL6IP1 a numeric vector  
ARL6IP4 a numeric vector  
ARL6IP5 a numeric vector  
ARL6IP6 a numeric vector  
ARL8A a numeric vector  
ARL8B a numeric vector  
ARL9 a numeric vector  
ARMC1 a numeric vector  
ARMC10 a numeric vector  
ARMC12 a numeric vector  
ARMC2 a numeric vector  
ARMC3 a numeric vector  
ARMC4 a numeric vector  
ARMC5 a numeric vector  
ARMC6 a numeric vector  
ARMC7 a numeric vector  
ARMC8 a numeric vector  
ARMC9 a numeric vector  
ARMCX1 a numeric vector  
ARMCX2 a numeric vector  
ARMCX3 a numeric vector  
ARMCX4 a numeric vector

ARMCX5 a numeric vector  
'ARMCX5-GPRASP2' a numeric vector  
ARMCX6 a numeric vector  
ARMH1 a numeric vector  
ARMH2 a numeric vector  
ARMH3 a numeric vector  
ARMH4 a numeric vector  
ARMS2 a numeric vector  
ARMT1 a numeric vector  
ARNT a numeric vector  
ARNT2 a numeric vector  
ARNTL a numeric vector  
ARNTL2 a numeric vector  
ARPC1A a numeric vector  
ARPC1B a numeric vector  
ARPC2 a numeric vector  
ARPC3 a numeric vector  
ARPC4 a numeric vector  
'ARPC4-TTLL3' a numeric vector  
ARPC5 a numeric vector  
ARPC5L a numeric vector  
ARPIN a numeric vector  
'ARPIN-AP3S2' a numeric vector  
ARPP19 a numeric vector  
ARPP21 a numeric vector  
ARR3 a numeric vector  
ARRB1 a numeric vector  
ARRB2 a numeric vector  
ARRDC1 a numeric vector  
ARRDC2 a numeric vector  
ARRDC3 a numeric vector  
ARRDC4 a numeric vector  
ARRDC5 a numeric vector  
ARSA a numeric vector  
ARSB a numeric vector  
ARSD a numeric vector  
ARSF a numeric vector  
ARSG a numeric vector  
ARSH a numeric vector  
ARSI a numeric vector

ARSJ a numeric vector  
ARSK a numeric vector  
ARSL a numeric vector  
ART1 a numeric vector  
ART3 a numeric vector  
ART4 a numeric vector  
ART5 a numeric vector  
ARTN a numeric vector  
ARV1 a numeric vector  
ARVCF a numeric vector  
ARX a numeric vector  
AS3MT a numeric vector  
ASAH1 a numeric vector  
ASAH2 a numeric vector  
ASAH2B a numeric vector  
ASAP1 a numeric vector  
ASAP2 a numeric vector  
ASAP3 a numeric vector  
ASB1 a numeric vector  
ASB10 a numeric vector  
ASB11 a numeric vector  
ASB12 a numeric vector  
ASB13 a numeric vector  
ASB14 a numeric vector  
ASB15 a numeric vector  
ASB16 a numeric vector  
ASB17 a numeric vector  
ASB18 a numeric vector  
ASB2 a numeric vector  
ASB3 a numeric vector  
ASB4 a numeric vector  
ASB5 a numeric vector  
ASB6 a numeric vector  
ASB7 a numeric vector  
ASB8 a numeric vector  
ASB9 a numeric vector  
ASCC1 a numeric vector  
ASCC2 a numeric vector  
ASCC3 a numeric vector  
ASCL1 a numeric vector

ASCL2 a numeric vector  
ASCL3 a numeric vector  
ASCL4 a numeric vector  
ASCL5 a numeric vector  
ASDURF a numeric vector  
ASF1A a numeric vector  
ASF1B a numeric vector  
ASGR1 a numeric vector  
ASGR2 a numeric vector  
ASH1L a numeric vector  
ASH2L a numeric vector  
ASIC1 a numeric vector  
ASIC2 a numeric vector  
ASIC3 a numeric vector  
ASIC4 a numeric vector  
ASIC5 a numeric vector  
ASIP a numeric vector  
ASL a numeric vector  
ASMT a numeric vector  
ASMTL a numeric vector  
ASNS a numeric vector  
ASNSD1 a numeric vector  
ASPA a numeric vector  
ASPDH a numeric vector  
ASPG a numeric vector  
ASPH a numeric vector  
ASPHD1 a numeric vector  
ASPHD2 a numeric vector  
ASPM a numeric vector  
ASPN a numeric vector  
ASPRV1 a numeric vector  
ASPSCR1 a numeric vector  
ASRGL1 a numeric vector  
ASS1 a numeric vector  
ASTE1 a numeric vector  
ASTL a numeric vector  
ASTN1 a numeric vector  
ASTN2 a numeric vector  
ASXL1 a numeric vector  
ASXL2 a numeric vector

ASXL3 a numeric vector  
ASZ1 a numeric vector  
ATAD1 a numeric vector  
ATAD2 a numeric vector  
ATAD2B a numeric vector  
ATAD3A a numeric vector  
ATAD3B a numeric vector  
ATAD3C a numeric vector  
ATAD5 a numeric vector  
ATAT1 a numeric vector  
ATCAY a numeric vector  
ATE1 a numeric vector  
ATF1 a numeric vector  
ATF2 a numeric vector  
ATF3 a numeric vector  
ATF4 a numeric vector  
ATF5 a numeric vector  
ATF6 a numeric vector  
ATF6B a numeric vector  
ATF7 a numeric vector  
'ATF7-NPFF' a numeric vector  
ATF7IP a numeric vector  
ATF7IP2 a numeric vector  
ATG10 a numeric vector  
ATG101 a numeric vector  
ATG12 a numeric vector  
ATG13 a numeric vector  
ATG14 a numeric vector  
ATG16L1 a numeric vector  
ATG16L2 a numeric vector  
ATG2A a numeric vector  
ATG2B a numeric vector  
ATG3 a numeric vector  
ATG4A a numeric vector  
ATG4B a numeric vector  
ATG4C a numeric vector  
ATG4D a numeric vector  
ATG5 a numeric vector  
ATG7 a numeric vector  
ATG9A a numeric vector

ATG9B a numeric vector  
ATIC a numeric vector  
ATL1 a numeric vector  
ATL2 a numeric vector  
ATL3 a numeric vector  
ATM a numeric vector  
ATMIN a numeric vector  
ATN1 a numeric vector  
ATOH1 a numeric vector  
ATOH7 a numeric vector  
ATOH8 a numeric vector  
ATOX1 a numeric vector  
ATP10A a numeric vector  
ATP10B a numeric vector  
ATP10D a numeric vector  
ATP11A a numeric vector  
ATP11B a numeric vector  
ATP11C a numeric vector  
ATP12A a numeric vector  
ATP13A1 a numeric vector  
ATP13A2 a numeric vector  
ATP13A3 a numeric vector  
ATP13A4 a numeric vector  
ATP13A5 a numeric vector  
ATP1A1 a numeric vector  
ATP1A2 a numeric vector  
ATP1A3 a numeric vector  
ATP1A4 a numeric vector  
ATP1B1 a numeric vector  
ATP1B2 a numeric vector  
ATP1B3 a numeric vector  
ATP1B4 a numeric vector  
ATP23 a numeric vector  
ATP2A1 a numeric vector  
ATP2A2 a numeric vector  
ATP2A3 a numeric vector  
ATP2B1 a numeric vector  
ATP2B2 a numeric vector  
ATP2B3 a numeric vector  
ATP2B4 a numeric vector

ATP2C1 a numeric vector  
ATP2C2 a numeric vector  
ATP4A a numeric vector  
ATP4B a numeric vector  
ATP5F1A a numeric vector  
ATP5F1B a numeric vector  
ATP5F1C a numeric vector  
ATP5F1D a numeric vector  
ATP5F1E a numeric vector  
ATP5IF1 a numeric vector  
ATP5MC1 a numeric vector  
ATP5MC2 a numeric vector  
ATP5MC3 a numeric vector  
ATP5MD a numeric vector  
ATP5ME a numeric vector  
ATP5MF a numeric vector  
'ATP5MF-PTCD1' a numeric vector  
ATP5MG a numeric vector  
ATP5MGL a numeric vector  
ATP5MPL a numeric vector  
ATP5PB a numeric vector  
ATP5PD a numeric vector  
ATP5PF a numeric vector  
ATP5P0 a numeric vector  
ATP6AP1 a numeric vector  
ATP6AP1L a numeric vector  
ATP6AP2 a numeric vector  
ATP6V0A1 a numeric vector  
ATP6V0A2 a numeric vector  
ATP6V0A4 a numeric vector  
ATP6V0B a numeric vector  
ATP6V0C a numeric vector  
ATP6V0D1 a numeric vector  
ATP6V0D2 a numeric vector  
ATP6V0E1 a numeric vector  
ATP6V0E2 a numeric vector  
ATP6V1A a numeric vector  
ATP6V1B1 a numeric vector  
ATP6V1B2 a numeric vector  
ATP6V1C1 a numeric vector

ATP6V1C2 a numeric vector  
ATP6V1D a numeric vector  
ATP6V1E1 a numeric vector  
ATP6V1E2 a numeric vector  
ATP6V1F a numeric vector  
ATP6V1FNB a numeric vector  
ATP6V1G1 a numeric vector  
ATP6V1G2 a numeric vector  
'ATP6V1G2-DDX39B' a numeric vector  
ATP6V1G3 a numeric vector  
ATP6V1H a numeric vector  
ATP7A a numeric vector  
ATP7B a numeric vector  
ATP8A1 a numeric vector  
ATP8A2 a numeric vector  
ATP8B1 a numeric vector  
ATP8B2 a numeric vector  
ATP8B3 a numeric vector  
ATP8B4 a numeric vector  
ATP9A a numeric vector  
ATP9B a numeric vector  
ATPAF1 a numeric vector  
ATPAF2 a numeric vector  
ATPCKMT a numeric vector  
ATR a numeric vector  
ATRAID a numeric vector  
ATRIP a numeric vector  
ATRN a numeric vector  
ATRN1 a numeric vector  
ATRX a numeric vector  
ATXN1 a numeric vector  
ATXN10 a numeric vector  
ATXN1L a numeric vector  
ATXN2 a numeric vector  
ATXN2L a numeric vector  
ATXN3 a numeric vector  
ATXN3L a numeric vector  
ATXN7 a numeric vector  
ATXN7L1 a numeric vector  
ATXN7L2 a numeric vector

ATXN7L3 a numeric vector  
ATXN7L3B a numeric vector  
AUH a numeric vector  
AUNIP a numeric vector  
AUP1 a numeric vector  
AURKA a numeric vector  
AURKAIP1 a numeric vector  
AURKB a numeric vector  
AURKC a numeric vector  
AUTS2 a numeric vector  
AVEN a numeric vector  
AVIL a numeric vector  
AVL9 a numeric vector  
AVP a numeric vector  
AVPI1 a numeric vector  
AVPR1A a numeric vector  
AVPR1B a numeric vector  
AVPR2 a numeric vector  
AWAT1 a numeric vector  
AWAT2 a numeric vector  
AXDND1 a numeric vector  
AXIN1 a numeric vector  
AXIN2 a numeric vector  
AXL a numeric vector  
AZGP1 a numeric vector  
AZI2 a numeric vector  
AZIN1 a numeric vector  
AZIN2 a numeric vector  
AZU1 a numeric vector  
B2M a numeric vector  
B3GALNT1 a numeric vector  
B3GALNT2 a numeric vector  
B3GALT1 a numeric vector  
B3GALT2 a numeric vector  
B3GALT4 a numeric vector  
B3GALT5 a numeric vector  
B3GALT6 a numeric vector  
B3GAT1 a numeric vector  
B3GAT2 a numeric vector  
B3GAT3 a numeric vector

B3GLCT a numeric vector  
B3GNT10 a numeric vector  
B3GNT2 a numeric vector  
B3GNT3 a numeric vector  
B3GNT4 a numeric vector  
B3GNT5 a numeric vector  
B3GNT6 a numeric vector  
B3GNT7 a numeric vector  
B3GNT8 a numeric vector  
B3GNT9 a numeric vector  
B3GNTL1 a numeric vector  
B4GALNT1 a numeric vector  
B4GALNT2 a numeric vector  
B4GALNT3 a numeric vector  
B4GALNT4 a numeric vector  
B4GALT1 a numeric vector  
B4GALT2 a numeric vector  
B4GALT3 a numeric vector  
B4GALT4 a numeric vector  
B4GALT5 a numeric vector  
B4GALT6 a numeric vector  
B4GALT7 a numeric vector  
B4GAT1 a numeric vector  
B9D1 a numeric vector  
B9D2 a numeric vector  
BAALC a numeric vector  
BAAT a numeric vector  
BABAM1 a numeric vector  
BABAM2 a numeric vector  
BACE1 a numeric vector  
BACE2 a numeric vector  
BACH1 a numeric vector  
BACH2 a numeric vector  
BAD a numeric vector  
BAG1 a numeric vector  
BAG2 a numeric vector  
BAG3 a numeric vector  
BAG4 a numeric vector  
BAG5 a numeric vector  
BAG6 a numeric vector

BAHCC1 a numeric vector  
BAHD1 a numeric vector  
BAIAP2 a numeric vector  
BAIAP2L1 a numeric vector  
BAIAP2L2 a numeric vector  
BAIAP3 a numeric vector  
BAK1 a numeric vector  
BAMBI a numeric vector  
BANF1 a numeric vector  
BANF2 a numeric vector  
BANK1 a numeric vector  
BANP a numeric vector  
BAP1 a numeric vector  
BARD1 a numeric vector  
BARHL1 a numeric vector  
BARHL2 a numeric vector  
BARX1 a numeric vector  
BARX2 a numeric vector  
BASP1 a numeric vector  
BATF a numeric vector  
BATF2 a numeric vector  
BATF3 a numeric vector  
BAX a numeric vector  
BAZ1A a numeric vector  
BAZ1B a numeric vector  
BAZ2A a numeric vector

### Details

This is a GBM dataset.

### Value

Returns a data frame and a plot.

### Source

<https://portal.gdc.cancer.gov/>

### References

Das P, Roychowdhury A, Das S, Roychoudhury S, Tripathy S (2020). “sigFeature: Novel Significant Feature Selection Method for Classification of Gene Expression Data Using Support Vector Machine and t Statistic.” *Frontiers in genetics*, 11, 247. doi:10.3389/fgene.2020.00247, <https://www.frontiersin.org/article/>

### Examples

```
data(Example_TCGA_LGG_FPKM_data)
## maybe str(Example_TCGA_LGG_FPKM_data) ; plot(Example_TCGA_LGG_FPKM_data)
```

---

```
feature_list_for_Nomogram  
feature list for Nomogram
```

---

**Description**

This is feature list for Nomogram.

**Usage**

```
data("feature_list_for_Nomogram")
```

**Format**

A data frame with 6 observations on the following variable.

ID a character vector

**Details**

This is feature list for Nomogram.

**Value**

Returns a plot.

**Source**

<https://portal.gdc.cancer.gov/>

**Examples**

```
data(feature_list_for_Nomogram)  
## maybe str(feature_list_for_Nomogram)  
## plot(feature_list_for_Nomogram)
```

---

```
Key_Clin_features_with_PI_list  
Key Clin features with PI list
```

---

**Description**

This is Key Clin features with PI list.

**Usage**

```
data("Key_Clin_features_with_PI_list")
```

**Format**

A data frame with 9 observations on the following variable.

ID a character vector

**Details**

This is Key Clin features with PI list.

**Value**

Returns a feature list.

**Source**

<https://portal.gdc.cancer.gov/>

**Examples**

```
data(Key_Clin_features_with_PI_list)
## maybe str(Key_Clin_features_with_PI_list)
```

---

Key\_Clin\_feature\_list *Key Clin feature list*

---

**Description**

This is Key Clin feature list.

**Usage**

```
data("Key_Clin_feature_list")
```

**Format**

A data frame with 8 observations on the following variable.

ID a character vector

**Details**

This is Key Clin feature list.

**Value**

Returns a feature list.

**Source**

<https://portal.gdc.cancer.gov/>

**Examples**

```
data(Key_Clin_feature_list)
## maybe str(Key_Clin_feature_list)
```

---

Key\_PI\_list

*Key PI list*

---

**Description**

This is Key PI list.

**Usage**

```
data("Key_PI_list")
```

**Format**

A data frame with 1 observations on the following variable.

ID a character vector

**Details**

This is Key PI list.

**Value**

Returns a feature list.

**Source**

<https://portal.gdc.cancer.gov/>

**Examples**

```
data(Key_PI_list)
## maybe str(Key_PI_list)
```

Key\_univariate\_features\_list  
*Key univariate features list*

---

**Description**

This is Key univariate features list.

**Usage**

```
data("Key_univariate_features_list")
```

**Format**

A data frame with 2391 observations on the following variable.

ID a character vector

**Details**

This is Key univariate features list.

**Value**

Returns a feature list.

**Source**

<https://portal.gdc.cancer.gov/>

**Examples**

```
data(Key_univariate_features_list)
## maybe str(Key_univariate_features_list)
```

---

Key\_univariate\_features\_with\_Clin\_list  
*Key univariate features with Clin list*

---

**Description**

This is Key univariate features with Clin list.

**Usage**

```
data("Key_univariate_features_with_Clin_list")
```

**Format**

A data frame with 2399 observations on the following variable.

ID a character vector

**Details**

This is Key univariate features with Clin list.

**Value**

Returns a feature list.

**Source**

<https://portal.gdc.cancer.gov/>

**Examples**

```
data(Key_univariate_features_with_Clin_list)
## maybe str(Key_univariate_features_with_Clin_list)
```

---

km_overlay_plot_f	<i>Overlay Kaplan-Meier Plot Function</i>
-------------------	---

---

**Description**

This function generates an overlaid Kaplan-Meier (KM) survival plot to visualize the survival curves of training data stratified by predicted risk groups (e.g., High Risk vs Low Risk), along with the survival curve of a selected test sample. It helps to visually assess how the test sample's predicted survival aligns with the survival profiles of the training groups.

**Arguments**

- |               |  |
|---------------|--|
| Train_results | <p>A data frame containing the training samples' survival prediction results (obtained from RF risk prediction model). The following columns are required:</p> <ul style="list-style-type: none"> <li>• Sample_ID: Unique identifier for the sample.</li> <li>• Actual: Actual TCGA ID (often the same as Sample_ID).</li> <li>• Predicted_Risk_Group: Predicted class label (e.g., High_Risk / Low_Risk).</li> <li>• High_Risk_Prob: Probability of being classified as High Risk.</li> <li>• Low_Risk_Prob: Probability of being classified as Low Risk.</li> <li>• Prediction_Prob: Maximum class probability (confidence in the prediction).</li> <li>• OS_month: Overall survival time in months.</li> <li>• OS_event: Event indicator (1 = death, 0 = censored). The data frame should have no duplicate Sample_IDs, and the OS_month column should be numeric while OS_event should be an integer.</li> </ul> |
| Test_results  | <p>A data frame containing the test samples' survival prediction results (obtained from RF risk prediction model). The structure is similar to Train_results, with the following columns:</p> <ul style="list-style-type: none"> <li>• Sample_ID: Unique identifier for the sample.</li> <li>• Actual: Actual TCGA ID (often the same as Sample_ID).</li> <li>• Predicted_Risk_Group: Predicted class label (e.g., High_Risk / Low_Risk).</li> <li>• High_Risk_Prob: Probability of being classified as High Risk.</li> <li>• Low_Risk_Prob: Probability of being classified as Low Risk.</li> </ul>   |

- Prediction\_Prob: Maximum class probability (confidence in the prediction).
- OS\_month: Overall survival time in months.
- OS\_event: Event indicator (1 = death, 0 = censored). The data frame should have no duplicate Sample\_IDs, and the OS\_month column should be numeric while OS\_event should be an integer. The Sample\_ID of the selected\_sample must be present in this data frame.

survcurve\_te\_data

A data frame containing survival probability curves for test samples. It should include:

- time\_point: Time points for survival estimates.
- <Sample\_ID columns>: Survival probabilities for each sample at each time point.

selected\_sample

The Sample\_ID of the selected test sample for which the user wants to plot the overlaid Kaplan-Meier plot. The Sample\_ID should be present in the Test\_results data frame.

font\_size

Numeric. Base font size for the plot text (axis labels, legend, and title). Default is 12.

train\_palette

Character vector of colors for training group curves (e.g., c("red", "blue")). Default is c("red", "blue").

test\_line\_col

Character. Color of the overlaid test sample curve. Default is "darkgreen".

test\_line\_type

Character. Line type of the overlaid test sample curve (e.g., "dashed", "solid"). Default is "dashed".

## Value

A ggplot object (from ggsurvplot) showing:

- Kaplan-Meier survival curves for the training dataset, stratified by predicted risk group.
- An overlaid survival curve for the selected test sample (in a dashed green line).
- Annotations displaying the test sample's predicted risk group and prediction probability.

## Examples

```
# Example usage of the km_overlay_plot_f function

# Example Train_results data frame
# Load example data included in the package
data(Train_results, package = "CPSM")
data(Test_results, package = "CPSM")
data(survCurves_data, package = "CPSM")

# Generate Kaplan-Meier plot with overlay
KM_plot_results <- km_overlay_plot_f(
  Train_results = Train_results,
  Test_results = Test_results,
  survcurve_te_data = survCurves_data,
  selected_sample = "TCGA-TQ-A7RQ-04",
  font_size = 14,
  train_palette = c("purple", "orange"),
  test_curve_col = "black",
```

```

    test_curve_lty = "solid"
  )

```

---

Lasso\_PI\_scores\_f      *Lasso-Based Prognostic Index Calculation*

---

## Description

Lasso-Based Prognostic Index Calculation

## Usage

```

Lasso_PI_scores_f(
  train_data,
  test_data,
  nfolds,
  col_num,
  surv_time,
  surv_event
)

```

## Arguments

train_data	A data frame containing the training data, including survival time, event status, and features.
test_data	A data frame containing the test data, including survival time, event status, and features.
nfolds	An integer specifying the number of cross-validation folds for LASSO.
col_num	An integer indicating the starting column index for the feature variables.
surv_time	A character string specifying the column name for survival time in the data.
surv_event	A character string specifying the column name for survival event status in the data.

## Details

The function first checks the validity of input data. It renames the survival time and event columns in the training and test datasets, then fits a Cox proportional hazards model using Lasso regularization via cross-validation. Based on the Lasso model, the function calculates the prognostic index (PI) for both the training and test datasets, appending the PI values to the original data frames.

## Value

A list with the following components:

- `Train_Lasso_key_variables`: A data frame of selected key variables and their coefficients.
- `Train_PI_data`: A data frame with training data, including survival time, event status, and PI.
- `Test_PI_data`: A data frame with test data, including survival time, event status, and PI.
- `cvfit`: A `cv.glmnet` object representing the fitted LASSO Cox model.

**Examples**

```
data(Train_Norm_data, package = "CPSM")
data(Test_Norm_data, package = "CPSM")
Result_PI <- Lasso_PI_scores_f(
  train_data = Train_Norm_data,
  test_data = Test_Norm_data,
  nfolds = 5,
  col_num = 21,
  surv_time = "OS_month",
  surv_event = "OS")
```

---

```
mean_median_survival_time_data
  mean median survival time data
```

---

**Description**

This is mean median survival time data.

**Usage**

```
data("mean_median_survival_time_data")
```

**Format**

A data frame with 18 observations on the following 3 variables.

IDs a character vector

Mean a numeric vector

Median a numeric vector

**Details**

This is mean median survival time data.

**Value**

Data which is used for plot.

**Source**

<https://portal.gdc.cancer.gov/>

**Examples**

```
data(mean_median_survival_time_data)
# maybe str(mean_median_survival_time_data)
# plot(mean_median_survival_time_data)
```

---

`mean_median_surv_barplot_f`*Mean and Median Survival Bar Plot*

---

## Description

This function generate barplots for mean and median survival of patients. Besides, user can also highlight one specific sample by providing sample IDs

## Arguments

`surv_mean_med_data`  
:args1 - Predicted Mean median survival time data for patients

`selected_sample`  
:args2 - ID of the sample for which user want to highlight in the plot.

`font_size`      Numeric: Font size for axis text and labels (default = 8)

`font_color`      Character: Font color for text/labels (default = "black")

`bar_colors`      Named vector: Custom bar colors for highlighted and other patients. Defaults to:  
`c("TRUE.Mean" = "red", "TRUE.Median" = "blue", "FALSE.Mean" = "lightgray", "FALSE.Median" = "darkgray")`

## Value

A list containing two ggplot objects:

- `mean_med_all_pat`: Bar plot of mean and median survival times for all patients.
- `highlighted_selected_pat`: Bar plot highlighting the selected patient's mean and median survival times with distinct colors.

## Examples

```
data(mean_median_survival_time_data, package = "CPSM")
mean_median_surv_barplot_f(
  surv_mean_med_data =
    mean_median_survival_time_data,
  selected_sample = "TCGA-TQ-A8XE-01",
  font_size = 10,
  font_color = "darkblue",
  bar_colors = c("TRUE.Mean" = "green", "TRUE.Median" = "purple",
                 "FALSE.Mean" = "lightblue", "FALSE.Median" = "gray70")
)
```

---

MTLR\_pred\_model\_f      *MTLR Prediction Model Function*

---

### Description

This function builds a Multi-Task Logistic Regression (MTLR) survival model based on clinical or selected feature or their combinations. It can handle various model types based on user input (e.g., Clinical features only, Clinical features with PI score, selected genes set).

### Usage

```
MTLR_pred_model_f(
  train_clin_data,
  test_clin_data,
  Model_type,
  train_features_data,
  test_features_data,
  Clin_Feature_List,
  surv_time,
  surv_event,
  nfold = 5
)
```

### Arguments

**train\_clin\_data**      A data frame containing the clinical data for the training set.

**test\_clin\_data**      A data frame containing the clinical data for the test set.

**Model\_type**      An integer indicating the model type:

- 1: Clinical features model
- 2: PI score model
- 3: PI score with Clinical features model
- 4: selected gene set or clinical with selected gene set based model

**train\_features\_data**      A data frame containing the feature data for the training set.

**test\_features\_data**      A data frame containing the feature data for the test set.

**Clin\_Feature\_List**      A list of clinical features to be used in the model.

**surv\_time**      A string specifying the name of the survival time column.

**surv\_event**      A string specifying the name of the survival event column.

**nfold**      An integer specifying the number of folds for cross-validation. Default is 5.

### Value

A list containing the following components:

**Model**      The fitted MTLR model.

**Error\_matrix** A matrix of error evaluation metrics ( C-index and MAE) for training and test sets.

**Survival\_predictions** Predicted survival probabilities, mean survival times, and median survival times.

**Model\_type** The model type selected by the user.

### Examples

```
# Example usage of the MTLR_pred_model_f function
data(Train_Clin, package = "CPSM")
data(Test_Clin, package = "CPSM")
data(Key_Clin_feature_list, package = "CPSM")
result <- MTLR_pred_model_f(
  train_clin_data = Train_Clin,
  test_clin_data = Test_Clin,
  Model_type = 1,
  train_features_data = Train_Clin,
  test_features_data = Test_Clin,
  Clin_Feature_List = Key_Clin_feature_list,
  surv_time = "OS_month",
  surv_event = "OS",
  nfolds = 5
)
```

---

New\_data

*New data*

---

### Description

This is New data.

### Usage

```
data("New_data")
```

### Format

A data frame with 176 observations on the following 2025 variables.

Age a numeric vector

subtype a character vector

gender a character vector

race a character vector

ajcc\_pathologic\_tumor\_stage a logical vector

histological\_type a character vector

histological\_grade a character vector

treatment\_outcome\_first\_course a character vector

radiation\_treatment\_adjuvant a character vector

sample\_type a character vector  
type a character vector  
OS a numeric vector  
OS.time a numeric vector  
DSS a numeric vector  
DSS.time a numeric vector  
DFI a numeric vector  
DFI.time a numeric vector  
PFI a numeric vector  
PFI.time a numeric vector  
OS\_month a numeric vector  
A1BG a numeric vector  
A1CF a numeric vector  
A2M a numeric vector  
A2ML1 a numeric vector  
A3GALT2 a numeric vector  
A4GALT a numeric vector  
A4GNT a numeric vector  
AAAS a numeric vector  
AACS a numeric vector  
AADAC a numeric vector  
AADACL2 a numeric vector  
AADACL3 a numeric vector  
AADACL4 a numeric vector  
AADAT a numeric vector  
AAGAB a numeric vector  
AAK1 a numeric vector  
AAMDC a numeric vector  
AAMP a numeric vector  
AANAT a numeric vector  
AAR2 a numeric vector  
AARD a numeric vector  
AARS1 a numeric vector  
AARS2 a numeric vector  
AARSD1 a numeric vector  
AASDH a numeric vector  
AASDHPPT a numeric vector  
AASS a numeric vector  
AATF a numeric vector  
AATK a numeric vector

ABAT a numeric vector  
ABCA1 a numeric vector  
ABCA10 a numeric vector  
ABCA12 a numeric vector  
ABCA13 a numeric vector  
ABCA2 a numeric vector  
ABCA3 a numeric vector  
ABCA4 a numeric vector  
ABCA5 a numeric vector  
ABCA6 a numeric vector  
ABCA7 a numeric vector  
ABCA8 a numeric vector  
ABCA9 a numeric vector  
ABCB1 a numeric vector  
ABCB10 a numeric vector  
ABCB11 a numeric vector  
ABCB4 a numeric vector  
ABCB5 a numeric vector  
ABCB6 a numeric vector  
ABCB7 a numeric vector  
ABCB8 a numeric vector  
ABCB9 a numeric vector  
ABCC1 a numeric vector  
ABCC10 a numeric vector  
ABCC11 a numeric vector  
ABCC12 a numeric vector  
ABCC2 a numeric vector  
ABCC3 a numeric vector  
ABCC4 a numeric vector  
ABCC5 a numeric vector  
ABCC6 a numeric vector  
ABCC8 a numeric vector  
ABCC9 a numeric vector  
ABCD1 a numeric vector  
ABCD2 a numeric vector  
ABCD3 a numeric vector  
ABCD4 a numeric vector  
ABCE1 a numeric vector  
ABCF1 a numeric vector  
ABCF2 a numeric vector

ABCF2.H2BE1 a numeric vector  
ABCF3 a numeric vector  
ABCG1 a numeric vector  
ABCG2 a numeric vector  
ABCG4 a numeric vector  
ABCG5 a numeric vector  
ABCG8 a numeric vector  
ABHD1 a numeric vector  
ABHD10 a numeric vector  
ABHD11 a numeric vector  
ABHD12 a numeric vector  
ABHD12B a numeric vector  
ABHD13 a numeric vector  
ABHD14A a numeric vector  
ABHD14A.ACY1 a numeric vector  
ABHD14B a numeric vector  
ABHD15 a numeric vector  
ABHD16A a numeric vector  
ABHD16B a numeric vector  
ABHD17A a numeric vector  
ABHD17B a numeric vector  
ABHD17C a numeric vector  
ABHD18 a numeric vector  
ABHD2 a numeric vector  
ABHD3 a numeric vector  
ABHD4 a numeric vector  
ABHD5 a numeric vector  
ABHD6 a numeric vector  
ABHD8 a numeric vector  
ABI1 a numeric vector  
ABI2 a numeric vector  
ABI3 a numeric vector  
ABI3BP a numeric vector  
ABITRAM a numeric vector  
ABL1 a numeric vector  
ABL2 a numeric vector  
ABLIM1 a numeric vector  
ABLIM2 a numeric vector  
ABLIM3 a numeric vector  
ABO a numeric vector

ABR a numeric vector  
ABRA a numeric vector  
ABRACL a numeric vector  
ABRAXAS1 a numeric vector  
ABRAXAS2 a numeric vector  
ABT1 a numeric vector  
ABTB1 a numeric vector  
ABTB2 a numeric vector  
AC000093.1 a numeric vector  
AC000120.2 a numeric vector  
AC000120.3 a numeric vector  
AC001226.2 a numeric vector  
AC002094.3 a numeric vector  
AC002310.4 a numeric vector  
AC002456.2 a numeric vector  
AC002985.1 a numeric vector  
AC002996.1 a numeric vector  
AC003002.1 a numeric vector  
AC003002.2 a numeric vector  
AC003002.3 a numeric vector  
AC003005.1 a numeric vector  
AC003006.1 a numeric vector  
AC003688.1 a numeric vector  
AC004076.1 a numeric vector  
AC004080.3 a numeric vector  
AC004223.3 a numeric vector  
AC004233.4 a numeric vector  
AC004593.2 a numeric vector  
AC004687.2 a numeric vector  
AC004691.2 a numeric vector  
AC004706.3 a numeric vector  
AC004805.1 a numeric vector  
AC004832.3 a numeric vector  
AC004922.1 a numeric vector  
AC004997.1 a numeric vector  
AC005020.2 a numeric vector  
AC005041.1 a numeric vector  
AC005154.5 a numeric vector  
AC005192.1 a numeric vector  
AC005258.1 a numeric vector

AC005324.2 a numeric vector  
AC005324.3 a numeric vector  
AC005520.1 a numeric vector  
AC005551.1 a numeric vector  
AC005670.2 a numeric vector  
AC005697.1 a numeric vector  
AC005702.1 a numeric vector  
AC005726.1 a numeric vector  
AC005832.4 a numeric vector  
AC005833.1 a numeric vector  
AC005837.2 a numeric vector  
AC005943.1 a numeric vector  
AC006030.1 a numeric vector  
AC006059.2 a numeric vector  
AC006064.6 a numeric vector  
AC006254.1 a numeric vector  
AC006486.1 a numeric vector  
AC006486.3 a numeric vector  
AC006538.2 a numeric vector  
AC006978.2 a numeric vector  
AC007040.2 a numeric vector  
AC007192.1 a numeric vector  
AC007326.4 a numeric vector  
AC007375.2 a numeric vector  
AC007731.4 a numeric vector  
AC007846.2 a numeric vector  
AC007906.2 a numeric vector  
AC007998.2 a numeric vector  
AC008012.1 a numeric vector  
AC008073.3 a numeric vector  
AC008162.2 a numeric vector  
AC008397.1 a numeric vector  
AC008397.2 a numeric vector  
AC008403.1 a numeric vector  
AC008481.3 a numeric vector  
AC008537.1 a numeric vector  
AC008575.1 a numeric vector  
AC008581.2 a numeric vector  
AC008676.3 a numeric vector  
AC008687.1 a numeric vector

AC008687.4 a numeric vector  
AC008687.8 a numeric vector  
AC008695.1 a numeric vector  
AC008750.7 a numeric vector  
AC008758.1 a numeric vector  
AC008758.5 a numeric vector  
AC008758.6 a numeric vector  
AC008763.2 a numeric vector  
AC008763.3 a numeric vector  
AC008763.4 a numeric vector  
AC008764.1 a numeric vector  
AC008764.4 a numeric vector  
AC008770.1 a numeric vector  
AC008770.2 a numeric vector  
AC008770.4 a numeric vector  
AC008878.1 a numeric vector  
AC008878.2 a numeric vector  
AC008878.3 a numeric vector  
AC008982.1 a numeric vector  
AC009070.1 a numeric vector  
AC009133.6 a numeric vector  
AC009163.3 a numeric vector  
AC009163.5 a numeric vector  
AC009412.1 a numeric vector  
AC009690.1 a numeric vector  
AC009690.3 a numeric vector  
AC009779.3 a numeric vector  
AC009879.2 a numeric vector  
AC009879.3 a numeric vector  
AC010132.3 a numeric vector  
AC010197.2 a numeric vector  
AC010255.2 a numeric vector  
AC010319.2 a numeric vector  
AC010323.1 a numeric vector  
AC010325.1 a numeric vector  
AC010326.2 a numeric vector  
AC010327.2 a numeric vector  
AC010422.3 a numeric vector  
AC010422.5 a numeric vector  
AC010422.6 a numeric vector

AC010422.8 a numeric vector  
AC010463.1 a numeric vector  
AC010522.1 a numeric vector  
AC010531.1 a numeric vector  
AC010542.3 a numeric vector  
AC010547.4 a numeric vector  
AC010615.4 a numeric vector  
AC010616.1 a numeric vector  
AC010619.1 a numeric vector  
AC010646.1 a numeric vector  
AC010973.3 a numeric vector  
AC010980.1 a numeric vector  
AC011005.1 a numeric vector  
AC011330.3 a numeric vector  
AC011448.1 a numeric vector  
AC011452.1 a numeric vector  
AC011455.2 a numeric vector  
AC011462.1 a numeric vector  
AC011473.4 a numeric vector  
AC011479.1 a numeric vector  
AC011498.4 a numeric vector  
AC011499.1 a numeric vector  
AC011511.1 a numeric vector  
AC011511.4 a numeric vector  
AC011530.1 a numeric vector  
AC012184.2 a numeric vector  
AC012213.5 a numeric vector  
AC012254.2 a numeric vector  
AC012309.1 a numeric vector  
AC012488.2 a numeric vector  
AC012531.3 a numeric vector  
AC012651.1 a numeric vector  
AC013271.1 a numeric vector  
AC013394.1 a numeric vector  
AC013470.2 a numeric vector  
AC013477.1 a numeric vector  
AC013489.1 a numeric vector  
AC013717.1 a numeric vector  
AC015688.4 a numeric vector  
AC015802.6 a numeric vector

AC015813.2 a numeric vector  
AC017083.3 a numeric vector  
AC018362.3 a numeric vector  
AC018512.1 a numeric vector  
AC018523.2 a numeric vector  
AC018630.4 a numeric vector  
AC018709.1 a numeric vector  
AC018755.2 a numeric vector  
AC018809.3 a numeric vector  
AC019117.3 a numeric vector  
AC019257.8 a numeric vector  
AC020636.2 a numeric vector  
AC020765.6 a numeric vector  
AC020907.6 a numeric vector  
AC020909.1 a numeric vector  
AC020915.4 a numeric vector  
AC020922.1 a numeric vector  
AC021072.1 a numeric vector  
AC021087.5 a numeric vector  
AC021660.3 a numeric vector  
AC022335.1 a numeric vector  
AC022384.1 a numeric vector  
AC022400.5 a numeric vector  
AC022414.1 a numeric vector  
AC022415.2 a numeric vector  
AC022506.1 a numeric vector  
AC022826.2 a numeric vector  
AC023055.1 a numeric vector  
AC024592.3 a numeric vector  
AC024598.1 a numeric vector  
AC025165.3 a numeric vector  
AC025165.6 a numeric vector  
AC025263.2 a numeric vector  
AC025283.2 a numeric vector  
AC025287.4 a numeric vector  
AC026316.4 a numeric vector  
AC026464.1 a numeric vector  
AC026464.3 a numeric vector  
AC026464.4 a numeric vector  
AC026464.6 a numeric vector

AC026786.1 a numeric vector  
AC026954.2 a numeric vector  
AC027644.4 a numeric vector  
AC027796.3 a numeric vector  
AC034102.2 a numeric vector  
AC034228.3 a numeric vector  
AC036214.3 a numeric vector  
AC037459.1 a numeric vector  
AC040162.1 a numeric vector  
AC046185.1 a numeric vector  
AC048338.1 a numeric vector  
AC048338.2 a numeric vector  
AC053503.6 a numeric vector  
AC055811.2 a numeric vector  
AC055839.2 a numeric vector  
AC058822.1 a numeric vector  
AC063943.2 a numeric vector  
AC067968.1 a numeric vector  
AC068234.1 a numeric vector  
AC068533.4 a numeric vector  
AC068547.1 a numeric vector  
AC068580.4 a numeric vector  
AC068631.2 a numeric vector  
AC068775.1 a numeric vector  
AC068831.6 a numeric vector  
AC068870.4 a numeric vector  
AC068896.1 a numeric vector  
AC068946.1 a numeric vector  
AC068946.2 a numeric vector  
AC069257.3 a numeric vector  
AC069288.1 a numeric vector  
AC069368.1 a numeric vector  
AC069444.2 a numeric vector  
AC069503.2 a numeric vector  
AC069544.2 a numeric vector  
AC072022.2 a numeric vector  
AC073082.1 a numeric vector  
AC073111.3 a numeric vector  
AC073283.3 a numeric vector  
AC073508.2 a numeric vector

AC073585.1 a numeric vector  
AC073610.2 a numeric vector  
AC073612.1 a numeric vector  
AC073896.1 a numeric vector  
AC074143.1 a numeric vector  
AC078815.1 a numeric vector  
AC078927.1 a numeric vector  
AC079447.1 a numeric vector  
AC079594.1 a numeric vector  
AC079741.2 a numeric vector  
AC083800.1 a numeric vector  
AC083977.1 a numeric vector  
AC084337.2 a numeric vector  
AC084756.2 a numeric vector  
AC087289.3 a numeric vector  
AC087632.2 a numeric vector  
AC087721.2 a numeric vector  
AC090004.1 a numeric vector  
AC090227.2 a numeric vector  
AC090360.1 a numeric vector  
AC090517.4 a numeric vector  
AC090527.2 a numeric vector  
AC091057.5 a numeric vector  
AC091167.2 a numeric vector  
AC091167.6 a numeric vector  
AC091167.7 a numeric vector  
AC091551.1 a numeric vector  
AC091959.1 a numeric vector  
AC092017.2 a numeric vector  
AC092042.3 a numeric vector  
AC092073.1 a numeric vector  
AC092111.3 a numeric vector  
AC092143.1 a numeric vector  
AC092329.3 a numeric vector  
AC092442.1 a numeric vector  
AC092587.1 a numeric vector  
AC092647.5 a numeric vector  
AC092718.3 a numeric vector  
AC092718.8 a numeric vector  
AC092835.1 a numeric vector

AC093155.3 a numeric vector  
AC093227.2 a numeric vector  
AC093246.1 a numeric vector  
AC093323.1 a numeric vector  
AC093423.3 a numeric vector  
AC093512.2 a numeric vector  
AC093525.1 a numeric vector  
AC093525.2 a numeric vector  
AC093668.1 a numeric vector  
AC093827.5 a numeric vector  
AC093884.1 a numeric vector  
AC093899.2 a numeric vector  
AC096887.1 a numeric vector  
AC097104.1 a numeric vector  
AC097625.1 a numeric vector  
AC097634.4 a numeric vector  
AC097636.1 a numeric vector  
AC097637.1 a numeric vector  
AC098484.3 a numeric vector  
AC098582.1 a numeric vector  
AC098588.2 a numeric vector  
AC098650.1 a numeric vector  
AC098850.3 a numeric vector  
AC099489.1 a numeric vector  
AC099569.1 a numeric vector  
AC099811.2 a numeric vector  
AC099850.2 a numeric vector  
AC100868.1 a numeric vector  
AC104109.3 a numeric vector  
AC104304.2 a numeric vector  
AC104389.5 a numeric vector  
AC104389.6 a numeric vector  
AC104452.1 a numeric vector  
AC104472.3 a numeric vector  
AC104532.1 a numeric vector  
AC104581.2 a numeric vector  
AC105001.2 a numeric vector  
AC105052.1 a numeric vector  
AC105052.3 a numeric vector  
AC106741.1 a numeric vector

AC106873.8 a numeric vector  
AC106886.5 a numeric vector  
AC107871.1 a numeric vector  
AC107959.5 a numeric vector  
AC108488.2 a numeric vector  
AC108941.3 a numeric vector  
AC109583.1 a numeric vector  
AC110275.1 a numeric vector  
AC112128.1 a numeric vector  
AC112229.3 a numeric vector  
AC112504.2 a numeric vector  
AC113189.12 a numeric vector  
AC113348.1 a numeric vector  
AC113348.2 a numeric vector  
AC113554.1 a numeric vector  
AC114402.2 a numeric vector  
AC114490.2 a numeric vector  
AC114490.3 a numeric vector  
AC114982.2 a numeric vector  
AC116366.2 a numeric vector  
AC117378.1 a numeric vector  
AC117457.1 a numeric vector  
AC118470.1 a numeric vector  
AC118553.2 a numeric vector  
AC119396.1 a numeric vector  
AC119674.2 a numeric vector  
AC119676.1 a numeric vector  
AC119733.1 a numeric vector  
AC120057.2 a numeric vector  
AC120114.4 a numeric vector  
AC124312.1 a numeric vector  
AC126283.2 a numeric vector  
AC127029.3 a numeric vector  
AC129492.3 a numeric vector  
AC131160.1 a numeric vector  
AC132217.2 a numeric vector  
AC134669.1 a numeric vector  
AC134980.2 a numeric vector  
AC135050.2 a numeric vector  
AC135068.1 a numeric vector

AC135068.4 a numeric vector  
AC135178.3 a numeric vector  
AC136428.1 a numeric vector  
AC137834.1 a numeric vector  
AC138647.1 a numeric vector  
AC138696.1 a numeric vector  
AC138811.2 a numeric vector  
AC138894.1 a numeric vector  
AC138969.1 a numeric vector  
AC139491.7 a numeric vector  
AC139530.2 a numeric vector  
AC140504.1 a numeric vector  
AC142391.1 a numeric vector  
AC144573.1 a numeric vector  
AC231656.1 a numeric vector  
AC231657.3 a numeric vector  
AC233723.1 a numeric vector  
AC233992.2 a numeric vector  
AC235565.2 a numeric vector  
AC236972.4 a numeric vector  
AC242628.1 a numeric vector  
AC242842.3 a numeric vector  
AC243547.3 a numeric vector  
AC243967.1 a numeric vector  
AC244197.3 a numeric vector  
AC244517.10 a numeric vector  
AC245033.1 a numeric vector  
AC245748.1 a numeric vector  
AC253536.7 a numeric vector  
ACAA1 a numeric vector  
ACAA2 a numeric vector  
ACACA a numeric vector  
ACACB a numeric vector  
ACAD10 a numeric vector  
ACAD11 a numeric vector  
ACAD8 a numeric vector  
ACAD9 a numeric vector  
ACADL a numeric vector  
ACADM a numeric vector  
ACADS a numeric vector

ACADSB a numeric vector  
ACADVL a numeric vector  
ACAN a numeric vector  
ACAP1 a numeric vector  
ACAP2 a numeric vector  
ACAP3 a numeric vector  
ACAT1 a numeric vector  
ACAT2 a numeric vector  
ACBD3 a numeric vector  
ACBD4 a numeric vector  
ACBD5 a numeric vector  
ACBD6 a numeric vector  
ACBD7 a numeric vector  
ACCS a numeric vector  
ACCSL a numeric vector  
ACD a numeric vector  
ACE a numeric vector  
ACE2 a numeric vector  
ACER1 a numeric vector  
ACER2 a numeric vector  
ACER3 a numeric vector  
ACHE a numeric vector  
ACIN1 a numeric vector  
ACKR1 a numeric vector  
ACKR2 a numeric vector  
ACKR3 a numeric vector  
ACKR4 a numeric vector  
ACLY a numeric vector  
ACMSD a numeric vector  
ACO1 a numeric vector  
ACO2 a numeric vector  
ACOD1 a numeric vector  
ACOT1 a numeric vector  
ACOT11 a numeric vector  
ACOT12 a numeric vector  
ACOT13 a numeric vector  
ACOT2 a numeric vector  
ACOT4 a numeric vector  
ACOT6 a numeric vector  
ACOT7 a numeric vector

ACOT8 a numeric vector  
ACOT9 a numeric vector  
ACOX1 a numeric vector  
ACOX2 a numeric vector  
ACOX3 a numeric vector  
ACOXL a numeric vector  
ACP1 a numeric vector  
ACP2 a numeric vector  
ACP3 a numeric vector  
ACP4 a numeric vector  
ACP5 a numeric vector  
ACP6 a numeric vector  
ACP7 a numeric vector  
ACR a numeric vector  
ACRBP a numeric vector  
ACRV1 a numeric vector  
ACSBG1 a numeric vector  
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APOL3 a numeric vector  
APOL4 a numeric vector  
APOL5 a numeric vector  
APOL6 a numeric vector  
APOLD1 a numeric vector  
APOM a numeric vector  
APOO a numeric vector  
APOOL a numeric vector  
APP a numeric vector  
APPBP2 a numeric vector  
APPL1 a numeric vector  
APPL2 a numeric vector  
APRT a numeric vector  
APTX a numeric vector  
AQP1 a numeric vector  
AQP10 a numeric vector  
AQP11 a numeric vector  
AQP12A a numeric vector  
AQP12B a numeric vector  
AQP2 a numeric vector  
AQP3 a numeric vector  
AQP4 a numeric vector  
AQP5 a numeric vector  
AQP6 a numeric vector  
AQP7 a numeric vector  
AQP8 a numeric vector  
AQP9 a numeric vector  
AQR a numeric vector

AR a numeric vector  
ARAF a numeric vector  
ARAP1 a numeric vector  
ARAP2 a numeric vector  
ARAP3 a numeric vector  
ARC a numeric vector  
ARCN1 a numeric vector  
AREG a numeric vector  
AREL1 a numeric vector  
ARF1 a numeric vector  
ARF3 a numeric vector  
ARF4 a numeric vector  
ARF5 a numeric vector  
ARF6 a numeric vector  
ARFGAP1 a numeric vector  
ARFGAP2 a numeric vector  
ARFGAP3 a numeric vector  
ARFGEF1 a numeric vector  
ARFGEF2 a numeric vector  
ARFGEF3 a numeric vector  
ARFIP1 a numeric vector  
ARFIP2 a numeric vector  
ARFRP1 a numeric vector  
ARG1 a numeric vector  
ARG2 a numeric vector  
ARGFX a numeric vector  
ARGLU1 a numeric vector  
ARHGAP1 a numeric vector  
ARHGAP10 a numeric vector  
ARHGAP11A a numeric vector  
ARHGAP11B a numeric vector  
ARHGAP12 a numeric vector  
ARHGAP15 a numeric vector  
ARHGAP17 a numeric vector  
ARHGAP18 a numeric vector  
ARHGAP19 a numeric vector  
ARHGAP19.SLIT1 a numeric vector  
ARHGAP20 a numeric vector  
ARHGAP21 a numeric vector  
ARHGAP22 a numeric vector

ARHGAP23 a numeric vector  
ARHGAP24 a numeric vector  
ARHGAP25 a numeric vector  
ARHGAP26 a numeric vector  
ARHGAP27 a numeric vector  
ARHGAP28 a numeric vector  
ARHGAP29 a numeric vector  
ARHGAP30 a numeric vector  
ARHGAP31 a numeric vector  
ARHGAP32 a numeric vector  
ARHGAP33 a numeric vector  
ARHGAP35 a numeric vector  
ARHGAP36 a numeric vector  
ARHGAP39 a numeric vector  
ARHGAP4 a numeric vector  
ARHGAP40 a numeric vector  
ARHGAP42 a numeric vector  
ARHGAP44 a numeric vector  
ARHGAP45 a numeric vector  
ARHGAP5 a numeric vector  
ARHGAP6 a numeric vector  
ARHGAP8 a numeric vector  
ARHGAP9 a numeric vector  
ARHGDIA a numeric vector  
ARHGDIB a numeric vector  
ARHGDIG a numeric vector  
ARHGEF1 a numeric vector  
ARHGEF10 a numeric vector  
ARHGEF10L a numeric vector  
ARHGEF11 a numeric vector  
ARHGEF12 a numeric vector  
ARHGEF15 a numeric vector  
ARHGEF16 a numeric vector  
ARHGEF17 a numeric vector  
ARHGEF18 a numeric vector  
ARHGEF19 a numeric vector  
ARHGEF2 a numeric vector  
ARHGEF25 a numeric vector  
ARHGEF26 a numeric vector  
ARHGEF28 a numeric vector

ARHGEF3 a numeric vector  
ARHGEF33 a numeric vector  
ARHGEF35 a numeric vector  
ARHGEF37 a numeric vector  
ARHGEF38 a numeric vector  
ARHGEF39 a numeric vector  
ARHGEF4 a numeric vector  
ARHGEF40 a numeric vector  
ARHGEF5 a numeric vector  
ARHGEF6 a numeric vector  
ARHGEF7 a numeric vector  
ARHGEF9 a numeric vector  
ARID1A a numeric vector  
ARID1B a numeric vector  
ARID2 a numeric vector  
ARID3A a numeric vector  
ARID3B a numeric vector  
ARID3BP1 a numeric vector  
ARID3C a numeric vector  
ARID4A a numeric vector  
ARID4B a numeric vector  
ARID5A a numeric vector  
ARID5B a numeric vector  
ARIH1 a numeric vector  
ARIH2 a numeric vector  
ARL1 a numeric vector  
ARL10 a numeric vector  
ARL11 a numeric vector  
ARL13A a numeric vector  
ARL13B a numeric vector  
ARL14 a numeric vector  
ARL14EP a numeric vector  
ARL14EPL a numeric vector  
ARL15 a numeric vector  
ARL16 a numeric vector  
ARL17A a numeric vector  
ARL17B a numeric vector  
ARL2 a numeric vector  
ARL2.SNX15 a numeric vector  
ARL2BP a numeric vector

ARL3 a numeric vector  
ARL4A a numeric vector  
ARL4C a numeric vector  
ARL4D a numeric vector  
ARL5A a numeric vector  
ARL5B a numeric vector  
ARL5C a numeric vector  
ARL6 a numeric vector  
ARL6IP1 a numeric vector  
ARL6IP4 a numeric vector  
ARL6IP5 a numeric vector  
ARL6IP6 a numeric vector  
ARL8A a numeric vector  
ARL8B a numeric vector  
ARL9 a numeric vector  
ARMC1 a numeric vector  
ARMC10 a numeric vector  
ARMC12 a numeric vector  
ARMC2 a numeric vector  
ARMC3 a numeric vector  
ARMC4 a numeric vector  
ARMC5 a numeric vector  
ARMC6 a numeric vector  
ARMC7 a numeric vector  
ARMC8 a numeric vector  
ARMC9 a numeric vector  
ARMCX1 a numeric vector  
ARMCX2 a numeric vector  
ARMCX3 a numeric vector  
ARMCX4 a numeric vector  
ARMCX5 a numeric vector  
ARMCX5.GPRASP2 a numeric vector  
ARMCX6 a numeric vector  
ARMH1 a numeric vector  
ARMH2 a numeric vector  
ARMH3 a numeric vector  
ARMH4 a numeric vector  
ARMS2 a numeric vector  
ARMT1 a numeric vector  
ARNT a numeric vector

ARNT2 a numeric vector  
ARNTL a numeric vector  
ARNTL2 a numeric vector  
ARPC1A a numeric vector  
ARPC1B a numeric vector  
ARPC2 a numeric vector  
ARPC3 a numeric vector  
ARPC4 a numeric vector  
ARPC4.TTLL3 a numeric vector  
ARPC5 a numeric vector  
ARPC5L a numeric vector  
ARPIN a numeric vector  
ARPIN.AP3S2 a numeric vector  
ARPP19 a numeric vector  
ARPP21 a numeric vector  
ARR3 a numeric vector  
ARRB1 a numeric vector  
ARRB2 a numeric vector  
ARRDC1 a numeric vector  
ARRDC2 a numeric vector  
ARRDC3 a numeric vector  
ARRDC4 a numeric vector  
ARRDC5 a numeric vector  
ARSA a numeric vector  
ARSB a numeric vector  
ARSD a numeric vector  
ARSF a numeric vector  
ARSG a numeric vector  
ARSH a numeric vector  
ARSI a numeric vector  
ARSJ a numeric vector  
ARSK a numeric vector  
ARSL a numeric vector  
ART1 a numeric vector  
ART3 a numeric vector  
ART4 a numeric vector  
ART5 a numeric vector  
ARTN a numeric vector  
ARV1 a numeric vector  
ARVCF a numeric vector

ARX a numeric vector  
AS3MT a numeric vector  
ASAH1 a numeric vector  
ASAH2 a numeric vector  
ASAH2B a numeric vector  
ASAP1 a numeric vector  
ASAP2 a numeric vector  
ASAP3 a numeric vector  
ASB1 a numeric vector  
ASB10 a numeric vector  
ASB11 a numeric vector  
ASB12 a numeric vector  
ASB13 a numeric vector  
ASB14 a numeric vector  
ASB15 a numeric vector  
ASB16 a numeric vector  
ASB17 a numeric vector  
ASB18 a numeric vector  
ASB2 a numeric vector  
ASB3 a numeric vector  
ASB4 a numeric vector  
ASB5 a numeric vector  
ASB6 a numeric vector  
ASB7 a numeric vector  
ASB8 a numeric vector  
ASB9 a numeric vector  
ASCC1 a numeric vector  
ASCC2 a numeric vector  
ASCC3 a numeric vector  
ASCL1 a numeric vector  
ASCL2 a numeric vector  
ASCL3 a numeric vector  
ASCL4 a numeric vector  
ASCL5 a numeric vector  
ASDURF a numeric vector  
ASF1A a numeric vector  
ASF1B a numeric vector  
ASGR1 a numeric vector  
ASGR2 a numeric vector  
ASH1L a numeric vector

ASH2L a numeric vector  
ASIC1 a numeric vector  
ASIC2 a numeric vector  
ASIC3 a numeric vector  
ASIC4 a numeric vector  
ASIC5 a numeric vector  
ASIP a numeric vector  
ASL a numeric vector  
ASMT a numeric vector  
ASMTL a numeric vector  
ASNS a numeric vector  
ASNSD1 a numeric vector  
ASPA a numeric vector  
ASPDH a numeric vector  
ASPG a numeric vector  
ASPH a numeric vector  
ASPHD1 a numeric vector  
ASPHD2 a numeric vector  
ASPM a numeric vector  
ASPN a numeric vector  
ASPRV1 a numeric vector  
ASPSCR1 a numeric vector  
ASRGL1 a numeric vector  
ASS1 a numeric vector  
ASTE1 a numeric vector  
ASTL a numeric vector  
ASTN1 a numeric vector  
ASTN2 a numeric vector  
ASXL1 a numeric vector  
ASXL2 a numeric vector  
ASXL3 a numeric vector  
ASZ1 a numeric vector  
ATAD1 a numeric vector  
ATAD2 a numeric vector  
ATAD2B a numeric vector  
ATAD3A a numeric vector  
ATAD3B a numeric vector  
ATAD3C a numeric vector  
ATAD5 a numeric vector  
ATAT1 a numeric vector

ATCAY a numeric vector  
ATE1 a numeric vector  
ATF1 a numeric vector  
ATF2 a numeric vector  
ATF3 a numeric vector  
ATF4 a numeric vector  
ATF5 a numeric vector  
ATF6 a numeric vector  
ATF6B a numeric vector  
ATF7 a numeric vector  
ATF7.NPFF a numeric vector  
ATF7IP a numeric vector  
ATF7IP2 a numeric vector  
ATG10 a numeric vector  
ATG101 a numeric vector  
ATG12 a numeric vector  
ATG13 a numeric vector  
ATG14 a numeric vector  
ATG16L1 a numeric vector  
ATG16L2 a numeric vector  
ATG2A a numeric vector  
ATG2B a numeric vector  
ATG3 a numeric vector  
ATG4A a numeric vector  
ATG4B a numeric vector  
ATG4C a numeric vector  
ATG4D a numeric vector  
ATG5 a numeric vector  
ATG7 a numeric vector  
ATG9A a numeric vector  
ATG9B a numeric vector  
ATIC a numeric vector  
ATL1 a numeric vector  
ATL2 a numeric vector  
ATL3 a numeric vector  
ATM a numeric vector  
ATMIN a numeric vector  
ATN1 a numeric vector  
ATOH1 a numeric vector  
ATOH7 a numeric vector

ATOH8 a numeric vector  
ATOX1 a numeric vector  
ATP10A a numeric vector  
ATP10B a numeric vector  
ATP10D a numeric vector  
ATP11A a numeric vector  
ATP11B a numeric vector  
ATP11C a numeric vector  
ATP12A a numeric vector  
ATP13A1 a numeric vector  
ATP13A2 a numeric vector  
ATP13A3 a numeric vector  
ATP13A4 a numeric vector  
ATP13A5 a numeric vector  
ATP1A1 a numeric vector  
ATP1A2 a numeric vector  
ATP1A3 a numeric vector  
ATP1A4 a numeric vector  
ATP1B1 a numeric vector  
ATP1B2 a numeric vector  
ATP1B3 a numeric vector  
ATP1B4 a numeric vector  
ATP23 a numeric vector  
ATP2A1 a numeric vector  
ATP2A2 a numeric vector  
ATP2A3 a numeric vector  
ATP2B1 a numeric vector  
ATP2B2 a numeric vector  
ATP2B3 a numeric vector  
ATP2B4 a numeric vector  
ATP2C1 a numeric vector  
ATP2C2 a numeric vector  
ATP4A a numeric vector  
ATP4B a numeric vector  
ATP5F1A a numeric vector  
ATP5F1B a numeric vector  
ATP5F1C a numeric vector  
ATP5F1D a numeric vector  
ATP5F1E a numeric vector  
ATP5IF1 a numeric vector

ATP5MC1 a numeric vector  
ATP5MC2 a numeric vector  
ATP5MC3 a numeric vector  
ATP5MD a numeric vector  
ATP5ME a numeric vector  
ATP5MF a numeric vector  
ATP5MF.PTCD1 a numeric vector  
ATP5MG a numeric vector  
ATP5MGL a numeric vector  
ATP5MPL a numeric vector  
ATP5PB a numeric vector  
ATP5PD a numeric vector  
ATP5PF a numeric vector  
ATP5P0 a numeric vector  
ATP6AP1 a numeric vector  
ATP6AP1L a numeric vector  
ATP6AP2 a numeric vector  
ATP6V0A1 a numeric vector  
ATP6V0A2 a numeric vector  
ATP6V0A4 a numeric vector  
ATP6V0B a numeric vector  
ATP6V0C a numeric vector  
ATP6V0D1 a numeric vector  
ATP6V0D2 a numeric vector  
ATP6V0E1 a numeric vector  
ATP6V0E2 a numeric vector  
ATP6V1A a numeric vector  
ATP6V1B1 a numeric vector  
ATP6V1B2 a numeric vector  
ATP6V1C1 a numeric vector  
ATP6V1C2 a numeric vector  
ATP6V1D a numeric vector  
ATP6V1E1 a numeric vector  
ATP6V1E2 a numeric vector  
ATP6V1F a numeric vector  
ATP6V1FNB a numeric vector  
ATP6V1G1 a numeric vector  
ATP6V1G2 a numeric vector  
ATP6V1G2.DDX39B a numeric vector  
ATP6V1G3 a numeric vector

ATP6V1H a numeric vector  
ATP7A a numeric vector  
ATP7B a numeric vector  
ATP8A1 a numeric vector  
ATP8A2 a numeric vector  
ATP8B1 a numeric vector  
ATP8B2 a numeric vector  
ATP8B3 a numeric vector  
ATP8B4 a numeric vector  
ATP9A a numeric vector  
ATP9B a numeric vector  
ATPAF1 a numeric vector  
ATPAF2 a numeric vector  
ATPSCKMT a numeric vector  
ATR a numeric vector  
ATRAID a numeric vector  
ATRIP a numeric vector  
ATRN a numeric vector  
ATRNL1 a numeric vector  
ATRX a numeric vector  
ATXN1 a numeric vector  
ATXN10 a numeric vector  
ATXN1L a numeric vector  
ATXN2 a numeric vector  
ATXN2L a numeric vector  
ATXN3 a numeric vector  
ATXN3L a numeric vector  
ATXN7 a numeric vector  
ATXN7L1 a numeric vector  
ATXN7L2 a numeric vector  
ATXN7L3 a numeric vector  
ATXN7L3B a numeric vector  
AUH a numeric vector  
AUNIP a numeric vector  
AUP1 a numeric vector  
AURKA a numeric vector  
AURKAIP1 a numeric vector  
AURKB a numeric vector  
AURKC a numeric vector  
AUTS2 a numeric vector

AVEN a numeric vector  
AVIL a numeric vector  
AVL9 a numeric vector  
AVP a numeric vector  
AVPI1 a numeric vector  
AVPR1A a numeric vector  
AVPR1B a numeric vector  
AVPR2 a numeric vector  
AWAT1 a numeric vector  
AWAT2 a numeric vector  
AXDND1 a numeric vector  
AXIN1 a numeric vector  
AXIN2 a numeric vector  
AXL a numeric vector  
AZGP1 a numeric vector  
AZI2 a numeric vector  
AZIN1 a numeric vector  
AZIN2 a numeric vector  
AZU1 a numeric vector  
B2M a numeric vector  
B3GALNT1 a numeric vector  
B3GALNT2 a numeric vector  
B3GALT1 a numeric vector  
B3GALT2 a numeric vector  
B3GALT4 a numeric vector  
B3GALT5 a numeric vector  
B3GALT6 a numeric vector  
B3GAT1 a numeric vector  
B3GAT2 a numeric vector  
B3GAT3 a numeric vector  
B3GLCT a numeric vector  
B3GNT10 a numeric vector  
B3GNT2 a numeric vector  
B3GNT3 a numeric vector  
B3GNT4 a numeric vector  
B3GNT5 a numeric vector  
B3GNT6 a numeric vector  
B3GNT7 a numeric vector  
B3GNT8 a numeric vector  
B3GNT9 a numeric vector

B3GNTL1 a numeric vector  
B4GALNT1 a numeric vector  
B4GALNT2 a numeric vector  
B4GALNT3 a numeric vector  
B4GALNT4 a numeric vector  
B4GALT1 a numeric vector  
B4GALT2 a numeric vector  
B4GALT3 a numeric vector  
B4GALT4 a numeric vector  
B4GALT5 a numeric vector  
B4GALT6 a numeric vector  
B4GALT7 a numeric vector  
B4GAT1 a numeric vector  
B9D1 a numeric vector  
B9D2 a numeric vector  
BAALC a numeric vector  
BAAT a numeric vector  
BABAM1 a numeric vector  
BABAM2 a numeric vector  
BACE1 a numeric vector  
BACE2 a numeric vector  
BACH1 a numeric vector  
BACH2 a numeric vector  
BAD a numeric vector  
BAG1 a numeric vector  
BAG2 a numeric vector  
BAG3 a numeric vector  
BAG4 a numeric vector  
BAG5 a numeric vector  
BAG6 a numeric vector  
BAHCC1 a numeric vector  
BAHD1 a numeric vector  
BAIAP2 a numeric vector  
BAIAP2L1 a numeric vector  
BAIAP2L2 a numeric vector  
BAIAP3 a numeric vector  
BAK1 a numeric vector  
BAMBI a numeric vector  
BANF1 a numeric vector  
BANF2 a numeric vector

BANK1 a numeric vector  
BANP a numeric vector  
BAP1 a numeric vector  
BARD1 a numeric vector  
BARHL1 a numeric vector  
BARHL2 a numeric vector  
BARX1 a numeric vector  
BARX2 a numeric vector  
BASP1 a numeric vector  
BATF a numeric vector  
BATF2 a numeric vector  
BATF3 a numeric vector  
BAX a numeric vector  
BAZ1A a numeric vector  
BAZ1B a numeric vector  
BAZ2A a numeric vector

**Details**

This is New data.

**Value**

Retuens a dataframe.

**Source**

<https://portal.gdc.cancer.gov/>

**Examples**

```
data(New_data)
## maybe str(New_data)
## plot(New_data)
```

---

Nomogram\_generate\_f    *Nomogram Generation Function*

---

**Description**

Nomogram Generation Function

**Usage**

```
Nomogram_generate_f(
  data,
  Feature_List,
  surv_time,
  surv_event,
  font_size = 0.8,
  axis_cex = 0.5,
  tcl_len = 0.5,
  label_margin = 0.5,
  col_grid = gray(c(0.85, 0.95))
)
```

**Arguments**

<code>data</code>	A data frame containing survival information and predictor variables. Must include columns for survival time, event status, and selected features.
<code>Feature_List</code>	A data frame or list containing the selected features (column names) to be included in the nomogram.
<code>surv_time</code>	A character string specifying the column name for survival time in the input data.
<code>surv_event</code>	A character string specifying the column name for survival event status in the input data (1 for event, 0 for censored).
<code>font_size</code>	Numeric. Base font size for the nomogram plot. Default is 0.8
<code>axis_cex</code>	Numeric. Scaling factor for axis text size ( <code>cex.axis</code> ). Default is 0.5
<code>tcl_len</code>	Numeric. Tick length on axes ( <code>tcl</code> ). Default is 0.5
<code>label_margin</code>	Numeric. Margin for variable labels ( <code>lmgp</code> ). Default is 0.5
<code>col_grid</code>	Color vector. Grid line colors for the nomogram plot. Default is <code>gray(c(0.85, 0.95))</code>

**Details**

The function dynamically creates a Cox proportional hazards model based on the selected features and survival data. It computes survival probabilities for 1, 3, 5, and 10 years (if applicable) and plots the nomogram. The function uses internal validation with bootstrapping ( $B = 1000$ ) to calculate the bias-corrected C-index.

**Value**

A list containing:

- `C_index_mat`: A matrix containing the bias-corrected and original C-index values.

The following steps are performed:

- Validates input data and renames survival columns to standard names.
- Prepares the data for modeling using `rms::datadist`.
- Dynamically creates a Cox proportional hazards model formula.
- Fits the Cox model using `rms::cph`.
- Generates the nomogram with survival probabilities at specified time points.
- Validates the model and computes C-index values.

**Examples**

```

data(Train_Data_Nomogram_input, package = "CPSM")
data(feature_list_for_Nomogram, package = "CPSM")
Nomogram_generate_f(
  data = Train_Data_Nomogram_input,
  Feature_List = feature_list_for_Nomogram,
  surv_time = "OS_month",
  surv_event = "OS",
  font_size = 0.8,
  axis_cex = 0.5,
  tcl_len = 0.5,
  label_margin = 0.5,
  col_grid = gray(c(0.85, 0.95))
)

```

---

predict\_survival\_risk\_group\_f  
*Survival Risk Group Prediction Function*

---

**Description**

This function builds a Random Forest (RF) model to classify samples into high-risk or low-risk survival groups based on selected features.

**Usage**

```

predict_survival_risk_group_f(
  selected_train_data,
  selected_test_data,
  Feature_List
)

```

**Arguments**

**selected\_train\_data** A data frame containing normalized expression data of selected features and survival information for training set.

**selected\_test\_data** A data frame containing normalized expression data of selected features and survival information for test set.

**Feature\_List** A list of features to be used for predicting the risk class in the model.

**Value**

A list containing the following components:

**best\_model** The Best RF model.

**Train\_results** Prediction resultst on Training data

**Test\_results** Prediction resultst on Test data

```

misclassification_results
      Prediction results of best on model on training and Test data
All_tree_matrix
      Prediction results on training and test data based on all models using different
      number of trees

```

### Examples

```

# Example usage of the predict_survival_risk_group_f function
data(Train_PI_data, package = "CPSM")
data(Test_PI_data, package = "CPSM")
data(Key_PI_list , package = "CPSM")
Results_Risk_group_Prediction<- predict_survival_risk_group_f(selected_train_data = Train_PI_data,
selected_test_data = Test_PI_data, Feature_List = Key_PI_list )

```

---

survCurves_data	<i>survCurves data</i>
-----------------	------------------------

---

### Description

This is survCurves data.

### Usage

```
data("survCurves_data")
```

### Format

A data frame with 15 observations on the following 19 variables.

```

time_point a numeric vector
'TCGA-E1-A7Z6-01' a numeric vector
'TCGA-S9-A7IX-01' a numeric vector
'TCGA-HT-8010-01' a numeric vector
'TCGA-VM-A8C8-01' a numeric vector
'TCGA-DU-5847-01' a numeric vector
'TCGA-TQ-A7RQ-01' a numeric vector
'TCGA-HT-7606-01' a numeric vector
'TCGA-S9-A7QY-01' a numeric vector
'TCGA-DH-5142-01' a numeric vector
'TCGA-DU-6408-01' a numeric vector
'TCGA-FG-8191-01' a numeric vector
'TCGA-TM-A84S-01' a numeric vector
'TCGA-DB-A64S-01' a numeric vector
'TCGA-DU-6542-01' a numeric vector
'TCGA-DU-A7T6-01' a numeric vector
'TCGA-DB-A4XF-01' a numeric vector
'TCGA-S9-A6WN-01' a numeric vector
'TCGA-P5-A5EX-01' a numeric vector

```

**Details**

This is survCurves data.

**Value**

This is a data frame.

**Source**

<https://portal.gdc.cancer.gov/>

**Examples**

```
data(survCurves_data)
## maybe str(survCurves_data)
```

---

surv\_curve\_plots\_f      *Generate Survival Curve Plots*

---

**Description**

This function creates survival curve plots for all patients and highlights a specific patient based on the selected sample.

**Arguments**

Surv_curve_data	A data frame containing survival curve data. The data frame must include a column named <code>time_point</code> representing time and other columns corresponding to patient survival probabilities.
selected_sample	A character string specifying the patient ID to be highlighted in the plot.
font_size	Numeric. Font size for axis labels, titles, and legends. Must be supplied by the user.
line_size	Numeric. Line thickness for plotted curves. Must be supplied by the user.
all_line_col	Character. Color used for all non-highlighted patients (e.g., "black"). Must be supplied by the user.
highlight_col	Character. Color used to highlight the selected patient (e.g., "red"). Must be supplied by the user.

**Details**

- The input data (`Surv_curve_data`) must be structured such that the first column (`time_point`) represents time points, and each subsequent column represents the survival probabilities for a specific patient.
- If the `selected_sample` is not present in the column names of `Surv_curve_data`, a message will indicate that the sample is missing.
- The function uses the `ggplot2` package for generating survival curve plots.

**Value**

A list containing two ggplot2 objects:

`all_patients_plot`

A ggplot object displaying survival curves for all patients.

`highlighted_patient_plot`

A ggplot object displaying survival curves for all patients with the selected patient highlighted.

**Examples**

```
# Example survival curve data
Surv_curve_data <- data.frame(
  time_point = c(0, 1, 2, 3, 4),
  Patient1 = c(1, 0.9, 0.8, 0.7, 0.6),
  Patient2 = c(1, 0.85, 0.75, 0.65, 0.55)
)

# Generate plots with Patient1 highlighted
plots <- surv_curve_plots_f(
  Surv_curve_data,
  selected_sample = "Patient1",
  font_size = 12,
  line_size = 0.5,
  all_line_col = "black",
  highlight_col = "red"
)

# View the plots
print(plots$all_patients_plot)
print(plots$highlighted_patient_plot)
```

---

Test\_Clin

*Test Clin*

---

**Description**

This is Test Clin.

**Usage**

```
data("Test_Clin")
```

**Format**

A data frame with 18 observations on the following 20 variables.

Age a numeric vector

subtype a character vector

gender a character vector

race a character vector

ajcc\_pathologic\_tumor\_stage a logical vector  
 histological\_type a character vector  
 histological\_grade a character vector  
 treatment\_outcome\_first\_course a character vector  
 radiation\_treatment\_adjuvant a character vector  
 sample\_type a character vector  
 type a character vector  
 OS a numeric vector  
 OS.time a numeric vector  
 DSS a numeric vector  
 DSS.time a numeric vector  
 DFI a numeric vector  
 DFI.time a numeric vector  
 PFI a numeric vector  
 PFI.time a numeric vector  
 OS\_month a numeric vector

### Details

This is Test Clin.

### Value

A data frame with columns X and Y.

### Source

<https://portal.gdc.cancer.gov/>

### Examples

```

data(Test_Clin)
## maybe str(Test_Clin)
## plot(Test_Clin)

```

---

test\_FPKM

*test FPKM*

---

### Description

This is test FPKM.

### Usage

```
data("test_FPKM")
```

**Format**

A data frame with 18 observations on the following 2025 variables.

Age a numeric vector  
subtype a character vector  
gender a character vector  
race a character vector  
ajcc\_pathologic\_tumor\_stage a logical vector  
histological\_type a character vector  
histological\_grade a character vector  
treatment\_outcome\_first\_course a character vector  
radiation\_treatment\_adjuvant a character vector  
sample\_type a character vector  
type a character vector  
OS a numeric vector  
OS.time a numeric vector  
DSS a numeric vector  
DSS.time a numeric vector  
DFI a numeric vector  
DFI.time a numeric vector  
PFI a numeric vector  
PFI.time a numeric vector  
OS\_month a numeric vector  
A1BG a numeric vector  
A1CF a numeric vector  
A2M a numeric vector  
A2ML1 a numeric vector  
A3GALT2 a numeric vector  
A4GALT a numeric vector  
A4GNT a numeric vector  
AAAS a numeric vector  
AACS a numeric vector  
AADAC a numeric vector  
AADACL2 a numeric vector  
AADACL3 a numeric vector  
AADACL4 a numeric vector  
AADAT a numeric vector  
AAGAB a numeric vector  
AAK1 a numeric vector  
AAMDC a numeric vector  
AAMP a numeric vector

AANAT a numeric vector  
AAR2 a numeric vector  
AARD a numeric vector  
AARS1 a numeric vector  
AARS2 a numeric vector  
AARSD1 a numeric vector  
AASDH a numeric vector  
AASDHPPT a numeric vector  
AASS a numeric vector  
AATF a numeric vector  
AATK a numeric vector  
ABAT a numeric vector  
ABCA1 a numeric vector  
ABCA10 a numeric vector  
ABCA12 a numeric vector  
ABCA13 a numeric vector  
ABCA2 a numeric vector  
ABCA3 a numeric vector  
ABCA4 a numeric vector  
ABCA5 a numeric vector  
ABCA6 a numeric vector  
ABCA7 a numeric vector  
ABCA8 a numeric vector  
ABCA9 a numeric vector  
ABCB1 a numeric vector  
ABCB10 a numeric vector  
ABCB11 a numeric vector  
ABCB4 a numeric vector  
ABCB5 a numeric vector  
ABCB6 a numeric vector  
ABCB7 a numeric vector  
ABCB8 a numeric vector  
ABCB9 a numeric vector  
ABCC1 a numeric vector  
ABCC10 a numeric vector  
ABCC11 a numeric vector  
ABCC12 a numeric vector  
ABCC2 a numeric vector  
ABCC3 a numeric vector  
ABCC4 a numeric vector

ABCC5 a numeric vector  
ABCC6 a numeric vector  
ABCC8 a numeric vector  
ABCC9 a numeric vector  
ABCD1 a numeric vector  
ABCD2 a numeric vector  
ABCD3 a numeric vector  
ABCD4 a numeric vector  
ABCE1 a numeric vector  
ABCF1 a numeric vector  
ABCF2 a numeric vector  
ABCF2.H2BE1 a numeric vector  
ABCF3 a numeric vector  
ABCG1 a numeric vector  
ABCG2 a numeric vector  
ABCG4 a numeric vector  
ABCG5 a numeric vector  
ABCG8 a numeric vector  
ABHD1 a numeric vector  
ABHD10 a numeric vector  
ABHD11 a numeric vector  
ABHD12 a numeric vector  
ABHD12B a numeric vector  
ABHD13 a numeric vector  
ABHD14A a numeric vector  
ABHD14A.ACY1 a numeric vector  
ABHD14B a numeric vector  
ABHD15 a numeric vector  
ABHD16A a numeric vector  
ABHD16B a numeric vector  
ABHD17A a numeric vector  
ABHD17B a numeric vector  
ABHD17C a numeric vector  
ABHD18 a numeric vector  
ABHD2 a numeric vector  
ABHD3 a numeric vector  
ABHD4 a numeric vector  
ABHD5 a numeric vector  
ABHD6 a numeric vector  
ABHD8 a numeric vector

ABI1 a numeric vector  
ABI2 a numeric vector  
ABI3 a numeric vector  
ABI3BP a numeric vector  
ABITRAM a numeric vector  
ABL1 a numeric vector  
ABL2 a numeric vector  
ABLIM1 a numeric vector  
ABLIM2 a numeric vector  
ABLIM3 a numeric vector  
ABO a numeric vector  
ABR a numeric vector  
ABRA a numeric vector  
ABRACL a numeric vector  
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ABRAXAS2 a numeric vector  
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ABTB1 a numeric vector  
ABTB2 a numeric vector  
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AC004687.2 a numeric vector

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AC120057.2 a numeric vector

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ACADM a numeric vector  
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ACADVL a numeric vector  
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ACD a numeric vector  
ACE a numeric vector  
ACE2 a numeric vector  
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ACER2 a numeric vector  
ACER3 a numeric vector  
ACHE a numeric vector  
ACIN1 a numeric vector  
ACKR1 a numeric vector  
ACKR2 a numeric vector  
ACKR3 a numeric vector  
ACKR4 a numeric vector  
ACLY a numeric vector  
ACMSD a numeric vector

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ACP4 a numeric vector  
ACP5 a numeric vector  
ACP6 a numeric vector  
ACP7 a numeric vector  
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ACRV1 a numeric vector  
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ACTL6B a numeric vector  
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ACTL7B a numeric vector  
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ACTR8 a numeric vector  
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ACTRT3 a numeric vector  
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ACVR1B a numeric vector  
ACVR1C a numeric vector

ACVR2A a numeric vector  
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AD000671.2 a numeric vector  
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ADA2 a numeric vector  
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ADAMTS14 a numeric vector

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ADAMTS17 a numeric vector  
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ADCY8 a numeric vector  
ADCY9 a numeric vector

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ADH5 a numeric vector

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ADH7 a numeric vector  
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ADIPOR1 a numeric vector  
ADIPOR2 a numeric vector  
ADIRF a numeric vector  
ADK a numeric vector  
ADM a numeric vector  
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ARMCX5 a numeric vector  
ARMCX5.GPRASP2 a numeric vector  
ARMCX6 a numeric vector  
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ARMH2 a numeric vector  
ARMH3 a numeric vector  
ARMH4 a numeric vector  
ARMS2 a numeric vector  
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ARNT a numeric vector  
ARNT2 a numeric vector  
ARNTL a numeric vector  
ARNTL2 a numeric vector  
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ARPC1B a numeric vector  
ARPC2 a numeric vector  
ARPC3 a numeric vector  
ARPC4 a numeric vector  
ARPC4.TTLL3 a numeric vector  
ARPC5 a numeric vector  
ARPC5L a numeric vector  
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ARPIN.AP3S2 a numeric vector  
ARPP19 a numeric vector  
ARPP21 a numeric vector  
ARR3 a numeric vector  
ARRB1 a numeric vector  
ARRB2 a numeric vector  
ARRDC1 a numeric vector  
ARRDC2 a numeric vector  
ARRDC3 a numeric vector  
ARRDC4 a numeric vector  
ARRDC5 a numeric vector  
ARSA a numeric vector  
ARSB a numeric vector  
ARSD a numeric vector  
ARSF a numeric vector  
ARSG a numeric vector  
ARSH a numeric vector

ARSI a numeric vector  
ARSJ a numeric vector  
ARSK a numeric vector  
ARSL a numeric vector  
ART1 a numeric vector  
ART3 a numeric vector  
ART4 a numeric vector  
ART5 a numeric vector  
ARTN a numeric vector  
ARV1 a numeric vector  
ARVCF a numeric vector  
ARX a numeric vector  
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ASB11 a numeric vector  
ASB12 a numeric vector  
ASB13 a numeric vector  
ASB14 a numeric vector  
ASB15 a numeric vector  
ASB16 a numeric vector  
ASB17 a numeric vector  
ASB18 a numeric vector  
ASB2 a numeric vector  
ASB3 a numeric vector  
ASB4 a numeric vector  
ASB5 a numeric vector  
ASB6 a numeric vector  
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ASB8 a numeric vector  
ASB9 a numeric vector  
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ASCC2 a numeric vector  
ASCC3 a numeric vector

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ASCL3 a numeric vector  
ASCL4 a numeric vector  
ASCL5 a numeric vector  
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ASF1B a numeric vector  
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ASGR2 a numeric vector  
ASH1L a numeric vector  
ASH2L a numeric vector  
ASIC1 a numeric vector  
ASIC2 a numeric vector  
ASIC3 a numeric vector  
ASIC4 a numeric vector  
ASIC5 a numeric vector  
ASIP a numeric vector  
ASL a numeric vector  
ASMT a numeric vector  
ASMTL a numeric vector  
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ASPG a numeric vector  
ASPH a numeric vector  
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ASPM a numeric vector  
ASPN a numeric vector  
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ASRGL1 a numeric vector  
ASS1 a numeric vector  
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ASTL a numeric vector  
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ASTN2 a numeric vector  
ASXL1 a numeric vector

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ASZ1 a numeric vector  
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ATE1 a numeric vector  
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ATF3 a numeric vector  
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ATF5 a numeric vector  
ATF6 a numeric vector  
ATF6B a numeric vector  
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ATF7.NPFF a numeric vector  
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ATF7IP2 a numeric vector  
ATG10 a numeric vector  
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ATG2A a numeric vector  
ATG2B a numeric vector  
ATG3 a numeric vector  
ATG4A a numeric vector  
ATG4B a numeric vector  
ATG4C a numeric vector  
ATG4D a numeric vector  
ATG5 a numeric vector  
ATG7 a numeric vector

ATG9A a numeric vector  
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ATL2 a numeric vector  
ATL3 a numeric vector  
ATM a numeric vector  
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ATOH7 a numeric vector  
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ATOX1 a numeric vector  
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ATP10B a numeric vector  
ATP10D a numeric vector  
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ATP11C a numeric vector  
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ATP1A2 a numeric vector  
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ATP1A4 a numeric vector  
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ATP1B3 a numeric vector  
ATP1B4 a numeric vector  
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ATP2A3 a numeric vector  
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ATP2B2 a numeric vector  
ATP2B3 a numeric vector

ATP2B4 a numeric vector  
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ATP2C2 a numeric vector  
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ATP4B a numeric vector  
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ATP5F1B a numeric vector  
ATP5F1C a numeric vector  
ATP5F1D a numeric vector  
ATP5F1E a numeric vector  
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ATP5PB a numeric vector  
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ATP5PF a numeric vector  
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ATP6V1B1 a numeric vector  
ATP6V1B2 a numeric vector

ATP6V1C1 a numeric vector  
ATP6V1C2 a numeric vector  
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ATP8B1 a numeric vector  
ATP8B2 a numeric vector  
ATP8B3 a numeric vector  
ATP8B4 a numeric vector  
ATP9A a numeric vector  
ATP9B a numeric vector  
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ATPAF2 a numeric vector  
ATPCKMT a numeric vector  
ATR a numeric vector  
ATRAID a numeric vector  
ATRIP a numeric vector  
ATRN a numeric vector  
ATRNL1 a numeric vector  
ATRX a numeric vector  
ATXN1 a numeric vector  
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ATXN1L a numeric vector  
ATXN2 a numeric vector  
ATXN2L a numeric vector  
ATXN3 a numeric vector  
ATXN3L a numeric vector  
ATXN7 a numeric vector  
ATXN7L1 a numeric vector

ATXN7L2 a numeric vector  
ATXN7L3 a numeric vector  
ATXN7L3B a numeric vector  
AUH a numeric vector  
AUNIP a numeric vector  
AUP1 a numeric vector  
AURKA a numeric vector  
AURKAIP1 a numeric vector  
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AURKC a numeric vector  
AUTS2 a numeric vector  
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AVIL a numeric vector  
AVL9 a numeric vector  
AVP a numeric vector  
AVPI1 a numeric vector  
AVPR1A a numeric vector  
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AWAT2 a numeric vector  
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AXIN1 a numeric vector  
AXIN2 a numeric vector  
AXL a numeric vector  
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AZI2 a numeric vector  
AZIN1 a numeric vector  
AZIN2 a numeric vector  
AZU1 a numeric vector  
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B3GAT2 a numeric vector

B3GAT3 a numeric vector  
B3GLCT a numeric vector  
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B4GALT3 a numeric vector  
B4GALT4 a numeric vector  
B4GALT5 a numeric vector  
B4GALT6 a numeric vector  
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BAALC a numeric vector  
BAAT a numeric vector  
BABAM1 a numeric vector  
BABAM2 a numeric vector  
BACE1 a numeric vector  
BACE2 a numeric vector  
BACH1 a numeric vector  
BACH2 a numeric vector  
BAD a numeric vector  
BAG1 a numeric vector  
BAG2 a numeric vector  
BAG3 a numeric vector  
BAG4 a numeric vector  
BAG5 a numeric vector

BAG6 a numeric vector  
BAHCC1 a numeric vector  
BAHD1 a numeric vector  
BAIAP2 a numeric vector  
BAIAP2L1 a numeric vector  
BAIAP2L2 a numeric vector  
BAIAP3 a numeric vector  
BAK1 a numeric vector  
BAMBI a numeric vector  
BANF1 a numeric vector  
BANF2 a numeric vector  
BANK1 a numeric vector  
BANP a numeric vector  
BAP1 a numeric vector  
BARD1 a numeric vector  
BARHL1 a numeric vector  
BARHL2 a numeric vector  
BARX1 a numeric vector  
BARX2 a numeric vector  
BASP1 a numeric vector  
BATF a numeric vector  
BATF2 a numeric vector  
BATF3 a numeric vector  
BAX a numeric vector  
BAZ1A a numeric vector  
BAZ1B a numeric vector  
BAZ2A a numeric vector

**Details**

This is test FPKM.

**Value**

Returns a dataframe.

**Source**

<https://portal.gdc.cancer.gov/>

**Examples**

```
data(test_FPKM)
## maybe str(test_FPKM)
## plot(test_FPKM)
```

---

Test_Norm_data	<i>Test Norm data</i>
----------------	-----------------------

---

**Description**

This is Test Norm data.

**Usage**

```
data("Test_Norm_data")
```

**Format**

A data frame with 18 observations on the following 2025 variables.

Age a numeric vector

subtype a character vector

gender a character vector

race a character vector

ajcc\_pathologic\_tumor\_stage a logical vector

histological\_type a character vector

histological\_grade a character vector

treatment\_outcome\_first\_course a character vector

radiation\_treatment\_adjuvant a character vector

sample\_type a character vector

type a character vector

OS a numeric vector

OS.time a numeric vector

DSS a numeric vector

DSS.time a numeric vector

DFI a numeric vector

DFI.time a numeric vector

PFI a numeric vector

PFI.time a numeric vector

OS\_month a numeric vector

A1BG a numeric vector

A1CF a numeric vector

A2M a numeric vector

A2ML1 a numeric vector

A3GALT2 a numeric vector

A4GALT a numeric vector

A4GNT a numeric vector

AAAS a numeric vector

AACS a numeric vector  
AADAC a numeric vector  
AADACL2 a numeric vector  
AADACL3 a numeric vector  
AADACL4 a numeric vector  
AADAT a numeric vector  
AAGAB a numeric vector  
AAK1 a numeric vector  
AAMDC a numeric vector  
AAMP a numeric vector  
AANAT a numeric vector  
AAR2 a numeric vector  
AARD a numeric vector  
AARS1 a numeric vector  
AARS2 a numeric vector  
AARSD1 a numeric vector  
AASDH a numeric vector  
AASDHPPT a numeric vector  
AASS a numeric vector  
AATF a numeric vector  
AATK a numeric vector  
ABAT a numeric vector  
ABCA1 a numeric vector  
ABCA10 a numeric vector  
ABCA12 a numeric vector  
ABCA13 a numeric vector  
ABCA2 a numeric vector  
ABCA3 a numeric vector  
ABCA4 a numeric vector  
ABCA5 a numeric vector  
ABCA6 a numeric vector  
ABCA7 a numeric vector  
ABCA8 a numeric vector  
ABCA9 a numeric vector  
ABCB1 a numeric vector  
ABCB10 a numeric vector  
ABCB11 a numeric vector  
ABCB4 a numeric vector  
ABCB5 a numeric vector  
ABCB6 a numeric vector

ABCB7 a numeric vector  
ABCB8 a numeric vector  
ABCB9 a numeric vector  
ABCC1 a numeric vector  
ABCC10 a numeric vector  
ABCC11 a numeric vector  
ABCC12 a numeric vector  
ABCC2 a numeric vector  
ABCC3 a numeric vector  
ABCC4 a numeric vector  
ABCC5 a numeric vector  
ABCC6 a numeric vector  
ABCC8 a numeric vector  
ABCC9 a numeric vector  
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ABCD2 a numeric vector  
ABCD3 a numeric vector  
ABCD4 a numeric vector  
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ABCF1 a numeric vector  
ABCF2 a numeric vector  
ABCF2.H2BE1 a numeric vector  
ABCF3 a numeric vector  
ABCG1 a numeric vector  
ABCG2 a numeric vector  
ABCG4 a numeric vector  
ABCG5 a numeric vector  
ABCG8 a numeric vector  
ABHD1 a numeric vector  
ABHD10 a numeric vector  
ABHD11 a numeric vector  
ABHD12 a numeric vector  
ABHD12B a numeric vector  
ABHD13 a numeric vector  
ABHD14A a numeric vector  
ABHD14A.ACY1 a numeric vector  
ABHD14B a numeric vector  
ABHD15 a numeric vector  
ABHD16A a numeric vector  
ABHD16B a numeric vector

ABHD17A a numeric vector  
ABHD17B a numeric vector  
ABHD17C a numeric vector  
ABHD18 a numeric vector  
ABHD2 a numeric vector  
ABHD3 a numeric vector  
ABHD4 a numeric vector  
ABHD5 a numeric vector  
ABHD6 a numeric vector  
ABHD8 a numeric vector  
ABI1 a numeric vector  
ABI2 a numeric vector  
ABI3 a numeric vector  
ABI3BP a numeric vector  
ABITRAM a numeric vector  
ABL1 a numeric vector  
ABL2 a numeric vector  
ABLIM1 a numeric vector  
ABLIM2 a numeric vector  
ABLIM3 a numeric vector  
ABO a numeric vector  
ABR a numeric vector  
ABRA a numeric vector  
ABRACL a numeric vector  
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ABRAXAS2 a numeric vector  
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ABTB1 a numeric vector  
ABTB2 a numeric vector  
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AC003002.2 a numeric vector

AC003002.3 a numeric vector  
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AC003688.1 a numeric vector  
AC004076.1 a numeric vector  
AC004080.3 a numeric vector  
AC004223.3 a numeric vector  
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APH1A a numeric vector  
APH1B a numeric vector  
API5 a numeric vector  
APIP a numeric vector

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APOH a numeric vector  
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APOO a numeric vector

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AREG a numeric vector  
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ASH2L a numeric vector  
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ASIC2 a numeric vector  
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ASIP a numeric vector  
ASL a numeric vector  
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ASMTL a numeric vector  
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ATP9B a numeric vector  
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ATRIP a numeric vector  
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ATXN3L a numeric vector  
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ATXN7L3 a numeric vector  
ATXN7L3B a numeric vector  
AUH a numeric vector  
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AUP1 a numeric vector  
AURKA a numeric vector  
AURKAIP1 a numeric vector  
AURKB a numeric vector  
AURKC a numeric vector  
AUTS2 a numeric vector  
AVEN a numeric vector  
AVIL a numeric vector  
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AVP a numeric vector  
AVPI1 a numeric vector  
AVPR1A a numeric vector  
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AWAT2 a numeric vector  
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AXIN2 a numeric vector  
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AZI2 a numeric vector  
AZIN1 a numeric vector  
AZIN2 a numeric vector  
AZU1 a numeric vector

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BABAM2 a numeric vector

BACE1 a numeric vector  
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BAG3 a numeric vector  
BAG4 a numeric vector  
BAG5 a numeric vector  
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BANF2 a numeric vector  
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BARHL1 a numeric vector  
BARHL2 a numeric vector  
BARX1 a numeric vector  
BARX2 a numeric vector  
BASP1 a numeric vector  
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BATF2 a numeric vector  
BATF3 a numeric vector  
BAX a numeric vector  
BAZ1A a numeric vector  
BAZ1B a numeric vector  
BAZ2A a numeric vector

**Details**

This is Test Norm data.

**Value**

Returns a dataframe.

**Source**

<https://portal.gdc.cancer.gov/>

**Examples**

```
data(Test_Norm_data)
## maybe str(Test_Norm_data)
## plot(Test_Norm_data)
```

---

Test_PI_data	<i>Test PI data</i>
--------------	---------------------

---

**Description**

This is Test PI data.

**Usage**

```
data("Test_PI_data")
```

**Format**

A data frame with 18 observations on the following 57 variables.

OS a numeric vector  
 OS\_month a numeric vector  
 AADACL4 a numeric vector  
 ABCA12 a numeric vector  
 ABCC3 a numeric vector  
 ABI1 a numeric vector  
 ABRA a numeric vector  
 AC006059.2 a numeric vector  
 AC008676.3 a numeric vector  
 AC008764.4 a numeric vector  
 AC010132.3 a numeric vector  
 AC012651.1 a numeric vector  
 AC013477.1 a numeric vector  
 AC109583.1 a numeric vector  
 AC113348.2 a numeric vector  
 AC117457.1 a numeric vector  
 AC131160.1 a numeric vector  
 AC144573.1 a numeric vector

AC235565.2 a numeric vector  
ACO2 a numeric vector  
ACTC1 a numeric vector  
ACTL9 a numeric vector  
ACTRT2 a numeric vector  
ADD3 a numeric vector  
ADGRL3 a numeric vector  
ADH7 a numeric vector  
ADPRHL1 a numeric vector  
ADRA2A a numeric vector  
ADRA2B a numeric vector  
AFMID a numeric vector  
AKAP12 a numeric vector  
AKAP14 a numeric vector  
AKAP3 a numeric vector  
AL139260.3 a numeric vector  
ALG6 a numeric vector  
ANGPTL6 a numeric vector  
ANKRD20A1 a numeric vector  
ANXA6 a numeric vector  
ANXA8L1 a numeric vector  
AOC2 a numeric vector  
APOBEC1 a numeric vector  
APOE a numeric vector  
ARHGAP11B a numeric vector  
ARHGAP12 a numeric vector  
ARHGEF19 a numeric vector  
ARL2.SNX15 a numeric vector  
ARL6IP1 a numeric vector  
ARPC4.TTLL3 a numeric vector  
ASB4 a numeric vector  
ASB5 a numeric vector  
ASB6 a numeric vector  
ASPM a numeric vector  
ATP1A2 a numeric vector  
ATP2B4 a numeric vector  
AZGP1 a numeric vector  
B3GAT2 a numeric vector  
PI a numeric vector

**Details**

This is Test PI data.

**Value**

A data frame with columns X and Y.

**Source**

<https://portal.gdc.cancer.gov/>

**Examples**

```
data(Test_PI_data)
## maybe str(Test_PI_data)
## plot(Test_PI_data)
```

---

Test\_results

*Test Results for Survival Prediction*

---

**Description**

A data frame containing survival prediction results for test samples. The data includes actual risk group labels, predicted risk groups, probabilities for each class, and overall survival data for the test samples.

**Usage**

```
data(Test_results)
```

**Format**

A data frame with 18 observations and 8 variables:

**Sample\_ID** Character vector with the unique sample identifier (e.g., "TCGA-E1-A7Z6-01").

**Actual** Factor indicating the actual risk group: "High\_Risk" or "Low\_Risk".

**Predicted\_Risk\_Group** Factor indicating the predicted risk group: "High\_Risk" or "Low\_Risk".

**High\_Risk\_Prob** Numeric value representing the probability of the sample being classified as High Risk.

**Low\_Risk\_Prob** Numeric value representing the probability of the sample being classified as Low Risk.

**Prediction\_Prob** Numeric value representing the maximum class probability (confidence in prediction).

**OS\_month** Integer representing the overall survival time in months.

**OS\_event** Integer indicating the survival event: 1 = death, 0 = censored.

**Source**

The data was derived from TCGA (The Cancer Genome Atlas) using survival prediction models.

---

Test_Uni_sig_data	<i>Test Uni sig data</i>
-------------------	--------------------------

---

**Description**

This is Test Uni sig data.

**Usage**

```
data("Test_Uni_sig_data")
```

**Format**

A data frame with 18 observations on the following 209 variables.

A2ML1 a numeric vector  
AADACL4 a numeric vector  
AAMDC a numeric vector  
AAR2 a numeric vector  
ABCA12 a numeric vector  
ABCB4 a numeric vector  
ABCB5 a numeric vector  
ABCB6 a numeric vector  
ABCC3 a numeric vector  
ABCC9 a numeric vector  
ABCE1 a numeric vector  
ABCF3 a numeric vector  
ABHD12 a numeric vector  
ABHD14B a numeric vector  
ABLIM1 a numeric vector  
ABLIM3 a numeric vector  
ABT1 a numeric vector  
AC004076.1 a numeric vector  
AC005520.1 a numeric vector  
AC005832.4 a numeric vector  
AC006030.1 a numeric vector  
AC008764.4 a numeric vector  
AC010132.3 a numeric vector  
AC013470.2 a numeric vector  
AC027796.3 a numeric vector  
AC097636.1 a numeric vector  
AC106741.1 a numeric vector  
AC131160.1 a numeric vector

AC132217.2 a numeric vector  
AC144573.1 a numeric vector  
ACAP2 a numeric vector  
ACBD5 a numeric vector  
ACE a numeric vector  
ACMSD a numeric vector  
ACO1 a numeric vector  
ACO2 a numeric vector  
ACP5 a numeric vector  
ACRV1 a numeric vector  
ACSBG1 a numeric vector  
ACSM5 a numeric vector  
ACSM6 a numeric vector  
ACTG1 a numeric vector  
ACTN1 a numeric vector  
ACTR3 a numeric vector  
ADAM12 a numeric vector  
ADAM15 a numeric vector  
ADAM19 a numeric vector  
ADAM32 a numeric vector  
ADAMTS18 a numeric vector  
ADAMTS7 a numeric vector  
ADAMTS8 a numeric vector  
ADCK2 a numeric vector  
ADCY2 a numeric vector  
ADCY8 a numeric vector  
ADD3 a numeric vector  
ADGRB3 a numeric vector  
ADGRD2 a numeric vector  
ADGRE2 a numeric vector  
ADGRE5 a numeric vector  
ADGRG7 a numeric vector  
ADGRL4 a numeric vector  
ADGRV1 a numeric vector  
ADH4 a numeric vector  
ADHFE1 a numeric vector  
ADK a numeric vector  
ADNP a numeric vector  
ADPRH a numeric vector  
ADRB2 a numeric vector

ADRM1 a numeric vector  
AEN a numeric vector  
AFAP1L2 a numeric vector  
AGAP1 a numeric vector  
AGGF1 a numeric vector  
AGPS a numeric vector  
AGR3 a numeric vector  
AGRN a numeric vector  
AHCYL1 a numeric vector  
AHNAK a numeric vector  
AK2 a numeric vector  
AK8 a numeric vector  
AKAP3 a numeric vector  
AKAP4 a numeric vector  
AKAP6 a numeric vector  
AKIP1 a numeric vector  
AKR1C1 a numeric vector  
AL121845.3 a numeric vector  
AL160272.2 a numeric vector  
AL365214.2 a numeric vector  
AL391628.1 a numeric vector  
AL445989.1 a numeric vector  
AL591806.2 a numeric vector  
AL669918.1 a numeric vector  
ALDH9A1 a numeric vector  
ALDOB a numeric vector  
ALDOC a numeric vector  
ALG10B a numeric vector  
ALG2 a numeric vector  
ALG3 a numeric vector  
ALG6 a numeric vector  
ALKBH3 a numeric vector  
ALOX5AP a numeric vector  
ALYREF a numeric vector  
AMDHD1 a numeric vector  
AMPD3 a numeric vector  
ANGPTL2 a numeric vector  
ANGPTL5 a numeric vector  
ANKFY1 a numeric vector  
ANKLE2 a numeric vector

ANKRD20A1 a numeric vector  
ANKRD24 a numeric vector  
ANKRD29 a numeric vector  
ANKRD36 a numeric vector  
ANKRD36C a numeric vector  
ANO2 a numeric vector  
ANPEP a numeric vector  
ANXA1 a numeric vector  
ANXA7 a numeric vector  
AP003108.2 a numeric vector  
AP3S1 a numeric vector  
AP3S2 a numeric vector  
APEH a numeric vector  
APEX2 a numeric vector  
APH1A a numeric vector  
APLN a numeric vector  
APOBEC3B a numeric vector  
APOBEC3G a numeric vector  
APOBR a numeric vector  
APOE a numeric vector  
APOL1 a numeric vector  
APOL4 a numeric vector  
APPBP2 a numeric vector  
AQP10 a numeric vector  
AQP7 a numeric vector  
ARAP3 a numeric vector  
ARF4 a numeric vector  
ARFGAP2 a numeric vector  
ARHGAP11A a numeric vector  
ARHGAP11B a numeric vector  
ARHGAP24 a numeric vector  
ARHGAP32 a numeric vector  
ARHGDIG a numeric vector  
ARHGEF17 a numeric vector  
ARHGEF19 a numeric vector  
ARL1 a numeric vector  
ARL15 a numeric vector  
ARL2.SNX15 a numeric vector  
ARL5C a numeric vector  
ARL6IP6 a numeric vector

ARMC4 a numeric vector  
ARMC6 a numeric vector  
ARMC9 a numeric vector  
ARPC3 a numeric vector  
ARPC4 a numeric vector  
ARPP21 a numeric vector  
ARSA a numeric vector  
ARSI a numeric vector  
ARSL a numeric vector  
ART4 a numeric vector  
ASAH2 a numeric vector  
ASAP1 a numeric vector  
ASB12 a numeric vector  
ASCC3 a numeric vector  
ASF1B a numeric vector  
ASIC4 a numeric vector  
ASPH a numeric vector  
ASPM a numeric vector  
ATAD2 a numeric vector  
ATAD5 a numeric vector  
ATG9B a numeric vector  
ATIC a numeric vector  
ATP11A a numeric vector  
ATP11C a numeric vector  
ATP13A4 a numeric vector  
ATP1B2 a numeric vector  
ATP1B3 a numeric vector  
ATP2A3 a numeric vector  
ATP2B1 a numeric vector  
ATP4B a numeric vector  
ATP5F1D a numeric vector  
ATP5MC2 a numeric vector  
ATP5ME a numeric vector  
ATP6V0A4 a numeric vector  
ATP9B a numeric vector  
ATR a numeric vector  
ATRAID a numeric vector  
ATRIP a numeric vector  
ATXN7 a numeric vector  
AUNIP a numeric vector

AURKA a numeric vector  
AVPI1 a numeric vector  
AWAT1 a numeric vector  
AZU1 a numeric vector  
B3GAT2 a numeric vector  
B3GNT7 a numeric vector  
B3GNT8 a numeric vector  
B4GALNT2 a numeric vector  
B4GALT3 a numeric vector  
B4GALT7 a numeric vector  
B4GAT1 a numeric vector  
BACH2 a numeric vector  
BAG3 a numeric vector  
BAG5 a numeric vector  
BAHD1 a numeric vector  
BAIAP3 a numeric vector  
BANK1 a numeric vector  
BASP1 a numeric vector  
BATF2 a numeric vector  
BAX a numeric vector  
BAZ1B a numeric vector

**Details**

This is Test Uni sig data.

**Value**

A data frame with columns X and Y.

**Source**

<https://portal.gdc.cancer.gov/>

**Examples**

```
data(Test_Uni_sig_data)
## maybe str(Test_Uni_sig_data)
## plot(Test_Uni_sig_data)
```

---

Train\_Clin

*Train Clin*

---

**Description**

This is Train Clin.

**Usage**

```
data("Train_Clin")
```

**Format**

A data frame with 158 observations on the following 20 variables.

Age a numeric vector  
subtype a character vector  
gender a character vector  
race a character vector  
ajcc\_pathologic\_tumor\_stage a logical vector  
histological\_type a character vector  
histological\_grade a character vector  
treatment\_outcome\_first\_course a character vector  
radiation\_treatment\_adjuvant a character vector  
sample\_type a character vector  
type a character vector  
OS a numeric vector  
OS.time a numeric vector  
DSS a numeric vector  
DSS.time a numeric vector  
DFI a numeric vector  
DFI.time a numeric vector  
PFI a numeric vector  
PFI.time a numeric vector  
OS\_month a numeric vector

**Details**

This is Train Clin.

**Value**

A data frame with columns X and Y.

**Source**

<https://portal.gdc.cancer.gov/>

**Examples**

```
data(Train_Clin)
## maybe str(Train_Clin)
## plot(Train_Clin)
```

---

Train\_Data\_Nomogram\_input  
*Train Data Nomogram input*

---

**Description**

This is Train Data Nomogram input.

**Usage**

```
data("Train_Data_Nomogram_input")
```

**Format**

A data frame with 158 observations on the following 34 variables.

Age a numeric vector  
subtype a character vector  
gender a character vector  
race a character vector  
ajcc\_pathologic\_tumor\_stage a logical vector  
histological\_type a character vector  
histological\_grade a character vector  
treatment\_outcome\_first\_course a character vector  
radiation\_treatment\_adjuvant a character vector  
sample\_type a character vector  
type a character vector  
OS a numeric vector  
OS.time a numeric vector  
DSS a numeric vector  
DSS.time a numeric vector  
DFI a numeric vector  
DFI.time a numeric vector  
PFI a numeric vector  
PFI.time a numeric vector  
OS\_month a numeric vector  
OS\_month a numeric vector  
ALG6 a numeric vector  
ARHGAP11A a numeric vector

DESI1 a numeric vector  
GALNT7 a numeric vector  
GJD3 a numeric vector  
GPC1 a numeric vector  
H2BC5 a numeric vector  
HOXD12 a numeric vector  
RNF185 a numeric vector  
TANG02 a numeric vector  
UNG a numeric vector  
ZNF648 a numeric vector  
PI a numeric vector

### Details

This is Train Data Nomogram input.

### Value

A data frame with columns X and Y.

### Source

<https://portal.gdc.cancer.gov/>

### Examples

```
data(Train_Data_Nomogram_input)
## maybe str(Train_Data_Nomogram_input)
## plot(Train_Data_Nomogram_input)
```

---

train\_FPKM

*train FPKM*

---

### Description

This is train FPKM.

### Usage

```
data("train_FPKM")
```

**Format**

A data frame with 158 observations on the following 2025 variables.

Age a numeric vector  
subtype a character vector  
gender a character vector  
race a character vector  
ajcc\_pathologic\_tumor\_stage a logical vector  
histological\_type a character vector  
histological\_grade a character vector  
treatment\_outcome\_first\_course a character vector  
radiation\_treatment\_adjuvant a character vector  
sample\_type a character vector  
type a character vector  
OS a numeric vector  
OS.time a numeric vector  
DSS a numeric vector  
DSS.time a numeric vector  
DFI a numeric vector  
DFI.time a numeric vector  
PFI a numeric vector  
PFI.time a numeric vector  
OS\_month a numeric vector  
A1BG a numeric vector  
A1CF a numeric vector  
A2M a numeric vector  
A2ML1 a numeric vector  
A3GALT2 a numeric vector  
A4GALT a numeric vector  
A4GNT a numeric vector  
AAAS a numeric vector  
AACS a numeric vector  
AADAC a numeric vector  
AADACL2 a numeric vector  
AADACL3 a numeric vector  
AADACL4 a numeric vector  
AADAT a numeric vector  
AAGAB a numeric vector  
AAK1 a numeric vector  
AAMDC a numeric vector  
AAMP a numeric vector

AANAT a numeric vector  
AAR2 a numeric vector  
AARD a numeric vector  
AARS1 a numeric vector  
AARS2 a numeric vector  
AARSD1 a numeric vector  
AASDH a numeric vector  
AASDHPPT a numeric vector  
AASS a numeric vector  
AATF a numeric vector  
AATK a numeric vector  
ABAT a numeric vector  
ABCA1 a numeric vector  
ABCA10 a numeric vector  
ABCA12 a numeric vector  
ABCA13 a numeric vector  
ABCA2 a numeric vector  
ABCA3 a numeric vector  
ABCA4 a numeric vector  
ABCA5 a numeric vector  
ABCA6 a numeric vector  
ABCA7 a numeric vector  
ABCA8 a numeric vector  
ABCA9 a numeric vector  
ABCB1 a numeric vector  
ABCB10 a numeric vector  
ABCB11 a numeric vector  
ABCB4 a numeric vector  
ABCB5 a numeric vector  
ABCB6 a numeric vector  
ABCB7 a numeric vector  
ABCB8 a numeric vector  
ABCB9 a numeric vector  
ABCC1 a numeric vector  
ABCC10 a numeric vector  
ABCC11 a numeric vector  
ABCC12 a numeric vector  
ABCC2 a numeric vector  
ABCC3 a numeric vector  
ABCC4 a numeric vector

ABCC5 a numeric vector  
ABCC6 a numeric vector  
ABCC8 a numeric vector  
ABCC9 a numeric vector  
ABCD1 a numeric vector  
ABCD2 a numeric vector  
ABCD3 a numeric vector  
ABCD4 a numeric vector  
ABCE1 a numeric vector  
ABCF1 a numeric vector  
ABCF2 a numeric vector  
ABCF2.H2BE1 a numeric vector  
ABCF3 a numeric vector  
ABCG1 a numeric vector  
ABCG2 a numeric vector  
ABCG4 a numeric vector  
ABCG5 a numeric vector  
ABCG8 a numeric vector  
ABHD1 a numeric vector  
ABHD10 a numeric vector  
ABHD11 a numeric vector  
ABHD12 a numeric vector  
ABHD12B a numeric vector  
ABHD13 a numeric vector  
ABHD14A a numeric vector  
ABHD14A.ACY1 a numeric vector  
ABHD14B a numeric vector  
ABHD15 a numeric vector  
ABHD16A a numeric vector  
ABHD16B a numeric vector  
ABHD17A a numeric vector  
ABHD17B a numeric vector  
ABHD17C a numeric vector  
ABHD18 a numeric vector  
ABHD2 a numeric vector  
ABHD3 a numeric vector  
ABHD4 a numeric vector  
ABHD5 a numeric vector  
ABHD6 a numeric vector  
ABHD8 a numeric vector

ABI1 a numeric vector  
ABI2 a numeric vector  
ABI3 a numeric vector  
ABI3BP a numeric vector  
ABITRAM a numeric vector  
ABL1 a numeric vector  
ABL2 a numeric vector  
ABLIM1 a numeric vector  
ABLIM2 a numeric vector  
ABLIM3 a numeric vector  
ABO a numeric vector  
ABR a numeric vector  
ABRA a numeric vector  
ABRACL a numeric vector  
ABRAXAS1 a numeric vector  
ABRAXAS2 a numeric vector  
ABT1 a numeric vector  
ABTB1 a numeric vector  
ABTB2 a numeric vector  
AC000093.1 a numeric vector  
AC000120.2 a numeric vector  
AC000120.3 a numeric vector  
AC001226.2 a numeric vector  
AC002094.3 a numeric vector  
AC002310.4 a numeric vector  
AC002456.2 a numeric vector  
AC002985.1 a numeric vector  
AC002996.1 a numeric vector  
AC003002.1 a numeric vector  
AC003002.2 a numeric vector  
AC003002.3 a numeric vector  
AC003005.1 a numeric vector  
AC003006.1 a numeric vector  
AC003688.1 a numeric vector  
AC004076.1 a numeric vector  
AC004080.3 a numeric vector  
AC004223.3 a numeric vector  
AC004233.4 a numeric vector  
AC004593.2 a numeric vector  
AC004687.2 a numeric vector

AC004691.2 a numeric vector  
AC004706.3 a numeric vector  
AC004805.1 a numeric vector  
AC004832.3 a numeric vector  
AC004922.1 a numeric vector  
AC004997.1 a numeric vector  
AC005020.2 a numeric vector  
AC005041.1 a numeric vector  
AC005154.5 a numeric vector  
AC005192.1 a numeric vector  
AC005258.1 a numeric vector  
AC005324.2 a numeric vector  
AC005324.3 a numeric vector  
AC005520.1 a numeric vector  
AC005551.1 a numeric vector  
AC005670.2 a numeric vector  
AC005697.1 a numeric vector  
AC005702.1 a numeric vector  
AC005726.1 a numeric vector  
AC005832.4 a numeric vector  
AC005833.1 a numeric vector  
AC005837.2 a numeric vector  
AC005943.1 a numeric vector  
AC006030.1 a numeric vector  
AC006059.2 a numeric vector  
AC006064.6 a numeric vector  
AC006254.1 a numeric vector  
AC006486.1 a numeric vector  
AC006486.3 a numeric vector  
AC006538.2 a numeric vector  
AC006978.2 a numeric vector  
AC007040.2 a numeric vector  
AC007192.1 a numeric vector  
AC007326.4 a numeric vector  
AC007375.2 a numeric vector  
AC007731.4 a numeric vector  
AC007846.2 a numeric vector  
AC007906.2 a numeric vector  
AC007998.2 a numeric vector  
AC008012.1 a numeric vector

AC008073.3 a numeric vector  
AC008162.2 a numeric vector  
AC008397.1 a numeric vector  
AC008397.2 a numeric vector  
AC008403.1 a numeric vector  
AC008481.3 a numeric vector  
AC008537.1 a numeric vector  
AC008575.1 a numeric vector  
AC008581.2 a numeric vector  
AC008676.3 a numeric vector  
AC008687.1 a numeric vector  
AC008687.4 a numeric vector  
AC008687.8 a numeric vector  
AC008695.1 a numeric vector  
AC008750.7 a numeric vector  
AC008758.1 a numeric vector  
AC008758.5 a numeric vector  
AC008758.6 a numeric vector  
AC008763.2 a numeric vector  
AC008763.3 a numeric vector  
AC008763.4 a numeric vector  
AC008764.1 a numeric vector  
AC008764.4 a numeric vector  
AC008770.1 a numeric vector  
AC008770.2 a numeric vector  
AC008770.4 a numeric vector  
AC008878.1 a numeric vector  
AC008878.2 a numeric vector  
AC008878.3 a numeric vector  
AC008982.1 a numeric vector  
AC009070.1 a numeric vector  
AC009133.6 a numeric vector  
AC009163.3 a numeric vector  
AC009163.5 a numeric vector  
AC009412.1 a numeric vector  
AC009690.1 a numeric vector  
AC009690.3 a numeric vector  
AC009779.3 a numeric vector  
AC009879.2 a numeric vector  
AC009879.3 a numeric vector

AC010132.3 a numeric vector  
AC010197.2 a numeric vector  
AC010255.2 a numeric vector  
AC010319.2 a numeric vector  
AC010323.1 a numeric vector  
AC010325.1 a numeric vector  
AC010326.2 a numeric vector  
AC010327.2 a numeric vector  
AC010422.3 a numeric vector  
AC010422.5 a numeric vector  
AC010422.6 a numeric vector  
AC010422.8 a numeric vector  
AC010463.1 a numeric vector  
AC010522.1 a numeric vector  
AC010531.1 a numeric vector  
AC010542.3 a numeric vector  
AC010547.4 a numeric vector  
AC010615.4 a numeric vector  
AC010616.1 a numeric vector  
AC010619.1 a numeric vector  
AC010646.1 a numeric vector  
AC010973.3 a numeric vector  
AC010980.1 a numeric vector  
AC011005.1 a numeric vector  
AC011330.3 a numeric vector  
AC011448.1 a numeric vector  
AC011452.1 a numeric vector  
AC011455.2 a numeric vector  
AC011462.1 a numeric vector  
AC011473.4 a numeric vector  
AC011479.1 a numeric vector  
AC011498.4 a numeric vector  
AC011499.1 a numeric vector  
AC011511.1 a numeric vector  
AC011511.4 a numeric vector  
AC011530.1 a numeric vector  
AC012184.2 a numeric vector  
AC012213.5 a numeric vector  
AC012254.2 a numeric vector  
AC012309.1 a numeric vector

AC012488.2 a numeric vector  
AC012531.3 a numeric vector  
AC012651.1 a numeric vector  
AC013271.1 a numeric vector  
AC013394.1 a numeric vector  
AC013470.2 a numeric vector  
AC013477.1 a numeric vector  
AC013489.1 a numeric vector  
AC013717.1 a numeric vector  
AC015688.4 a numeric vector  
AC015802.6 a numeric vector  
AC015813.2 a numeric vector  
AC017083.3 a numeric vector  
AC018362.3 a numeric vector  
AC018512.1 a numeric vector  
AC018523.2 a numeric vector  
AC018630.4 a numeric vector  
AC018709.1 a numeric vector  
AC018755.2 a numeric vector  
AC018809.3 a numeric vector  
AC019117.3 a numeric vector  
AC019257.8 a numeric vector  
AC020636.2 a numeric vector  
AC020765.6 a numeric vector  
AC020907.6 a numeric vector  
AC020909.1 a numeric vector  
AC020915.4 a numeric vector  
AC020922.1 a numeric vector  
AC021072.1 a numeric vector  
AC021087.5 a numeric vector  
AC021660.3 a numeric vector  
AC022335.1 a numeric vector  
AC022384.1 a numeric vector  
AC022400.5 a numeric vector  
AC022414.1 a numeric vector  
AC022415.2 a numeric vector  
AC022506.1 a numeric vector  
AC022826.2 a numeric vector  
AC023055.1 a numeric vector  
AC024592.3 a numeric vector

AC024598.1 a numeric vector  
AC025165.3 a numeric vector  
AC025165.6 a numeric vector  
AC025263.2 a numeric vector  
AC025283.2 a numeric vector  
AC025287.4 a numeric vector  
AC026316.4 a numeric vector  
AC026464.1 a numeric vector  
AC026464.3 a numeric vector  
AC026464.4 a numeric vector  
AC026464.6 a numeric vector  
AC026786.1 a numeric vector  
AC026954.2 a numeric vector  
AC027644.4 a numeric vector  
AC027796.3 a numeric vector  
AC034102.2 a numeric vector  
AC034228.3 a numeric vector  
AC036214.3 a numeric vector  
AC037459.1 a numeric vector  
AC040162.1 a numeric vector  
AC046185.1 a numeric vector  
AC048338.1 a numeric vector  
AC048338.2 a numeric vector  
AC053503.6 a numeric vector  
AC055811.2 a numeric vector  
AC055839.2 a numeric vector  
AC058822.1 a numeric vector  
AC063943.2 a numeric vector  
AC067968.1 a numeric vector  
AC068234.1 a numeric vector  
AC068533.4 a numeric vector  
AC068547.1 a numeric vector  
AC068580.4 a numeric vector  
AC068631.2 a numeric vector  
AC068775.1 a numeric vector  
AC068831.6 a numeric vector  
AC068870.4 a numeric vector  
AC068896.1 a numeric vector  
AC068946.1 a numeric vector  
AC068946.2 a numeric vector

AC069257.3 a numeric vector  
AC069288.1 a numeric vector  
AC069368.1 a numeric vector  
AC069444.2 a numeric vector  
AC069503.2 a numeric vector  
AC069544.2 a numeric vector  
AC072022.2 a numeric vector  
AC073082.1 a numeric vector  
AC073111.3 a numeric vector  
AC073283.3 a numeric vector  
AC073508.2 a numeric vector  
AC073585.1 a numeric vector  
AC073610.2 a numeric vector  
AC073612.1 a numeric vector  
AC073896.1 a numeric vector  
AC074143.1 a numeric vector  
AC078815.1 a numeric vector  
AC078927.1 a numeric vector  
AC079447.1 a numeric vector  
AC079594.1 a numeric vector  
AC079741.2 a numeric vector  
AC083800.1 a numeric vector  
AC083977.1 a numeric vector  
AC084337.2 a numeric vector  
AC084756.2 a numeric vector  
AC087289.3 a numeric vector  
AC087632.2 a numeric vector  
AC087721.2 a numeric vector  
AC090004.1 a numeric vector  
AC090227.2 a numeric vector  
AC090360.1 a numeric vector  
AC090517.4 a numeric vector  
AC090527.2 a numeric vector  
AC091057.5 a numeric vector  
AC091167.2 a numeric vector  
AC091167.6 a numeric vector  
AC091167.7 a numeric vector  
AC091551.1 a numeric vector  
AC091959.1 a numeric vector  
AC092017.2 a numeric vector

AC092042.3 a numeric vector  
AC092073.1 a numeric vector  
AC092111.3 a numeric vector  
AC092143.1 a numeric vector  
AC092329.3 a numeric vector  
AC092442.1 a numeric vector  
AC092587.1 a numeric vector  
AC092647.5 a numeric vector  
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ANK3 a numeric vector  
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ANKDD1B a numeric vector  
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ANKH a numeric vector  
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ANKK1 a numeric vector  
ANKLE1 a numeric vector

ANKLE2 a numeric vector  
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ANKRA2 a numeric vector  
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ANKRD13B a numeric vector  
ANKRD13C a numeric vector  
ANKRD13D a numeric vector  
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ANKRD33B a numeric vector  
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ANKRD34B a numeric vector  
ANKRD34C a numeric vector  
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ANKRD36 a numeric vector  
ANKRD36B a numeric vector

ANKRD36C a numeric vector  
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ANKZF1 a numeric vector  
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ANO10 a numeric vector  
ANO2 a numeric vector  
ANO3 a numeric vector  
ANO4 a numeric vector  
ANO5 a numeric vector  
ANO6 a numeric vector  
ANO7 a numeric vector

ANO8 a numeric vector  
ANO9 a numeric vector  
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ANP32D a numeric vector  
ANP32E a numeric vector  
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ANTXRL a numeric vector  
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ANXA13 a numeric vector  
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ANXA2R a numeric vector  
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AP000721.1 a numeric vector  
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AP2B1 a numeric vector  
AP2M1 a numeric vector  
AP2S1 a numeric vector  
AP3B1 a numeric vector  
AP3B2 a numeric vector  
AP3D1 a numeric vector  
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AP3M2 a numeric vector  
AP3S1 a numeric vector

AP3S2 a numeric vector  
AP4B1 a numeric vector  
AP4E1 a numeric vector  
AP4M1 a numeric vector  
AP4S1 a numeric vector  
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AP5M1 a numeric vector  
AP5S1 a numeric vector  
AP5Z1 a numeric vector  
APAF1 a numeric vector  
APBA1 a numeric vector  
APBA2 a numeric vector  
APBA3 a numeric vector  
APBB1 a numeric vector  
APBB1IP a numeric vector  
APBB2 a numeric vector  
APBB3 a numeric vector  
APC a numeric vector  
APC2 a numeric vector  
APCDD1 a numeric vector  
APCDD1L a numeric vector  
APCS a numeric vector  
APEH a numeric vector  
APELA a numeric vector  
APEX1 a numeric vector  
APEX2 a numeric vector  
APH1A a numeric vector  
APH1B a numeric vector  
API5 a numeric vector  
APIP a numeric vector  
APLF a numeric vector  
APLN a numeric vector  
APLNR a numeric vector  
APLP1 a numeric vector  
APLP2 a numeric vector  
APMAP a numeric vector  
APOA1 a numeric vector  
APOA2 a numeric vector  
APOA4 a numeric vector  
APOA5 a numeric vector

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APOBEC1 a numeric vector  
APOBEC2 a numeric vector  
APOBEC3A a numeric vector  
APOBEC3B a numeric vector  
APOBEC3C a numeric vector  
APOBEC3D a numeric vector  
APOBEC3F a numeric vector  
APOBEC3G a numeric vector  
APOBEC3H a numeric vector  
APOBEC4 a numeric vector  
APOBR a numeric vector  
APOC1 a numeric vector  
APOC2 a numeric vector  
APOC3 a numeric vector  
APOC4 a numeric vector  
APOC4.APOC2 a numeric vector  
APOD a numeric vector  
APOE a numeric vector  
APOF a numeric vector  
APOH a numeric vector  
APOL1 a numeric vector  
APOL2 a numeric vector  
APOL3 a numeric vector  
APOL4 a numeric vector  
APOL5 a numeric vector  
APOL6 a numeric vector  
APOLD1 a numeric vector  
APOM a numeric vector  
APOO a numeric vector  
APOOL a numeric vector  
APP a numeric vector  
APPBP2 a numeric vector  
APPL1 a numeric vector  
APPL2 a numeric vector  
APRT a numeric vector  
APTX a numeric vector  
AQP1 a numeric vector  
AQP10 a numeric vector  
AQP11 a numeric vector

AQP12A a numeric vector  
AQP12B a numeric vector  
AQP2 a numeric vector  
AQP3 a numeric vector  
AQP4 a numeric vector  
AQP5 a numeric vector  
AQP6 a numeric vector  
AQP7 a numeric vector  
AQP8 a numeric vector  
AQP9 a numeric vector  
AQR a numeric vector  
AR a numeric vector  
ARAF a numeric vector  
ARAP1 a numeric vector  
ARAP2 a numeric vector  
ARAP3 a numeric vector  
ARC a numeric vector  
ARCN1 a numeric vector  
AREG a numeric vector  
AREL1 a numeric vector  
ARF1 a numeric vector  
ARF3 a numeric vector  
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ARF6 a numeric vector  
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ARG2 a numeric vector  
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ARHGAP17 a numeric vector  
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ARHGAP22 a numeric vector  
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ARHGAP25 a numeric vector  
ARHGAP26 a numeric vector  
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ARHGAP29 a numeric vector  
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ARHGAP31 a numeric vector  
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ARHGAP33 a numeric vector  
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ARHGAP39 a numeric vector  
ARHGAP4 a numeric vector  
ARHGAP40 a numeric vector  
ARHGAP42 a numeric vector  
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ARHGAP45 a numeric vector  
ARHGAP5 a numeric vector  
ARHGAP6 a numeric vector  
ARHGAP8 a numeric vector  
ARHGAP9 a numeric vector  
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ARHGDIB a numeric vector  
ARHGDIG a numeric vector  
ARHGEF1 a numeric vector  
ARHGEF10 a numeric vector  
ARHGEF10L a numeric vector

ARHGEF11 a numeric vector  
ARHGEF12 a numeric vector  
ARHGEF15 a numeric vector  
ARHGEF16 a numeric vector  
ARHGEF17 a numeric vector  
ARHGEF18 a numeric vector  
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ARHGEF26 a numeric vector  
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ARHGEF37 a numeric vector  
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ARHGEF5 a numeric vector  
ARHGEF6 a numeric vector  
ARHGEF7 a numeric vector  
ARHGEF9 a numeric vector  
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ARID2 a numeric vector  
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ARID3B a numeric vector  
ARID3BP1 a numeric vector  
ARID3C a numeric vector  
ARID4A a numeric vector  
ARID4B a numeric vector  
ARID5A a numeric vector  
ARID5B a numeric vector  
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ARL10 a numeric vector  
ARL11 a numeric vector  
ARL13A a numeric vector

ARL13B a numeric vector  
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ARL15 a numeric vector  
ARL16 a numeric vector  
ARL17A a numeric vector  
ARL17B a numeric vector  
ARL2 a numeric vector  
ARL2.SNX15 a numeric vector  
ARL2BP a numeric vector  
ARL3 a numeric vector  
ARL4A a numeric vector  
ARL4C a numeric vector  
ARL4D a numeric vector  
ARL5A a numeric vector  
ARL5B a numeric vector  
ARL5C a numeric vector  
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ARRB2 a numeric vector  
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ARRDC4 a numeric vector  
ARRDC5 a numeric vector  
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ARSB a numeric vector  
ARSD a numeric vector  
ARSF a numeric vector  
ARSG a numeric vector  
ARSH a numeric vector

ARSI a numeric vector  
ARSJ a numeric vector  
ARSK a numeric vector  
ARSL a numeric vector  
ART1 a numeric vector  
ART3 a numeric vector  
ART4 a numeric vector  
ART5 a numeric vector  
ARTN a numeric vector  
ARV1 a numeric vector  
ARVCF a numeric vector  
ARX a numeric vector  
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ASAH2B a numeric vector  
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ASAP2 a numeric vector  
ASAP3 a numeric vector  
ASB1 a numeric vector  
ASB10 a numeric vector  
ASB11 a numeric vector  
ASB12 a numeric vector  
ASB13 a numeric vector  
ASB14 a numeric vector  
ASB15 a numeric vector  
ASB16 a numeric vector  
ASB17 a numeric vector  
ASB18 a numeric vector  
ASB2 a numeric vector  
ASB3 a numeric vector  
ASB4 a numeric vector  
ASB5 a numeric vector  
ASB6 a numeric vector  
ASB7 a numeric vector  
ASB8 a numeric vector  
ASB9 a numeric vector  
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ASCC3 a numeric vector

ASCL1 a numeric vector  
ASCL2 a numeric vector  
ASCL3 a numeric vector  
ASCL4 a numeric vector  
ASCL5 a numeric vector  
ASDURF a numeric vector  
ASF1A a numeric vector  
ASF1B a numeric vector  
ASGR1 a numeric vector  
ASGR2 a numeric vector  
ASH1L a numeric vector  
ASH2L a numeric vector  
ASIC1 a numeric vector  
ASIC2 a numeric vector  
ASIC3 a numeric vector  
ASIC4 a numeric vector  
ASIC5 a numeric vector  
ASIP a numeric vector  
ASL a numeric vector  
ASMT a numeric vector  
ASMTL a numeric vector  
ASNS a numeric vector  
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ASPA a numeric vector  
ASPDH a numeric vector  
ASPG a numeric vector  
ASPH a numeric vector  
ASPHD1 a numeric vector  
ASPHD2 a numeric vector  
ASPM a numeric vector  
ASPN a numeric vector  
ASPRV1 a numeric vector  
ASPSCR1 a numeric vector  
ASRGL1 a numeric vector  
ASS1 a numeric vector  
ASTE1 a numeric vector  
ASTL a numeric vector  
ASTN1 a numeric vector  
ASTN2 a numeric vector  
ASXL1 a numeric vector

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ASZ1 a numeric vector  
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ATE1 a numeric vector  
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ATF2 a numeric vector  
ATF3 a numeric vector  
ATF4 a numeric vector  
ATF5 a numeric vector  
ATF6 a numeric vector  
ATF6B a numeric vector  
ATF7 a numeric vector  
ATF7.NPFF a numeric vector  
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ATF7IP2 a numeric vector  
ATG10 a numeric vector  
ATG101 a numeric vector  
ATG12 a numeric vector  
ATG13 a numeric vector  
ATG14 a numeric vector  
ATG16L1 a numeric vector  
ATG16L2 a numeric vector  
ATG2A a numeric vector  
ATG2B a numeric vector  
ATG3 a numeric vector  
ATG4A a numeric vector  
ATG4B a numeric vector  
ATG4C a numeric vector  
ATG4D a numeric vector  
ATG5 a numeric vector  
ATG7 a numeric vector

ATG9A a numeric vector  
ATG9B a numeric vector  
ATIC a numeric vector  
ATL1 a numeric vector  
ATL2 a numeric vector  
ATL3 a numeric vector  
ATM a numeric vector  
ATMIN a numeric vector  
ATN1 a numeric vector  
ATOH1 a numeric vector  
ATOH7 a numeric vector  
ATOH8 a numeric vector  
ATOX1 a numeric vector  
ATP10A a numeric vector  
ATP10B a numeric vector  
ATP10D a numeric vector  
ATP11A a numeric vector  
ATP11B a numeric vector  
ATP11C a numeric vector  
ATP12A a numeric vector  
ATP13A1 a numeric vector  
ATP13A2 a numeric vector  
ATP13A3 a numeric vector  
ATP13A4 a numeric vector  
ATP13A5 a numeric vector  
ATP1A1 a numeric vector  
ATP1A2 a numeric vector  
ATP1A3 a numeric vector  
ATP1A4 a numeric vector  
ATP1B1 a numeric vector  
ATP1B2 a numeric vector  
ATP1B3 a numeric vector  
ATP1B4 a numeric vector  
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ATP2A2 a numeric vector  
ATP2A3 a numeric vector  
ATP2B1 a numeric vector  
ATP2B2 a numeric vector  
ATP2B3 a numeric vector

ATP2B4 a numeric vector  
ATP2C1 a numeric vector  
ATP2C2 a numeric vector  
ATP4A a numeric vector  
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ATP5F1C a numeric vector  
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ATP5MC3 a numeric vector  
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ATP5PB a numeric vector  
ATP5PD a numeric vector  
ATP5PF a numeric vector  
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ATP6V0C a numeric vector  
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ATP6V0E2 a numeric vector  
ATP6V1A a numeric vector  
ATP6V1B1 a numeric vector  
ATP6V1B2 a numeric vector

ATP6V1C1 a numeric vector  
ATP6V1C2 a numeric vector  
ATP6V1D a numeric vector  
ATP6V1E1 a numeric vector  
ATP6V1E2 a numeric vector  
ATP6V1F a numeric vector  
ATP6V1FNB a numeric vector  
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ATP6V1G2 a numeric vector  
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ATP6V1G3 a numeric vector  
ATP6V1H a numeric vector  
ATP7A a numeric vector  
ATP7B a numeric vector  
ATP8A1 a numeric vector  
ATP8A2 a numeric vector  
ATP8B1 a numeric vector  
ATP8B2 a numeric vector  
ATP8B3 a numeric vector  
ATP8B4 a numeric vector  
ATP9A a numeric vector  
ATP9B a numeric vector  
ATPAF1 a numeric vector  
ATPAF2 a numeric vector  
ATPCKMT a numeric vector  
ATR a numeric vector  
ATRAID a numeric vector  
ATRIP a numeric vector  
ATRN a numeric vector  
ATRNL1 a numeric vector  
ATRX a numeric vector  
ATXN1 a numeric vector  
ATXN10 a numeric vector  
ATXN1L a numeric vector  
ATXN2 a numeric vector  
ATXN2L a numeric vector  
ATXN3 a numeric vector  
ATXN3L a numeric vector  
ATXN7 a numeric vector  
ATXN7L1 a numeric vector

ATXN7L2 a numeric vector  
ATXN7L3 a numeric vector  
ATXN7L3B a numeric vector  
AUH a numeric vector  
AUNIP a numeric vector  
AUP1 a numeric vector  
AURKA a numeric vector  
AURKAIP1 a numeric vector  
AURKB a numeric vector  
AURKC a numeric vector  
AUTS2 a numeric vector  
AVEN a numeric vector  
AVIL a numeric vector  
AVL9 a numeric vector  
AVP a numeric vector  
AVPI1 a numeric vector  
AVPR1A a numeric vector  
AVPR1B a numeric vector  
AVPR2 a numeric vector  
AWAT1 a numeric vector  
AWAT2 a numeric vector  
AXDND1 a numeric vector  
AXIN1 a numeric vector  
AXIN2 a numeric vector  
AXL a numeric vector  
AZGP1 a numeric vector  
AZI2 a numeric vector  
AZIN1 a numeric vector  
AZIN2 a numeric vector  
AZU1 a numeric vector  
B2M a numeric vector  
B3GALNT1 a numeric vector  
B3GALNT2 a numeric vector  
B3GALT1 a numeric vector  
B3GALT2 a numeric vector  
B3GALT4 a numeric vector  
B3GALT5 a numeric vector  
B3GALT6 a numeric vector  
B3GAT1 a numeric vector  
B3GAT2 a numeric vector

B3GAT3 a numeric vector  
B3GLCT a numeric vector  
B3GNT10 a numeric vector  
B3GNT2 a numeric vector  
B3GNT3 a numeric vector  
B3GNT4 a numeric vector  
B3GNT5 a numeric vector  
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B3GNT8 a numeric vector  
B3GNT9 a numeric vector  
B3GNTL1 a numeric vector  
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B4GALNT2 a numeric vector  
B4GALNT3 a numeric vector  
B4GALNT4 a numeric vector  
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B4GALT2 a numeric vector  
B4GALT3 a numeric vector  
B4GALT4 a numeric vector  
B4GALT5 a numeric vector  
B4GALT6 a numeric vector  
B4GALT7 a numeric vector  
B4GAT1 a numeric vector  
B9D1 a numeric vector  
B9D2 a numeric vector  
BAALC a numeric vector  
BAAT a numeric vector  
BABAM1 a numeric vector  
BABAM2 a numeric vector  
BACE1 a numeric vector  
BACE2 a numeric vector  
BACH1 a numeric vector  
BACH2 a numeric vector  
BAD a numeric vector  
BAG1 a numeric vector  
BAG2 a numeric vector  
BAG3 a numeric vector  
BAG4 a numeric vector  
BAG5 a numeric vector

BAG6 a numeric vector  
BAHCC1 a numeric vector  
BAHD1 a numeric vector  
BAIAP2 a numeric vector  
BAIAP2L1 a numeric vector  
BAIAP2L2 a numeric vector  
BAIAP3 a numeric vector  
BAK1 a numeric vector  
BAMBI a numeric vector  
BANF1 a numeric vector  
BANF2 a numeric vector  
BANK1 a numeric vector  
BANP a numeric vector  
BAP1 a numeric vector  
BARD1 a numeric vector  
BARHL1 a numeric vector  
BARHL2 a numeric vector  
BARX1 a numeric vector  
BARX2 a numeric vector  
BASP1 a numeric vector  
BATF a numeric vector  
BATF2 a numeric vector  
BATF3 a numeric vector  
BAX a numeric vector  
BAZ1A a numeric vector  
BAZ1B a numeric vector  
BAZ2A a numeric vector

**Details**

This is train FPKM.

**Value**

A data frame with columns X and Y.

**Source**

<https://portal.gdc.cancer.gov/>

**Examples**

```
data(train_FPKM)  
## maybe str(train_FPKM)
```

---

Train_Norm_data	<i>Train Norm data</i>
-----------------	------------------------

---

**Description**

This is Train Norm data.

**Usage**

```
data("Train_Norm_data")
```

**Format**

A data frame with 158 observations on the following 2025 variables.

Age a numeric vector

subtype a character vector

gender a character vector

race a character vector

ajcc\_pathologic\_tumor\_stage a logical vector

histological\_type a character vector

histological\_grade a character vector

treatment\_outcome\_first\_course a character vector

radiation\_treatment\_adjuvant a character vector

sample\_type a character vector

type a character vector

OS a numeric vector

OS.time a numeric vector

DSS a numeric vector

DSS.time a numeric vector

DFI a numeric vector

DFI.time a numeric vector

PFI a numeric vector

PFI.time a numeric vector

OS\_month a numeric vector

A1BG a numeric vector

A1CF a numeric vector

A2M a numeric vector

A2ML1 a numeric vector

A3GALT2 a numeric vector

A4GALT a numeric vector

A4GNT a numeric vector

AAAS a numeric vector

AACS a numeric vector  
AADAC a numeric vector  
AADACL2 a numeric vector  
AADACL3 a numeric vector  
AADACL4 a numeric vector  
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ARPC1B a numeric vector  
ARPC2 a numeric vector  
ARPC3 a numeric vector  
ARPC4 a numeric vector  
ARPC4.TTLL3 a numeric vector  
ARPC5 a numeric vector  
ARPC5L a numeric vector  
ARPIN a numeric vector  
ARPIN.AP3S2 a numeric vector  
ARPP19 a numeric vector  
ARPP21 a numeric vector  
ARR3 a numeric vector  
ARRB1 a numeric vector  
ARRB2 a numeric vector  
ARRDC1 a numeric vector

ARRDC2 a numeric vector  
ARRDC3 a numeric vector  
ARRDC4 a numeric vector  
ARRDC5 a numeric vector  
ARSA a numeric vector  
ARSB a numeric vector  
ARSD a numeric vector  
ARSF a numeric vector  
ARSG a numeric vector  
ARSH a numeric vector  
ARSI a numeric vector  
ARSJ a numeric vector  
ARSK a numeric vector  
ARSL a numeric vector  
ART1 a numeric vector  
ART3 a numeric vector  
ART4 a numeric vector  
ART5 a numeric vector  
ARTN a numeric vector  
ARV1 a numeric vector  
ARVCF a numeric vector  
ARX a numeric vector  
AS3MT a numeric vector  
ASAH1 a numeric vector  
ASAH2 a numeric vector  
ASAH2B a numeric vector  
ASAP1 a numeric vector  
ASAP2 a numeric vector  
ASAP3 a numeric vector  
ASB1 a numeric vector  
ASB10 a numeric vector  
ASB11 a numeric vector  
ASB12 a numeric vector  
ASB13 a numeric vector  
ASB14 a numeric vector  
ASB15 a numeric vector  
ASB16 a numeric vector  
ASB17 a numeric vector  
ASB18 a numeric vector  
ASB2 a numeric vector

ASB3 a numeric vector  
ASB4 a numeric vector  
ASB5 a numeric vector  
ASB6 a numeric vector  
ASB7 a numeric vector  
ASB8 a numeric vector  
ASB9 a numeric vector  
ASCC1 a numeric vector  
ASCC2 a numeric vector  
ASCC3 a numeric vector  
ASCL1 a numeric vector  
ASCL2 a numeric vector  
ASCL3 a numeric vector  
ASCL4 a numeric vector  
ASCL5 a numeric vector  
ASDURF a numeric vector  
ASF1A a numeric vector  
ASF1B a numeric vector  
ASGR1 a numeric vector  
ASGR2 a numeric vector  
ASH1L a numeric vector  
ASH2L a numeric vector  
ASIC1 a numeric vector  
ASIC2 a numeric vector  
ASIC3 a numeric vector  
ASIC4 a numeric vector  
ASIC5 a numeric vector  
ASIP a numeric vector  
ASL a numeric vector  
ASMT a numeric vector  
ASMTL a numeric vector  
ASNS a numeric vector  
ASNSD1 a numeric vector  
ASPA a numeric vector  
ASPDH a numeric vector  
ASPG a numeric vector  
ASPH a numeric vector  
ASPHD1 a numeric vector  
ASPHD2 a numeric vector  
ASPM a numeric vector

ASPN a numeric vector  
ASPRV1 a numeric vector  
ASPSCR1 a numeric vector  
ASRGL1 a numeric vector  
ASS1 a numeric vector  
ASTE1 a numeric vector  
ASTL a numeric vector  
ASTN1 a numeric vector  
ASTN2 a numeric vector  
ASXL1 a numeric vector  
ASXL2 a numeric vector  
ASXL3 a numeric vector  
ASZ1 a numeric vector  
ATAD1 a numeric vector  
ATAD2 a numeric vector  
ATAD2B a numeric vector  
ATAD3A a numeric vector  
ATAD3B a numeric vector  
ATAD3C a numeric vector  
ATAD5 a numeric vector  
ATAT1 a numeric vector  
ATCAY a numeric vector  
ATE1 a numeric vector  
ATF1 a numeric vector  
ATF2 a numeric vector  
ATF3 a numeric vector  
ATF4 a numeric vector  
ATF5 a numeric vector  
ATF6 a numeric vector  
ATF6B a numeric vector  
ATF7 a numeric vector  
ATF7.NPFF a numeric vector  
ATF7IP a numeric vector  
ATF7IP2 a numeric vector  
ATG10 a numeric vector  
ATG101 a numeric vector  
ATG12 a numeric vector  
ATG13 a numeric vector  
ATG14 a numeric vector  
ATG16L1 a numeric vector

ATG16L2 a numeric vector  
ATG2A a numeric vector  
ATG2B a numeric vector  
ATG3 a numeric vector  
ATG4A a numeric vector  
ATG4B a numeric vector  
ATG4C a numeric vector  
ATG4D a numeric vector  
ATG5 a numeric vector  
ATG7 a numeric vector  
ATG9A a numeric vector  
ATG9B a numeric vector  
ATIC a numeric vector  
ATL1 a numeric vector  
ATL2 a numeric vector  
ATL3 a numeric vector  
ATM a numeric vector  
ATMIN a numeric vector  
ATN1 a numeric vector  
ATOH1 a numeric vector  
ATOH7 a numeric vector  
ATOH8 a numeric vector  
ATOX1 a numeric vector  
ATP10A a numeric vector  
ATP10B a numeric vector  
ATP10D a numeric vector  
ATP11A a numeric vector  
ATP11B a numeric vector  
ATP11C a numeric vector  
ATP12A a numeric vector  
ATP13A1 a numeric vector  
ATP13A2 a numeric vector  
ATP13A3 a numeric vector  
ATP13A4 a numeric vector  
ATP13A5 a numeric vector  
ATP1A1 a numeric vector  
ATP1A2 a numeric vector  
ATP1A3 a numeric vector  
ATP1A4 a numeric vector  
ATP1B1 a numeric vector

ATP1B2 a numeric vector  
ATP1B3 a numeric vector  
ATP1B4 a numeric vector  
ATP23 a numeric vector  
ATP2A1 a numeric vector  
ATP2A2 a numeric vector  
ATP2A3 a numeric vector  
ATP2B1 a numeric vector  
ATP2B2 a numeric vector  
ATP2B3 a numeric vector  
ATP2B4 a numeric vector  
ATP2C1 a numeric vector  
ATP2C2 a numeric vector  
ATP4A a numeric vector  
ATP4B a numeric vector  
ATP5F1A a numeric vector  
ATP5F1B a numeric vector  
ATP5F1C a numeric vector  
ATP5F1D a numeric vector  
ATP5F1E a numeric vector  
ATP5IF1 a numeric vector  
ATP5MC1 a numeric vector  
ATP5MC2 a numeric vector  
ATP5MC3 a numeric vector  
ATP5MD a numeric vector  
ATP5ME a numeric vector  
ATP5MF a numeric vector  
ATP5MF.PTCD1 a numeric vector  
ATP5MG a numeric vector  
ATP5MGL a numeric vector  
ATP5MPL a numeric vector  
ATP5PB a numeric vector  
ATP5PD a numeric vector  
ATP5PF a numeric vector  
ATP5P0 a numeric vector  
ATP6AP1 a numeric vector  
ATP6AP1L a numeric vector  
ATP6AP2 a numeric vector  
ATP6V0A1 a numeric vector  
ATP6V0A2 a numeric vector

ATP6V0A4 a numeric vector  
ATP6V0B a numeric vector  
ATP6V0C a numeric vector  
ATP6V0D1 a numeric vector  
ATP6V0D2 a numeric vector  
ATP6V0E1 a numeric vector  
ATP6V0E2 a numeric vector  
ATP6V1A a numeric vector  
ATP6V1B1 a numeric vector  
ATP6V1B2 a numeric vector  
ATP6V1C1 a numeric vector  
ATP6V1C2 a numeric vector  
ATP6V1D a numeric vector  
ATP6V1E1 a numeric vector  
ATP6V1E2 a numeric vector  
ATP6V1F a numeric vector  
ATP6V1FNB a numeric vector  
ATP6V1G1 a numeric vector  
ATP6V1G2 a numeric vector  
ATP6V1G2.DDX39B a numeric vector  
ATP6V1G3 a numeric vector  
ATP6V1H a numeric vector  
ATP7A a numeric vector  
ATP7B a numeric vector  
ATP8A1 a numeric vector  
ATP8A2 a numeric vector  
ATP8B1 a numeric vector  
ATP8B2 a numeric vector  
ATP8B3 a numeric vector  
ATP8B4 a numeric vector  
ATP9A a numeric vector  
ATP9B a numeric vector  
ATPAF1 a numeric vector  
ATPAF2 a numeric vector  
ATPCKMT a numeric vector  
ATR a numeric vector  
ATRAID a numeric vector  
ATRIP a numeric vector  
ATRN a numeric vector  
ATRNL1 a numeric vector

ATRX a numeric vector  
ATXN1 a numeric vector  
ATXN10 a numeric vector  
ATXN1L a numeric vector  
ATXN2 a numeric vector  
ATXN2L a numeric vector  
ATXN3 a numeric vector  
ATXN3L a numeric vector  
ATXN7 a numeric vector  
ATXN7L1 a numeric vector  
ATXN7L2 a numeric vector  
ATXN7L3 a numeric vector  
ATXN7L3B a numeric vector  
AUH a numeric vector  
AUNIP a numeric vector  
AUP1 a numeric vector  
AURKA a numeric vector  
AURKAIP1 a numeric vector  
AURKB a numeric vector  
AURKC a numeric vector  
AUTS2 a numeric vector  
AVEN a numeric vector  
AVIL a numeric vector  
AVL9 a numeric vector  
AVP a numeric vector  
AVPI1 a numeric vector  
AVPR1A a numeric vector  
AVPR1B a numeric vector  
AVPR2 a numeric vector  
AWAT1 a numeric vector  
AWAT2 a numeric vector  
AXDND1 a numeric vector  
AXIN1 a numeric vector  
AXIN2 a numeric vector  
AXL a numeric vector  
AZGP1 a numeric vector  
AZI2 a numeric vector  
AZIN1 a numeric vector  
AZIN2 a numeric vector  
AZU1 a numeric vector

B2M a numeric vector  
B3GALNT1 a numeric vector  
B3GALNT2 a numeric vector  
B3GALT1 a numeric vector  
B3GALT2 a numeric vector  
B3GALT4 a numeric vector  
B3GALT5 a numeric vector  
B3GALT6 a numeric vector  
B3GAT1 a numeric vector  
B3GAT2 a numeric vector  
B3GAT3 a numeric vector  
B3GLCT a numeric vector  
B3GNT10 a numeric vector  
B3GNT2 a numeric vector  
B3GNT3 a numeric vector  
B3GNT4 a numeric vector  
B3GNT5 a numeric vector  
B3GNT6 a numeric vector  
B3GNT7 a numeric vector  
B3GNT8 a numeric vector  
B3GNT9 a numeric vector  
B3GNTL1 a numeric vector  
B4GALNT1 a numeric vector  
B4GALNT2 a numeric vector  
B4GALNT3 a numeric vector  
B4GALNT4 a numeric vector  
B4GALT1 a numeric vector  
B4GALT2 a numeric vector  
B4GALT3 a numeric vector  
B4GALT4 a numeric vector  
B4GALT5 a numeric vector  
B4GALT6 a numeric vector  
B4GALT7 a numeric vector  
B4GAT1 a numeric vector  
B9D1 a numeric vector  
B9D2 a numeric vector  
BAALC a numeric vector  
BAAT a numeric vector  
BABAM1 a numeric vector  
BABAM2 a numeric vector

BACE1 a numeric vector  
BACE2 a numeric vector  
BACH1 a numeric vector  
BACH2 a numeric vector  
BAD a numeric vector  
BAG1 a numeric vector  
BAG2 a numeric vector  
BAG3 a numeric vector  
BAG4 a numeric vector  
BAG5 a numeric vector  
BAG6 a numeric vector  
BAHCC1 a numeric vector  
BAHD1 a numeric vector  
BAIAP2 a numeric vector  
BAIAP2L1 a numeric vector  
BAIAP2L2 a numeric vector  
BAIAP3 a numeric vector  
BAK1 a numeric vector  
BAMBI a numeric vector  
BANF1 a numeric vector  
BANF2 a numeric vector  
BANK1 a numeric vector  
BANP a numeric vector  
BAP1 a numeric vector  
BARD1 a numeric vector  
BARHL1 a numeric vector  
BARHL2 a numeric vector  
BARX1 a numeric vector  
BARX2 a numeric vector  
BASP1 a numeric vector  
BATF a numeric vector  
BATF2 a numeric vector  
BATF3 a numeric vector  
BAX a numeric vector  
BAZ1A a numeric vector  
BAZ1B a numeric vector  
BAZ2A a numeric vector

**Details**

This is Train Norm data.

**Value**

A data frame with columns X and Y.

**Source**

<https://portal.gdc.cancer.gov/>

**Examples**

```
data(Train_Norm_data)
## maybe str(Train_Norm_data)
## plot(Train_Norm_data)
```

---

Train_PI_data	<i>Train PI data</i>
---------------	----------------------

---

**Description**

This is Train PI data.

**Usage**

```
data("Train_PI_data")
```

**Format**

A data frame with 158 observations on the following 57 variables.

OS a numeric vector  
 OS\_month a numeric vector  
 AADACL4 a numeric vector  
 ABCA12 a numeric vector  
 ABCC3 a numeric vector  
 ABI1 a numeric vector  
 ABRA a numeric vector  
 AC006059.2 a numeric vector  
 AC008676.3 a numeric vector  
 AC008764.4 a numeric vector  
 AC010132.3 a numeric vector  
 AC012651.1 a numeric vector  
 AC013477.1 a numeric vector  
 AC109583.1 a numeric vector  
 AC113348.2 a numeric vector  
 AC117457.1 a numeric vector  
 AC131160.1 a numeric vector  
 AC144573.1 a numeric vector

AC235565.2 a numeric vector  
ACO2 a numeric vector  
ACTC1 a numeric vector  
ACTL9 a numeric vector  
ACTRT2 a numeric vector  
ADD3 a numeric vector  
ADGRL3 a numeric vector  
ADH7 a numeric vector  
ADPRHL1 a numeric vector  
ADRA2A a numeric vector  
ADRA2B a numeric vector  
AFMID a numeric vector  
AKAP12 a numeric vector  
AKAP14 a numeric vector  
AKAP3 a numeric vector  
AL139260.3 a numeric vector  
ALG6 a numeric vector  
ANGPTL6 a numeric vector  
ANKRD20A1 a numeric vector  
ANXA6 a numeric vector  
ANXA8L1 a numeric vector  
AOC2 a numeric vector  
APOBEC1 a numeric vector  
APOE a numeric vector  
ARHGAP11B a numeric vector  
ARHGAP12 a numeric vector  
ARHGEF19 a numeric vector  
ARL2.SNX15 a numeric vector  
ARL6IP1 a numeric vector  
ARPC4.TTLL3 a numeric vector  
ASB4 a numeric vector  
ASB5 a numeric vector  
ASB6 a numeric vector  
ASPM a numeric vector  
ATP1A2 a numeric vector  
ATP2B4 a numeric vector  
AZGP1 a numeric vector  
B3GAT2 a numeric vector  
PI a numeric vector

**Details**

This is Train PI data.

**Value**

A data frame with columns X and Y.

**Source**

<https://portal.gdc.cancer.gov/>

**Examples**

```
data(Train_PI_data)
## maybe str(Train_PI_data)
## plot(Train_PI_data)
```

---

 Train\_results

*Training Results for Survival Prediction*


---

**Description**

A data frame containing survival prediction results for training samples. The data includes actual risk group labels, predicted risk groups, probabilities for each class, and overall survival data.

**Usage**

```
data(Train_results)
```

**Format**

A data frame with 158 observations and 8 variables:

**Sample\_ID** Character vector with the unique sample identifier (e.g., "TCGA-E1-5318-01").

**Actual** Factor indicating the actual risk group: "High\_Risk" or "Low\_Risk".

**Predicted\_Risk\_Group** Factor indicating the predicted risk group: "High\_Risk" or "Low\_Risk".

**High\_Risk\_Prob** Numeric value representing the probability of the sample being classified as High Risk.

**Low\_Risk\_Prob** Numeric value representing the probability of the sample being classified as Low Risk.

**Prediction\_Prob** Numeric value representing the maximum class probability (confidence in prediction).

**OS\_month** Integer representing the overall survival time in months.

**OS\_event** Integer indicating the survival event: 1 = death, 0 = censored.

**Source**

The data was derived from TCGA (The Cancer Genome Atlas) using survival prediction models.

---

`train_test_normalization_f`*Train-Test Data Normalization Function*

---

### Description

This function performs normalization on training and test datasets, which include clinical data and gene expression values. The function applies log transformation and quantile normalization to the gene expression values.

### Usage

```
train_test_normalization_f(train_data, test_data, col_num)
```

### Arguments

<code>train_data</code>	A data frame containing the training dataset. The first columns represent clinical data, and the rest represent gene expression data.
<code>test_data</code>	A data frame containing the test dataset. The structure is the same as <code>train_data</code> .
<code>col_num</code>	An integer specifying the starting column index of the gene expression data in the datasets.

### Details

The function performs the following steps:

1. Splits clinical and gene expression data based on `col_num`.
2. Applies log<sub>2</sub> transformation to the gene expression data.
3. Performs quantile normalization on the log-transformed data for both training and test datasets.
4. Combines the clinical data with the normalized gene expression data.

### Value

A list containing four data frames:

**Train\_Clin** A data frame containing the clinical data from the training dataset.

**Test\_Clin** A data frame containing the clinical data from the test dataset.

**Train\_Norm\_data** A data frame containing the combined clinical and normalized gene expression data for the training set.

**Test\_Norm\_data** A data frame containing the combined clinical and normalized gene expression data for the test set.

### Examples

```
# Example datasets
train_data <- data.frame(matrix(rnorm(100), nrow = 10))
test_data <- data.frame(matrix(rnorm(100), nrow = 10))
col_num <- 5
result <- train_test_normalization_f(train_data, test_data, col_num)
str(result$Train_Norm_data)
str(result$Test_Norm_data)
```

---

Train_Uni_sig_data	<i>Train Uni sig data</i>
--------------------	---------------------------

---

**Description**

This is Train Uni sig data.

**Usage**

```
data("Train_Uni_sig_data")
```

**Format**

A data frame with 158 observations on the following 209 variables.

A2ML1 a numeric vector  
AADACL4 a numeric vector  
AAMDC a numeric vector  
AAR2 a numeric vector  
ABCA12 a numeric vector  
ABCB4 a numeric vector  
ABCB5 a numeric vector  
ABCB6 a numeric vector  
ABCC3 a numeric vector  
ABCC9 a numeric vector  
ABCE1 a numeric vector  
ABCF3 a numeric vector  
ABHD12 a numeric vector  
ABHD14B a numeric vector  
ABLIM1 a numeric vector  
ABLIM3 a numeric vector  
ABT1 a numeric vector  
AC004076.1 a numeric vector  
AC005520.1 a numeric vector  
AC005832.4 a numeric vector  
AC006030.1 a numeric vector  
AC008764.4 a numeric vector  
AC010132.3 a numeric vector  
AC013470.2 a numeric vector  
AC027796.3 a numeric vector  
AC097636.1 a numeric vector  
AC106741.1 a numeric vector  
AC131160.1 a numeric vector

AC132217.2 a numeric vector  
AC144573.1 a numeric vector  
ACAP2 a numeric vector  
ACBD5 a numeric vector  
ACE a numeric vector  
ACMSD a numeric vector  
ACO1 a numeric vector  
ACO2 a numeric vector  
ACP5 a numeric vector  
ACRV1 a numeric vector  
ACSBG1 a numeric vector  
ACSM5 a numeric vector  
ACSM6 a numeric vector  
ACTG1 a numeric vector  
ACTN1 a numeric vector  
ACTR3 a numeric vector  
ADAM12 a numeric vector  
ADAM15 a numeric vector  
ADAM19 a numeric vector  
ADAM32 a numeric vector  
ADAMTS18 a numeric vector  
ADAMTS7 a numeric vector  
ADAMTS8 a numeric vector  
ADCK2 a numeric vector  
ADCY2 a numeric vector  
ADCY8 a numeric vector  
ADD3 a numeric vector  
ADGRB3 a numeric vector  
ADGRD2 a numeric vector  
ADGRE2 a numeric vector  
ADGRE5 a numeric vector  
ADGRG7 a numeric vector  
ADGRL4 a numeric vector  
ADGRV1 a numeric vector  
ADH4 a numeric vector  
ADHFE1 a numeric vector  
ADK a numeric vector  
ADNP a numeric vector  
ADPRH a numeric vector  
ADRB2 a numeric vector

ADRM1 a numeric vector  
AEN a numeric vector  
AFAP1L2 a numeric vector  
AGAP1 a numeric vector  
AGGF1 a numeric vector  
AGPS a numeric vector  
AGR3 a numeric vector  
AGRN a numeric vector  
AHCYL1 a numeric vector  
AHNAK a numeric vector  
AK2 a numeric vector  
AK8 a numeric vector  
AKAP3 a numeric vector  
AKAP4 a numeric vector  
AKAP6 a numeric vector  
AKIP1 a numeric vector  
AKR1C1 a numeric vector  
AL121845.3 a numeric vector  
AL160272.2 a numeric vector  
AL365214.2 a numeric vector  
AL391628.1 a numeric vector  
AL445989.1 a numeric vector  
AL591806.2 a numeric vector  
AL669918.1 a numeric vector  
ALDH9A1 a numeric vector  
ALDOB a numeric vector  
ALDOC a numeric vector  
ALG10B a numeric vector  
ALG2 a numeric vector  
ALG3 a numeric vector  
ALG6 a numeric vector  
ALKBH3 a numeric vector  
ALOX5AP a numeric vector  
ALYREF a numeric vector  
AMDHD1 a numeric vector  
AMPD3 a numeric vector  
ANGPTL2 a numeric vector  
ANGPTL5 a numeric vector  
ANKFY1 a numeric vector  
ANKLE2 a numeric vector

ANKRD20A1 a numeric vector  
ANKRD24 a numeric vector  
ANKRD29 a numeric vector  
ANKRD36 a numeric vector  
ANKRD36C a numeric vector  
ANO2 a numeric vector  
ANPEP a numeric vector  
ANXA1 a numeric vector  
ANXA7 a numeric vector  
AP003108.2 a numeric vector  
AP3S1 a numeric vector  
AP3S2 a numeric vector  
APEH a numeric vector  
APEX2 a numeric vector  
APH1A a numeric vector  
APLN a numeric vector  
APOBEC3B a numeric vector  
APOBEC3G a numeric vector  
APOBR a numeric vector  
APOE a numeric vector  
APOL1 a numeric vector  
APOL4 a numeric vector  
APPBP2 a numeric vector  
AQP10 a numeric vector  
AQP7 a numeric vector  
ARAP3 a numeric vector  
ARF4 a numeric vector  
ARFGAP2 a numeric vector  
ARHGAP11A a numeric vector  
ARHGAP11B a numeric vector  
ARHGAP24 a numeric vector  
ARHGAP32 a numeric vector  
ARHGDIG a numeric vector  
ARHGEF17 a numeric vector  
ARHGEF19 a numeric vector  
ARL1 a numeric vector  
ARL15 a numeric vector  
ARL2.SNX15 a numeric vector  
ARL5C a numeric vector  
ARL6IP6 a numeric vector

ARMC4 a numeric vector  
ARMC6 a numeric vector  
ARMC9 a numeric vector  
ARPC3 a numeric vector  
ARPC4 a numeric vector  
ARPP21 a numeric vector  
ARSA a numeric vector  
ARSI a numeric vector  
ARSL a numeric vector  
ART4 a numeric vector  
ASAH2 a numeric vector  
ASAP1 a numeric vector  
ASB12 a numeric vector  
ASCC3 a numeric vector  
ASF1B a numeric vector  
ASIC4 a numeric vector  
ASPH a numeric vector  
ASPM a numeric vector  
ATAD2 a numeric vector  
ATAD5 a numeric vector  
ATG9B a numeric vector  
ATIC a numeric vector  
ATP11A a numeric vector  
ATP11C a numeric vector  
ATP13A4 a numeric vector  
ATP1B2 a numeric vector  
ATP1B3 a numeric vector  
ATP2A3 a numeric vector  
ATP2B1 a numeric vector  
ATP4B a numeric vector  
ATP5F1D a numeric vector  
ATP5MC2 a numeric vector  
ATP5ME a numeric vector  
ATP6V0A4 a numeric vector  
ATP9B a numeric vector  
ATR a numeric vector  
ATRAID a numeric vector  
ATRIP a numeric vector  
ATXN7 a numeric vector  
AUNIP a numeric vector

AURKA a numeric vector  
AVPI1 a numeric vector  
AWAT1 a numeric vector  
AZU1 a numeric vector  
B3GAT2 a numeric vector  
B3GNT7 a numeric vector  
B3GNT8 a numeric vector  
B4GALNT2 a numeric vector  
B4GALT3 a numeric vector  
B4GALT7 a numeric vector  
B4GAT1 a numeric vector  
BACH2 a numeric vector  
BAG3 a numeric vector  
BAG5 a numeric vector  
BAHD1 a numeric vector  
BAIAP3 a numeric vector  
BANK1 a numeric vector  
BASP1 a numeric vector  
BATF2 a numeric vector  
BAX a numeric vector  
BAZ1B a numeric vector

**Details**

This is Train Uni sig data.

**Value**

A data frame with columns X and Y.

**Source**

<https://portal.gdc.cancer.gov/>

**Examples**

```
data(Train_Uni_sig_data)
## maybe str(Train_Uni_sig_data)
## plot(Train_Uni_sig_data)
```

---

`tr_test_f`*Train-Test Split Function*

---

### Description

This function splits a given dataset into training and testing sets based on a specified fraction.

### Usage

```
tr_test_f(data, fraction)
```

### Arguments

<code>data</code>	A data frame containing the dataset to be split.
<code>fraction</code>	A numeric value between 0 and 1 indicating the proportion of data to include in the training set.

### Details

The function checks whether the input data is valid and whether the `fraction` is a number between 0 and 1. It then performs a random split of the dataset into training and testing sets.

### Value

A list containing two data frames:

**train\_data** A data frame containing the training set.

**test\_data** A data frame containing the testing set.

### Examples

```
# Example dataset
data <- data.frame(x = rnorm(100), y = rnorm(100))
fraction <- 0.7
result <- tr_test_f(data, fraction)
head(result$train_data)
head(result$test_data)
```

---

`Univariate_sig_features_f`*Perform Univariate Survival Analysis*

---

### Description

This function performs univariate survival analysis on the provided datasets to identify significant features (genes or clinical features) associated with survival outcomes. It applies Cox proportional hazards models to compute hazard ratios and p-values for median expression cut-offs or clinical feature values.

**Usage**

```

Univariate_sig_features_f(
  train_data,
  test_data,
  col_num,
  surv_time,
  surv_event
)

```

**Arguments**

<code>train_data</code>	A data frame containing the training dataset. It must include survival time and event columns.
<code>test_data</code>	A data frame containing the test dataset. It must include survival time and event columns.
<code>col_num</code>	An integer specifying the column number in the dataset from which feature analysis should begin.
<code>surv_time</code>	A string specifying the name of the survival time column in the dataset.
<code>surv_event</code>	A string specifying the name of the survival event column in the dataset.

**Details**

The function first checks the validity of the input variables, such as whether the survival time and event columns are present in the training and test datasets. It then renames these columns to "OS\_month" and "OS" internally for consistency. For each feature starting from the specified column number (`col_num`), univariate Cox proportional hazards models are fitted to assess the association between the feature and survival outcomes.

For clinical features, a similar process is applied, but the analysis is limited to the initial `col_num - 1` columns.

Significant features are determined based on a p-value threshold of 0.05. The function returns the significant features and their corresponding hazard ratios, p-values, and other related statistics for both training and test datasets.

**Value**

A list containing:

`Univariate_Survival_Significant_genes_List`

A data frame of significant gene features with associated statistics.

`Train_Uni_sig_data`

A data frame of selected significant gene features for the training dataset.

`Test_Uni_sig_data`

A data frame of selected significant gene features for the test dataset.

`Univariate_Survival_Significant_clin_List`

A data frame of significant clinical features with associated statistics.

`Train_Uni_sig_clin_data`

A data frame of selected significant clinical features for the training dataset.

`Test_Uni_sig_clin_data`

A data frame of selected significant clinical features for the test dataset.

**Examples**

```
# Example data (requires real survival datasets for testing)
train_data <- data.frame(
  OS_month = c(10, 15, 20, 25),
  OS = c(1, 0, 1, 1),
  Gene1 = c(2.3, 3.4, 1.2, 2.5),
  Gene2 = c(0.5, 1.8, 0.9, 0.6),
  Clinical1 = c(1, 0, 1, 0)
)
test_data <- data.frame(
  OS_month = c(12, 18, 22, 28),
  OS = c(1, 1, 0, 1),
  Gene1 = c(2.0, 3.1, 1.0, 2.3),
  Gene2 = c(0.4, 1.5, 1.0, 0.7),
  Clinical1 = c(1, 1, 0, 0)
)
#result <- Univariate_sig_features_f(
#  train_data = train_data,
#  test_data = test_data,
#  col_num = 3,
#  surv_time = "OS_month",
#  surv_event = "OS"
#)
```

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