

Package ‘Neoantimon’

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Type Package

Title Neoantimon: A multifunctional R package for identification oftumor-specific neoantigens

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Description This Package has been developed to calculate candidates neoantigens from Mutation Data (.vcf,.txt,string).

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VignetteBuilder knitr

Encoding UTF-8

Depends R (>= 3.3.0)

biocViews

Imports ensemblVEP, devtools, graphics, grDevices, stats, utils

Suggests data.table, knitr, rmarkdown

LazyData FALSE

RoxygenNote 7.0.2

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Export_Summary_Entire_Fragments

Export Summary Count from Indel/SV Results

Description

Export Summary Count from Indel/SV Results

Usage

```
Export_Summary_Entire_Fragments(
  Input,
  Mut_IC50_th = NA,
  Mut_Rank_th = NA,
  Total_RNA_th = NA,
  Tumor_RNA_th = NA,
  MutRatio_th = NA,
  WriteLongIndel = NA,
  DupCount = FALSE
)
```

Arguments

Input	Input file generated from MainSNVClass1,2.
Mut_IC50_th	The threshold for mutant peptide to be neoantigen by IC50.
Mut_Rank_th	The threshold for mutant peptide to be neoantigen by Rank.
Total_RNA_th	The total RNA expression threshold.
Tumor_RNA_th	The tumor specific RNA expression threshold.
MutRatio_th	The mutation ratio threshold.
WriteLongIndel	If setting a file name, Write Long Indels of which the p-value is less than 0.05.
DupCount	Count for each different HLA type

Value

Num_Alteration The number of evaluated alterations.

Num_Alteration_Generating_NeoAg The number of evaluated alterations that can generate neoantigen.

Num_Peptide The number of evaluated peptides.

Num_Peptide_Generating_NeoAg The number of evaluated peptides that can be neoantigen.

Export_Summary_Fragments

Export Summary Count from Indel/SV Results

Description

Export Summary Count from Indel/SV Results

Usage

```
Export_Summary_Fragments(
  Input,
  Mut_IC50_th = NA,
  Mut_Rank_th = NA,
  Total_RNA_th = NA,
  Tumor_RNA_th = NA,
  MutRatio_th = NA,
  WriteLongIndel = NA,
  DupCount = FALSE
)
```

Arguments

Input	Input file generated from MainSNVClass1,2.
Mut_IC50_th	The threshold for mutant peptide to be neoantigen by IC50.
Mut_Rank_th	The threshold for mutant peptide to be neoantigen by Rank.
Total_RNA_th	The total RNA expression threshold.
Tumor_RNA_th	The tumor specific RNA expression threshold.
MutRatio_th	The mutation ratio threshold.
WriteLongIndel	If setting a file name, Write Long Indels of which the p-value is less than 0.05.
DupCount	Count for each different HLA type

Value

Num_Alteration The number of evaluated alterations.

Num_Alteration_Generating_NeoAg The number of evaluated alterations that can generate neoantigen.

Num_Peptide The number of evaluated peptides.

Num_Peptide_Generating_NeoAg The number of evaluated peptides that can be neoantigen.

Export_Summary_IndelSV

Export Summary Count from Indel/SV Results

Description

Export Summary Count from Indel/SV Results

Usage

```
Export_Summary_IndelSV(
  Input,
  Mut_IC50_th = NA,
  Mut_Rank_th = NA,
  Total_RNA_th = NA,
  Tumor_RNA_th = NA,
  MutRatio_th = NA,
  Weight = NA,
  WriteLongIndel = NA,
  IgnoreLongIndel = 0,
  DupCount = FALSE
)
```

Arguments

Input	Input file generated from MainSNVClass1,2.
Mut_IC50_th	The threshold for mutant peptide to be neoantigen by IC50.
Mut_Rank_th	The threshold for mutant peptide to be neoantigen by Rank.
Total_RNA_th	The total RNA expression threshold.
Tumor_RNA_th	The tumor specific RNA expression threshold.
MutRatio_th	The mutation ratio threshold.
Weight	The weight for alterations.
WriteLongIndel	If setting a file name, Write Long Indels of which the p-value is less than 0.05.
IgnoreLongIndel	Ignore Indels of which p-value is less than the indicated value for counting.
DupCount	Count for each different HLA type

Value

Num_Alteration The number of evaluated alterations.

Num_Alteration_Generating_NeoAg The number of evaluated alterations that can generate neoantigen.

Num_Peptide The number of evaluated peptides.

Num_Peptide_Generating_NeoAg The number of evaluated peptides that can be neoantigen.

Export_Summary_IndelSV_perFragments

Export Summary Count from Indel/SV Results

Description

Export Summary Count from Indel/SV Results

Usage

```
Export_Summary_IndelSV_perFragments(
  Input,
  Mut_IC50_th = NA,
  Mut_Rank_th = NA,
  Total_RNA_th = NA,
  Tumor_RNA_th = NA,
  MutRatio_th = NA,
  Weight = NA,
  WriteLongIndel = NA,
  IgnoreLongIndel = 0,
  DupCount = FALSE
)
```

Arguments

Input	Input file generated from MainSNVClass1,2.
Mut_IC50_th	The threshold for mutant peptide to be neoantigen by IC50.
Mut_Rank_th	The threshold for mutant peptide to be neoantigen by Rank.
Total_RNA_th	The total RNA expression threshold.
Tumor_RNA_th	The tumor specific RNA expression threshold.
MutRatio_th	The mutation ratio threshold.
Weight	The weight for alterations.
WriteLongIndel	If setting a file name, Write Long Indels of which the p-value is less than 0.05.
IgnoreLongIndel	Ignore Indels of which p-value is less than the indicated value for counting.
DupCount	Count for each different HLA type

Value

Num_Alteration The number of evaluated alterations.

Num_Alteration_Generating_NeoAg The number of evaluated alterations that can generate neoantigen.

Num_Peptide The number of evaluated peptides.

Num_Peptide_Generating_NeoAg The number of evaluated peptides that can be neoantigen.

Export_Summary_SNV	<i>Export Summary Count from SNV Results</i>
--------------------	--

Description

Export Summary Count from SNV Results

Usage

```
Export_Summary_SNV(
  Input,
  Mut_IC50_th = NA,
  Mut_Rank_th = NA,
  Wt_IC50_th = NA,
  Wt_Rank_th = NA,
  Total_RNA_th = NA,
  Tumor_RNA_th = NA,
  MutRatio_th = NA,
  DupCount = FALSE
)
```

Arguments

Input	Input file generated from MainSNVClass1,2.
Mut_IC50_th	The threshold for mutant peptide to be neoantigen.
Mut_Rank_th	The threshold for mutant peptide to be neoantigen.
Wt_IC50_th	The threshold for wt peptide to be neoantigen.
Wt_Rank_th	The threshold for wt peptide to be neoantigen.
Total_RNA_th	The total RNA expression threshold.
Tumor_RNA_th	The tumor specific RNA expression threshold.
MutRatio_th	The mutation ratio threshold.
DupCount	Count for each different HLA type

Value

Num_Alteration The number of evaluated alterations.

Num_Alteration_Generating_NeoAg The number of evaluated alterations that can generate neoantigen.

Num_Peptide The number of evaluated peptides.

Num_Peptide_Generating_NeoAg The number of evaluated peptides that can be neoantigen.

MainEntireRegionClass1

Calculate A Set All Neoantigen Candidates from A Given Gene Symbol and nm_id for MHC ClassI (Not yet stably available)

Description

Calculate A Set All Neoantigen Candidates from A Given Gene Symbol and nm_id for MHC ClassI (Not yet stably available)

Usage

```
MainEntireRegionClass1(
  input_nm_id,
  group_ids = seq(1:length(input_nm_id)),
  hla_file = "here_is_a_table",
  hla_types = NA,
  file_name_in_hla_table = NA,
  refflat_file = paste(hmdir, "lib/refFlat.txt", sep = "/"),
  refmrna_file = paste(hmdir, "lib/refMrna.fa", sep = "/"),
  hmdir = getwd(),
  job_id = "ID",
  export_dir = paste("result", job_id, "EntireRegion1", sep = "."),
  netMHCpan_dir = paste(hmdir, "lib/netMHCpan-4.0/netMHCpan", sep = "/"),
  peptide_length = c(8, 9, 10, 11, 12, 13),
  reading_frame = 1,
  CalculateIC50 = FALSE,
  IgnoreShortPeptides = TRUE
)
```

Arguments

input_nm_id	(Required) An input amino acid sequence indicated as NM_ID
group_ids	flag to cluster the same group
hla_file	A tab separated file indicating HLA types. The 1st column is input_file name, and the following columns indicate HLA types. See by data(sample_hla_table_c1); sample_hla_table_c1;
hla_types	Set a list of HLA types
file_name_in_hla_table	If the name (1st column) in HLA table is not the same as input_file, indicate the corresponding name (Default=input_file).
refflat_file	refFlat file to be used in constructing peptide. (Default=paste(hmdir, "lib/refFlat.txt", sep="")). See " https://github.com/hase62/Neoantimon "
refmrna_file	refMrna file to be used in constructing peptide (Default=paste(hmdir, "lib/refMrna.fa", sep="")). See " https://github.com/hase62/Neoantimon "
hmdir	Home directory for the analysis (Default = getwd()).

job_id	Job-id to be attached in output files (Default = "NO_job_id").
export_dir	The directory will be stored results (Default = "paste("result", file_name_in_hla_table, job_id, sep=".")")
netMHCpan_dir	The file directory to netMHCpan (Default="lib/netMHCpan-4.0/netMHCpan").
peptide_length	Peptide Length to be generated (Default = 8,9,10,11,12,13).
reading_frame	The starting frame of the input sequence (Default = 1)
CalculateIC50	Whether Calculate IC50 by NetMHCpan or not.
IgnoreShortPeptides	Ignore to output results of Short Peptide Less Than min(peptide_length)
MHCflurry	Also output results using MHCflurry (Default=FALSE).

Value

void (Calculated Neoantigen Files will be generated as .tsv files.):

HLA: HLA type used to calculate neoantigen.

Pos: The position of a fraction of peptide used to be evaluated from the full-length peptide.

Gene: Gene symbol used to be evaluated in NetMHCpan.

Evaluated_Mutant_Peptide: The mutant peptide to be evaluated.

Evaluated_Mutant_Peptide_Core: The core peptide of the mutant peptide to be evaluated in NetMHCpan.

Mut_IC50: IC50 value for evaluated mutant peptide.

Mut_Rank: Rank value for evaluated mutant peptide.

Chr: Chromosome Number of the mutation.

NM_ID: NM_ID used to construct peptides from the mutation.

Change: The annotation to be described in .vcf file.

Ref: reference type nucleic acid base.

Alt: alternative type nucleic acid base.

Prob: A probability of reference nucleic acid base described in .vcf file.

Mutation_Prob: A probability of alternative nucleic acid base described in .vcf file.

Exon_Start: The exon start position of the corresponding NM_ID.

Exon_End: The exon end position of the corresponding NM_ID.

Mutation_Position: The mutation position of the corresponding NM_ID.

Total_Depth: The sum depth of the reference and alternative nucleic acid base.

Tumor_Depth: The depth of the alternative nucleic acid base.

Wt_Peptide: The full-length of the wild-type peptide.

Mutant_Peptide: The full-length of the mutant peptide.

Total_RNA: The expression amount of the corresponding RNA.

Tumor_RNA_Ratio: The variant allele frequency of the corresponding RNA.

Tumor_RNA: The modified amount of the corresponding RNA level based on RNA Reads.

Tumor_RNA_based_on_DNA: The modified amount of the corresponding RNA level based on DNA Reads.

MutRatio: The mean value of the cancer cell fraction probability.

MutRatio_Min: The 1% percentile of the cancer cell fraction probability.

MutRatio_Max: The 99% percentile of the cancer cell fraction probability.

MainEntireRegionClass2

Calculate A Set All Neoantigen Candidates from A Given Gene Symbol and nm_id for MHC Class2 (Not yet stably available)

Description

Calculate A Set All Neoantigen Candidates from A Given Gene Symbol and nm_id for MHC Class2 (Not yet stably available)

Usage

```
MainEntireRegionClass2(
  input_nm_id,
  group_ids = seq(1:length(input_nm_id)),
  hla_file = "here_is_a_table",
  hla_types = NA,
  file_name_in_hla_table = NA,
  refflat_file = paste(hmdir, "lib/refFlat.txt", sep = "/"),
  refmrna_file = paste(hmdir, "lib/refMrna.fa", sep = "/"),
  hmdir = getwd(),
  job_id = "ID",
  export_dir = paste("result", job_id, "EntireRegion2", sep = "."),
  netMHCIIpan_dir = paste(hmdir, "lib/netMHCIIpan-3.1/netMHCIIpan", sep = "/"),
  peptide_length = c(15),
  reading_frame = 1,
  CalculateIC50 = FALSE,
  IgnoreShortPeptides = TRUE
)
```

Arguments

input_nm_id	(Required) An input amino acid sequence indicated as NM_ID
group_ids	flag to cluster the same group
hla_file	A tab separated file indicating HLA types. The 1st column is input_file name, and the following columns indicate HLA types. See by data(sample_hla_table_c1); sample_hla_table_c1;
hla_types	Set a list of HLA types
file_name_in_hla_table	If the name (1st column) in HLA table is not the same as input_file, indicate the corresponding name (Default=input_file).
refflat_file	refFlat file to be used in constructing peptide. (Default=paste(hmdir, "lib/refFlat.txt", sep="")). See " https://github.com/hase62/Neoantimon "
refmrna_file	refMrna file to be used in constructing peptide (Default=paste(hmdir, "lib/refMrna.fa", sep="")). See " https://github.com/hase62/Neoantimon "
hmdir	Home directory for the analysis (Default = getwd()).

job_id	Job-id to be attached in output files (Default = "NO_job_id").
export_dir	The directory will be stored results (Default = "paste("result", file_name_in_hla_table, job_id, sep=".")")
netMHCIIpan_dir	The file directory to netMHCpan (Default="lib/netMHCIIpan-3.2/netMHCIIpan").
peptide_length	Peptide Length to be generated (Default = 8,9,10,11,12,13).
reading_frame	The starting frame of the input sequence (Default = 1)
CalculateIC50	Whether Calculate IC50 by NetMHCpan or not.
IgnoreShortPeptides	Ignore to output results of Short Peptide Less Than min(peptide_length)

Value

void (Calculated Neoantigen Files will be generated as .tsv files.):

HLA: HLA type used to calculate neoantigen.

Pos: The position of a fraction of peptide used to be evaluated from the full-length peptide.

Gene: Gene symbol used to be evaluated in NetMHCpan.

Evaluated_Mutant_Peptide: The mutant peptide to be evaluated.

Evaluated_Mutant_Peptide_Core: The core peptide of the mutant peptide to be evaluated in NetMHCpan.

Mut_IC50: IC50 value for evaluated mutant peptide.

Mut_Rank: Rank value for evaluated mutant peptide.

Chr: Chromosome Number of the mutation.

NM_ID: NM_ID used to construct peptides from the mutation.

Change: The annotation to be described in .vcf file.

Ref: reference type nucleic acid base.

Alt: alternative type nucleic acid base.

Prob: A probability of reference nucleic acid base described in .vcf file.

Mutation_Prob: A probability of alternative nucleic acid base described in .vcf file.

Exon_Start: The exon start position of the corresponding NM_ID.

Exon_End: The exon end position of the corresponding NM_ID.

Mutation_Position: The mutation position of the corresponding NM_ID.

Total_Depth: The sum depth of the reference and alternative nucleic acid base.

Tumor_Depth: The depth of the alternative nucleic acid base.

Wt_Peptide: The full-length of the wild-type peptide.

Mutant_Peptide: The full-length of the mutant peptide.

Total_RNA: The expression amount of the corresponding RNA.

Tumor_RNA_Ratio: The variant allele frequency of the corresponding RNA.

Tumor_RNA: The modified amount of the corresponding RNA level based on RNA Reads.

Tumor_RNA_based_on_DNA: The modified amount of the corresponding RNA level based on DNA Reads.

MutRatio: The mean value of the cancer cell fraction probability.

MutRatio_Min: The 1% percentile of the cancer cell fraction probability.

MutRatio_Max: The 99% percentile of the cancer cell fraction probability.

MainINDELClass1

*Calculate Neoantigen Candidates on INDELs for MHC ClassI***Description**

Calculate Neoantigen Candidates on INDELs for MHC ClassI

Usage

```

MainINDELClass1(
  input_file,
  hla_file = "here_is_a_table",
  hla_types = NA,
  file_name_in_hla_table = input_file,
  refflat_file = paste(hmdir, "lib/refFlat.txt", sep = "/"),
  refmrna_file = paste(hmdir, "lib/refMrna.fa", sep = "/"),
  hmdir = getwd(),
  job_id = "ID",
  export_dir = paste("result", job_id, "INDEL1", sep = "."),
  rnaexp_file = NA,
  rnabam_file = NA,
  cnv_file = NA,
  purity = 1,
  netMHCpan_dir = paste(hmdir, "lib/netMHCpan-4.0/netMHCpan", sep = "/"),
  MHCflurry = NA,
  refdna_file = NA,
  samtools_dir = "samtools",
  bcftools_dir = NA,
  chr_column = NA,
  mutation_start_column = NA,
  mutation_end_column = NA,
  mutation_ref_column = NA,
  mutation_alt_column = NA,
  nm_id_column = NA,
  depth_normal_column = NA,
  depth_tumor_column = NA,
  ambiguous_between_exon = 0,
  ambiguous_codon = 0,
  peptide_length = c(8, 9, 10, 11, 12, 13),
  IgnoreShortPeptides = TRUE,
  SNPs = NA,
  multiple_variants = FALSE,
  apply_annotation = FALSE
)

```

Arguments

input_file (Required) An input vcf file annotated by, e.g., ANNOVAR (<http://annovar.openbioinformatics.org/en/latest/>) or other softwares.
See by `data(sample_vcf)`; `sample_vcf`;

hla_file	A tab separated file indicating HLA types. The 1st column is input_file name, and the following columns indicate HLA types. See by data(sample_hla_table_c1); sample_hla_table_c1;
hla_types	Set a list of HLA types
file_name_in_hla_table	If the name (1st column) in HLA table is not the same as input_file, indicate the corresponding name (Default=input_file).
refflat_file	refFlat file to be used in constructing peptide. (Default=paste(hmdir, "lib/refFlat.txt", sep=""). See " https://github.com/hase62/Neoantimon "
refmrna_file	refMrna file to be used in constructing peptide (Default=paste(hmdir, "lib/refMrna.fa", sep=""). See " https://github.com/hase62/Neoantimon "
hmdir	Home directory for the analysis (Default = getwd()).
job_id	Job-id to be attached in output files (Default = "NO_job_id").
export_dir	The directory will be stored results (Default = "paste("result", file_name_in_hla_table, job_id, sep=".")")
rnaexp_file	A file including RNA expressions (Default=NA). The 1st, 2nd and 3rd columns are "GeneSymbol Chr:Exonstart-Exonend (locus) ExpressionAmount", respectively. The 1st row should be any header. See by data(sample_rna_exp); sample_rna_exp;
rnabam_file	RNA bam file to calculate variant allele frequency of RNA at each mutation (Default=NA).
cnv_file	A file including copy number variation to calculate cancer cell fraction probability (CCFP) (Default=NA). The format is according to ASCAT output files. The columns are "SNPName Chromosome Position LogR segmentedLogR BAF segmentedBAF CopyNumber MinorAllele RawCopyNumber" The 1st row should be the above header. See data(sample_copynum); sample_copynum;
purity	Tumor purity or tumor contents ratio required to calculate CCFP (Default=1).
netMHCpan_dir	The file directory to netMHCpan (Default="lib/netMHCpan-4.0/netMHCpan").
MHCflurry	Also output results using MHCflurry (Default=FALSE).
refdna_file	refdna_file information to be used to calculate RNA VAF (Default=NA). See " https://github.com/hase62/Neoantimon "
samtools_dir	The file directory to samtools_0_x_x (Default="samtools"). It should be indicated when you indicate RNA-bam and try to calculate RNA VAF.
bcftools_dir	The file directory to netMHCpan (Default="bcftools"). It should be indicated when you indicate RNA-bam and try to calculate RNA VAF. samtools 0_x_x includes bcftools in the directory.
chr_column	The column number describing chromosome number in input_file (Default=NA, but will automatically search "Chr" in header).
mutation_start_column	The column number describing mutation start Position in input_file (Default=NA, but will automatically search "Start" in header) .
mutation_end_column	The column number describing mutation end Position in input_file (Default=NA, but will automatically search "End" in header).

mutation_ref_column	The column number describing mutation Ref in input_file (Default=NA, but will automatically search "Ref" in header).
mutation_alt_column	The column number describing mutation Alt in input_file (Default=NA, but will automatically search "Alt" in header).
nm_id_column	The column number describing NM IDs in input_file such as "SLCO1C1:NM_001145944:exon7:c.692_693insG:p.L231fs" (Default=NA).
depth_normal_column	The column number describing the read count from normal cells (Default = NA).
depth_tumor_column	The column number describing the read count from tumor cells (Default = NA).
ambiguous_between_exon	The maximum number to permit the differences between Exon-Lengths from refFlat and refMrna (Default=0).
ambiguous_codon	The maximum number to permit the differences between inputfile- and refMrna-oriented translation start/end position (Default=0).
peptide_length	Peptide Length to be generated (Default = 8,9,10,11,12,13).
IgnoreShortPeptides	Ignore to output results of Short Peptide Less Than min(peptide_length)
SNPs	Apply individual SNPs on peptides by indicate a vcf file.
multiple_variants	Reflect multiple variants on a peptide, e.g., SNVs on frameshift region.
apply_annotation	Annotate by Ensembl Variant Effect Predictor (VEP).

Value

void (Calculated Neoantigen Files will be generated as .tsv files.):

HLA: HLA type used to calculate neoantigen.

Pos: The position of a fraction of peptide used to be evaluated from the full-length peptide.

Gene: Gene symbol used to be evaluated in NetMHCpan.

Evaluated_Mutant_Peptide: The mutant peptide to be evaluated.

Evaluated_Mutant_Peptide_Core: The core peptide of the mutant peptide to be evaluated in NetMHCpan.

Mut_IC50: IC50 value for evaluated mutant peptide.

Mut_Rank: Rank value for evaluated mutant peptide.

Chr: Chromosome Number of the mutation.

NM_ID: NM_ID used to construct peptides from the mutation.

Change: The annotation to be described in .vcf file.

Ref: reference type nucleic acid base.

Alt: alternative type nucleic acid base.

Prob: A probability of reference nucleic acid base described in .vcf file.

Mutation_Prob: A probability of alternative nucleic acid base described in .vcf file.

Exon_Start: The exon start position of the corresponding NM_ID.
 Exon_End: The exon end position of the corresponding NM_ID.
 Mutation_Position: The mutation position of the corresponding NM_ID.
 Total_Depth: The sum depth of the reference and alternative nucleic acid base.
 Tumor_Depth: The depth of the alternative nucleic acid base.
 Wt_Peptide: The full-length of the wild-type peptide.
 Mutant_Peptide: The full-length of the mutant peptide.
 Total_RNA: The expression amount of the corresponding RNA.
 Tumor_RNA_Ratio: The variant allele frequency of the corresponding RNA.
 Tumor_RNA: The modified amount of the corresponding RNA level based on RNA Reads.
 Tumor_RNA_based_on_DNA: The modified amount of the corresponding RNA level based on DNA Reads.
 MutRatio: The mean value of the cancer cell fraction probability.
 MutRatio_Min: The 1% percentile of the cancer cell fraction probability.
 MutRatio_Max: The 99% percentile of the cancer cell fraction probability.

MainINDELClass2

Calculate Neoantigen Candidates on INDELs for MHC Class2

Description

Calculate Neoantigen Candidates on INDELs for MHC Class2

Usage

```
MainINDELClass2(
  input_file,
  hla_file = "here_is_a_table",
  hla_types = NA,
  file_name_in_hla_table = input_file,
  refFlat_file = paste(hmdir, "lib/refFlat.txt", sep = "/"),
  refmrna_file = paste(hmdir, "lib/refMrna.fa", sep = "/"),
  hmdir = getwd(),
  job_id = "ID",
  export_dir = paste("result", job_id, "INDEL2", sep = "."),
  rnaexp_file = NA,
  rnabam_file = NA,
  cnv_file = NA,
  purity = 1,
  netMHCIipan_dir = paste(hmdir, "lib/netMHCIipan-3.1/netMHCIipan", sep = "/"),
  refdna_file = NA,
  samtools_dir = "samtools",
  bcftools_dir = NA,
  chr_column = NA,
  mutation_start_column = NA,
  mutation_end_column = NA,
  mutation_ref_column = NA,
```

```

mutation_alt_column = NA,
nm_id_column = NA,
depth_normal_column = NA,
depth_tumor_column = NA,
ambiguous_between_exon = 0,
ambiguous_codon = 0,
peptide_length = c(15),
IgnoreShortPeptides = TRUE,
SNPs = NA,
multiple_variants = FALSE,
apply_annotation = FALSE
)

```

Arguments

input_file	(Required) An input vcf file annotated by, e.g., ANNOVAR (http://annovar.openbioinformatics.org/en/latest/) or other softwares. See by data(sample_vcf); sample_vcf;
hla_file	A tab separated file indicating HLA types. The 1st column is input_file name, and the following columns indicate HLA types. See by data(sample_hla_table_c2); sample_hla_table_c2;
hla_types	Set a list of HLA types
file_name_in_hla_table	If the name (1st column) in HLA table is not the same as input_file, indicate the corresponding name (Default=input_file).
refflat_file	refFlat file to be used in constructing peptide. (Default=paste(hmdir, "lib/refFlat.txt", sep="")). See " https://github.com/hase62/Neoantimon "
refmrna_file	refMrna file to be used in constructing peptide (Default=paste(hmdir, "lib/refMrna.fa", sep="")). See " https://github.com/hase62/Neoantimon "
hmdir	Home directory for the analysis (Default = getwd()).
job_id	Job-Id to be attached in output files (Default = "NO_job_id").
export_dir	The directory will be stored results (Default = "paste("result", file_name_in_hla_table, job_id, sep=".")")
rnaexp_file	A file including RNA expressions (Default=NA). The 1st, 2nd and 3rd columns are "GeneSymbol Chr:Exonstart-Exonend (locus) ExpressionAmount", respectively. The 1st row should be any header. See by data(sample_rna_exp); sample_rna_exp;
rnabam_file	RNA bam file to calculate variant allele frequency of RNA at each mutation (Default=NA).
cnv_file	A file including copy number variation to calculate cancer cell fraction probability (CCFP) (Default=NA). The format is according to ASCAT output files. The columns are "SNPName Chromosome Position LogR segmentedLogR BAF segmentedBAF CopyNumber MinorAllele RawCopyNumber" The 1st row should be the above header. See data(sample_copynum); sample_copynum;

purity	Tumor purity or tumor contents ratio required to calculate CCFP (Default=1).
netMHCIipan_dir	The file directory to netMHCpan (Default="lib/netMHCIipan-3.2/netMHCpan").
refdna_file	refdna_file information to be used to calculate RNA VAF (Default=NA). See " https://github.com/hase62/Neoantimon "
samtools_dir	The file directory to samtools_0_x_x (Default="samtools"). It should be indicated when you indicate RNA-bam and try to calculate RNA VAF.
bcftools_dir	The file directory to netMHCpan (Default="bcftools"). It should be indicated when you indicate RNA-bam and try to calculate RNA VAF. samtools 0_x_x includes bcftools in the directory.
chr_column	The column number describing chromosome number in input_file (Default=NA, but will automatically search "Chr" in header).
mutation_start_column	The column number describing mutation start Position in input_file (Default=NA, but will automatically search "Start" in header) .
mutation_end_column	The column number describing mutation end Position in input_file (Default=NA, but will automatically search "End" in header).
mutation_ref_column	The column number describing mutation Ref in input_file (Default=NA, but will automatically search "Ref" in header).
mutation_alt_column	The column number describing mutation Alt in input_file (Default=NA, but will automatically search "Alt" in header).
nm_id_column	The column number describing NM IDs in input_file such as "SLCO1C1:NM_001145944:exon7:c.692_693insG:p.L231fs" (Default=NA).
depth_normal_column	The column number describing the read count from normal cells (Default = NA).
depth_tumor_column	The column number describing the read count from tumor cells (Default = NA).
ambiguous_between_exon	The maximum number to permit the differences between Exon-Lengths from refFlat and refMrna (Default=0).
ambiguous_codon	The maximum number to permit the differences between inputfile- and refMrna-oriented translation start/end position (Default=0).
peptide_length	Peptide Length to be generated (Default = 15 in HLA Class2).
IgnoreShortPeptides	Ignore to output results of Short Peptide Less Than min(peptide_length)
SNPs	Apply individual SNPs on peptides by indicate a vcf file.
multiple_variants	Reflect multiple variants on a peptide, e.g., SNVs on frameshift region.
apply_annotation	Annotate by Ensembl Variant Effect Predictor (VEP).

Value

void (Calculated Neoantigen Files will be generated as .tsv files.):

HLA: HLA type used to calculate neoantigen.

Pos: The position of a fraction of peptide used to be evaluated from the full-length peptide.

Gene: Gene symbol used to be evaluated in NetMHCpan.

Evaluated_Mutant_Peptide: The mutant peptide to be evaluated.

Evaluated_Mutant_Peptide_Core: The core peptide of the mutant peptide to be evaluated in NetMHCpan.

Mut_IC50: IC50 value for evaluated mutant peptide.

Mut_Rank: Rank value for evaluated mutant peptide.

Chr: Chromosome Number of the mutation.

NM_ID: NM_ID used to construct peptides from the mutation.

Change: The annotation to be described in .vcf file.

Ref: reference type nucleic acid base.

Alt: alternative type nucleic acid base.

Prob: A probability of reference nucleic acid base described in .vcf file.

Mutation_Prob: A probability of alternative nucleic acid base described in .vcf file.

Exon_Start: The exon start position of the corresponding NM_ID.

Exon_End: The exon end position of the corresponding NM_ID.

Mutation_Position: The mutation position of the corresponding NM_ID.

Total_Depth: The sum depth of the reference and alternative nucleic acid base.

Tumor_Depth: The depth of the alternative nucleic acid base.

Wt_Peptide: The full-length of the wild-type peptide.

Mutant_Peptide: The full-length of the mutant peptide.

Total_RNA: The expression amount of the corresponding RNA.

Tumor_RNA_Ratio: The variant allele frequency of the corresponding RNA.

Tumor_RNA: The modified amount of the corresponding RNA level based on RNA Reads.

Tumor_RNA_based_on_DNA: The modified amount of the corresponding RNA level based on DNA Reads.

MutRatio: The mean value of the cancer cell fraction probability.

MutRatio_Min: The 1% percentile of the cancer cell fraction probability.

MutRatio_Max: The 99% percentile of the cancer cell fraction probability.

MainSeqFragmentClass1 *Calculate Neoantigen Candidates from A Given Sequence for MHC Class1*

Description

Calculate Neoantigen Candidates from A Given Sequence for MHC Class1

Usage

```
MainSeqFragmentClass1(
  input_sequence = NA,
  group_ids = seq(1:length(reference_nm_id)),
  hla_file = "here_is_a_table",
  hla_types = NA,
  file_name_in_hla_table = NA,
  refflat_file = paste(hmdir, "lib/refFlat.txt", sep = "/"),
  refmrna_file = paste(hmdir, "lib/refMrna.fa", sep = "/"),
  hmdir = getwd(),
  job_id = "ID",
  export_dir = paste("result", job_id, "SeqFragment1", sep = "."),
  netMHCpan_dir = paste(hmdir, "lib/netMHCpan-4.0/netMHCpan", sep = "/"),
  peptide_length = c(8, 9, 10, 11, 12, 13),
  reference_nm_id = NA,
  reference_gene_symbol = NA,
  IgnoreShortPeptides = TRUE
)
```

Arguments

input_sequence	(Required) An input amino acid sequence
group_ids	flag to cluster the same group
hla_file	A tab separated file indicating HLA types. The 1st column is input_file name, and the following columns indicate HLA types. See by data(sample_hla_table_c1); sample_hla_table_c1;
hla_types	Set a list of HLA types
file_name_in_hla_table	If the name (1st column) in HLA table is not the same as input_file, indicate the corresponding name (Default=input_file).
refflat_file	refFlat file to be used in constructing peptide. (Default=paste(hmdir, "lib/refFlat.txt", sep="")). See " https://github.com/hase62/Neoantimon "
refmrna_file	refMrna file to be used in constructing peptide (Default=paste(hmdir, "lib/refMrna.fa", sep="")). See " https://github.com/hase62/Neoantimon "
hmdir	Home directory for the analysis (Default = getwd()).
job_id	Job-Id to be attached in output files (Default = "NO_job_id").

export_dir	The directory will be stored results (Default = "paste("result", file_name_in_hla_table, job_id, sep=".")")
netMHCpan_dir	The file directory to netMHCpan (Default="lib/netMHCpan-4.0/netMHCpan").
peptide_length	Peptide Length to be generated (Default = 8,9,10,11,12,13).
reference_nm_id	Corresponding original sequences that the input sequence is generated. If fractions of peptides generated from the input are included in the indicated protein, such peptides are removed. It can be indicated when gene_symbol is not NA.
reference_gene_symbol	Corresponding original sequences that the input sequence is generated. If fractions of peptides generated from the input are included in the indicated protein, such peptides are removed. It can be indicated when nm_id is not NA.
IgnoreShortPeptides	Ignore to output results of Short Peptide Less Than min(peptide_length)

Value

void (Calculated Neoantigen Files will be generated as .tsv files.):

HLA: HLA type used to calculate neoantigen.

Pos: The position of a fraction of peptide used to be evaluated from the full-length peptide.

Gene: Gene symbol used to be evaluated in NetMHCpan.

Evaluated_Mutant_Peptide: The mutant peptide to be evaluated.

Evaluated_Mutant_Peptide_Core: The core peptide of the mutant peptide to be evaluated in NetMHCpan.

Mut_IC50: IC50 value for evaluated mutant peptide.

Mut_Rank: Rank value for evaluated mutant peptide.

Chr: Chromosome Number of the mutation.

NM_ID: NM_ID used to construct peptides from the mutation.

Change: The annotation to be described in .vcf file.

Ref: reference type nucleic acid base.

Alt: alternative type nucleic acid base.

Prob: A probability of reference nucleic acid base described in .vcf file.

Mutation_Prob: A probability of alternative nucleic acid base described in .vcf file.

Exon_Start: The exon start position of the corresponding NM_ID.

Exon_End: The exon end position of the corresponding NM_ID.

Mutation_Position: The mutation position of the corresponding NM_ID.

Total_Depth: The sum depth of the reference and alternative nucleic acid base.

Tumor_Depth: The depth of the alternative nucleic acid base.

Wt_Peptide: The full-length of the wild-type peptide.

Mutant_Peptide: The full-length of the mutant peptide.

Total_RNA: The expression amount of the corresponding RNA.

Tumor_RNA_Ratio: The variant allele frequency of the corresponding RNA.

Tumor_RNA: The modified amount of the corresponding RNA level based on RNA Reads.

Tumor_RNA_based_on_DNA: The modified amount of the corresponding RNA level based on DNA Reads.

MutRatio: The mean value of the cancer cell fraction probability.

MutRatio_Min: The 1% percentile of the cancer cell fraction probability.

MutRatio_Max: The 99% percentile of the cancer cell fraction probability.

MainSeqFragmentClass2 *Calculate Neoantigen Candidates from A Given Sequence for MHC Class2*

Description

Calculate Neoantigen Candidates from A Given Sequence for MHC Class2

Usage

```
MainSeqFragmentClass2(
  input_sequence = NA,
  group_ids = seq(1:length(reference_nm_id)),
  hla_file = "here_is_a_table",
  hla_types = NA,
  file_name_in_hla_table = NA,
  refFlat_file = paste(hmdir, "lib/refFlat.txt", sep = "/"),
  refmrna_file = paste(hmdir, "lib/refMrna.fa", sep = "/"),
  hmdir = getwd(),
  job_id = "ID",
  export_dir = paste("result", job_id, "SeqFragment2", sep = "."),
  netMHCIipan_dir = paste(hmdir, "lib/netMHCIipan-3.1/netMHCIipan", sep = "/"),
  peptide_length = c(15),
  reference_nm_id = NA,
  reference_gene_symbol = NA,
  IgnoreShortPeptides = TRUE
)
```

Arguments

input_sequence	(Required) An input amino acid sequence
group_ids	flag to cluster the same group
hla_file	A tab separated file indicating HLA types. The 1st column is input_file name, and the following columns indicate HLA types. See by data(sample_hla_table_c1); sample_hla_table_c1;
hla_types	Set a list of HLA types
file_name_in_hla_table	If the name (1st column) in HLA table is not the same as input_file, indicate the corresponding name (Default=input_file).
refFlat_file	refFlat file to be used in constructing peptide. (Default=paste(hmdir, "lib/refFlat.txt", sep="")). See " https://github.com/hase62/Neoantimon "

refmrna_file	refMrna file to be used in constructing peptide (Default=paste(hmdir, "lib/refMrna.fa", sep=""). See " https://github.com/hase62/Neoantimon "
hmdir	Home directory for the analysis (Default = getwd()).
job_id	Job-Id to be attached in output files (Default = "NO_job_id").
export_dir	The directory will be stored results (Default = "paste("result", file_name_in_hla_table, job_id, sep=".")")
netMHCIIpan_dir	The file directory to netMHCpan (Default="lib/netMHCIIpan-3.2/netMHCIIpan").
peptide_length	Peptide Length to be generated (Default = 8,9,10,11,12,13).
reference_nm_id	Corresponding original sequences that the input sequence is generated. If fractions of peptides generated from the input are included in the indicated protein, such peptides are removed. It can be indicated when gene_symbol is not NA.
reference_gene_symbol	Corresponding original sequences that the input sequence is generated. If fractions of peptides generated from the input are included in the indicated protein, such peptides are removed. It can be indicated when nm_id is not NA.
IgnoreShortPeptides	Ignore to output results of Short Peptide Less Than min(peptide_length)

Value

void (Calculated Neoantigen Files will be generated as .tsv files.):

HLA: HLA type used to calculate neoantigen.

Pos: The position of a fraction of peptide used to be evaluated from the full-length peptide.

Gene: Gene symbol used to be evaluated in NetMHCpan.

Evaluated_Mutant_Peptide: The mutant peptide to be evaluated.

Evaluated_Mutant_Peptide_Core: The core peptide of the mutant peptide to be evaluated in NetMHCpan.

Mut_IC50: IC50 value for evaluated mutant peptide.

Mut_Rank: Rank value for evaluated mutant peptide.

Chr: Chromosome Number of the mutation.

NM_ID: NM_ID used to construct peptides from the mutation.

Change: The annotation to be described in .vcf file.

Ref: reference type nucleic acid base.

Alt: alternative type nucleic acid base.

Prob: A probability of reference nucleic acid base described in .vcf file.

Mutation_Prob: A probability of alternative nucleic acid base described in .vcf file.

Exon_Start: The exon start position of the corresponding NM_ID.

Exon_End: The exon end position of the corresponding NM_ID.

Mutation_Position: The mutation position of the corresponding NM_ID.

Total_Depth: The sum depth of the reference and alternative nucleic acid base.

Tumor_Depth: The depth of the alternative nucleic acid base.

Wt_Peptide: The full-length of the wild-type peptide.

Mutant_Peptide: The full-length of the mutant peptide.

Total_RNA: The expression amount of the corresponding RNA.

Tumor_RNA_Ratio: The variant allele frequency of the corresponding RNA.

Tumor_RNA: The modified amount of the corresponding RNA level based on RNA Reads.

Tumor_RNA_based_on_DNA: The modified amount of the corresponding RNA level based on DNA Reads.

MutRatio: The mean value of the cancer cell fraction probability.

MutRatio_Min: The 1% percentile of the cancer cell fraction probability.

MutRatio_Max: The 99% percentile of the cancer cell fraction probability.

MainSNVClass1

Calculate Neoantigen Candidates on SNVs for MHC ClassI

Description

Calculate Neoantigen Candidates on SNVs for MHC ClassI

Usage

```
MainSNVClass1(
  input_file,
  hla_file = "here_is_a_table",
  hla_types = NA,
  file_name_in_hla_table = input_file,
  refFlat_file = paste(hmdir, "lib/refFlat.txt", sep = "/"),
  refmrna_file = paste(hmdir, "lib/refMrna.fa", sep = "/"),
  hmdir = getwd(),
  job_id = "ID",
  export_dir = paste("result", job_id, "SNV1", sep = "."),
  rnaexp_file = NA,
  rnabam_file = NA,
  cnv_file = NA,
  purity = 1,
  netMHCpan_dir = paste(hmdir, "lib/netMHCpan-4.0/netMHCpan", sep = "/"),
  MHCflurry = NA,
  refdna_file = NA,
  samtools_dir = "samtools",
  bcftools_dir = NA,
  chr_column = NA,
  mutation_start_column = NA,
  mutation_end_column = NA,
  mutation_ref_column = NA,
  mutation_alt_column = NA,
  nm_id_column = NA,
  depth_normal_column = NA,
  depth_tumor_column = NA,
  ambiguous_between_exon = 0,
```

```

    ambiguous_codon = 0,
    peptide_length = c(8, 9, 10, 11, 12, 13),
    IgnoreShortPeptides = TRUE,
    SNPs = NA,
    multiple_variants = FALSE,
    apply_annotation = FALSE
)

```

Arguments

input_file	(Required) An input vcf file annotated by, e.g., ANNOVAR (http://annovar.openbioinformatics.org/en/latest/) or other softwares, or apply annotation_option = TRUE. See by data(sample_vcf); sample_vcf;
hla_file	A tab separated file indicating HLA types. The 1st column is input_file name, and the following columns indicate HLA types. See by data(sample_hla_table_c1); sample_hla_table_c1;
hla_types	Set a list of HLA types
file_name_in_hla_table	If the name (1st column) in HLA table is not the same as input_file, indicate the corresponding name (Default=input_file).
refflat_file	refFlat file to be used in constructing peptide. (Default=paste(hmdir, "lib/refFlat.txt", sep="")). See " https://github.com/hase62/Neoantimon "
refmrna_file	refMrna file to be used in constructing peptide (Default=paste(hmdir, "lib/refMrna.fa", sep="")). See " https://github.com/hase62/Neoantimon "
hmdir	Home directory for the analysis (Default = getwd()).
job_id	Job-id to be attached in output files (Default = "NO_job_id").
export_dir	The directory will be stored results (Default = "paste("result", file_name_in_hla_table, job_id, sep=".")")
rnaexp_file	A file including RNA expressions (Default=NA). The 1st, 2nd and 3rd columns are "GeneSymbol Chr:Exonstart-Exonend (locus) ExpressionAmount", respectively. The 1st row should be any header. See by data(sample_rna_exp); sample_rna_exp;
rnabam_file	RNA bam file to calculate variant allele frequency of RNA at each mutation (Default=NA).
cnv_file	A file including copy number variation to calculate cancer cell fraction probability (CCFP) (Default=NA). The format is according to ASCAT output files. The columns are "SNPName Chromosome Position LogR segmentedLogR BAF segmentedBAF CopyNumber MinorAllele RawCopyNumber" The 1st row should be the above header. See data(sample_copynum); sample_copynum;
purity	Tumor purity or tumor contents ratio required to calculate CCFP (Default=1).
netMHCpan_dir	The file directory to netMHCpan (Default="lib/netMHCpan-4.0/netMHCpan").
MHCflurry	Also output results using MHCflurry (Default=FALSE).
refdna_file	refdna_file information to be used to calculate RNA VAF (Default=NA). See " https://github.com/hase62/Neoantimon "

samtools_dir	The file directory to samtools_0_x_x (Default="samtools"). It should be indicated when you indicate RNA-bam and try to calculate RNA VAF.
bcftools_dir	The file directory to netMHCpan (Default="bcftools"). It should be indicated when you indicate RNA-bam and try to calculate RNA VAF . samtools 0_x_x includes bcftools in the directory.
chr_column	The column number describing chromosome number in input_file (Default=NA, but will automatically search "Chr" in header).
mutation_start_column	The column number describing mutation start Position in input_file (Default=NA, but will automatically search "Start" in header) .
mutation_end_column	The column number describing mutation end Position in input_file (Default=NA, but will automatically search "End" in header).
mutation_ref_column	The column number describing mutation Ref in input_file (Default=NA, but will automatically search "Ref" in header).
mutation_alt_column	The column number describing mutation Alt in input_file (Default=NA, but will automatically search "Alt" in header).
nm_id_column	The column number describing NM IDs in input_file such as "SLCO1C1:NM_001145944:exon7:c.692_693insG;p.L231fs" (Default=NA).
depth_normal_column	The column number describing the read count from normal cells (Default = NA).
depth_tumor_column	The column number describing the read count from tumor cells (Default = NA).
ambiguous_between_exon	The maximum number to permit the differences between Exon-Lengths from refFlat and refMrna (Default=0).
ambiguous_codon	The maximum number to permit the differences between inputfile- and refMrna-oriented translation start/end position (Default=0).
peptide_length	Peptide Length to be generated (Default = 8,9,10,11,12,13).
IgnoreShortPeptides	Ignore to output results of Short Peptide Less Than min (peptide_length)
SNPs	Apply individual SNPs on peptides by indicate a vcf file.
multiple_variants	Reflect multiple variants on a peptide, e.g., SNVs on frameshift region.
apply_annotation	Annotate by Ensembl Variant Effect Predictor (VEP).

Value

void (Calculated Neoantigen Files will be generated as .tsv files.)

HLA: HLA type used to calculate neoantigen.

Pos: The position of a fraction of peptide used to be evaluated from the full-length peptide.

Gene: Gene symbol used to be evaluated in NetMHCpan.

Evaluated_Mutant_Peptide: The mutant peptide to be evaluated.

Mut_IC50: IC50 value for evaluated mutant peptide.

Mut_Rank: Rank value for evaluated mutant peptide.

Evaluated_Wt_Peptide: The wild-type peptide to be evaluated.

Wt_IC50: IC50 value for evaluated wild-type peptide.

Wt_Rank: Rank value for evaluated wild-type peptide.

Chr: Chromosome Number of the mutation.

NM_ID: NM_ID used to construct peptides from the mutation.

Change: The annotation to be described in .vcf file.

Ref: reference type nucleic acid base.

Alt: alternative type nucleic acid base.

Prob: A probability of reference nucleic acid base described in .vcf file.

Mutation_Prob: A probability of alternative nucleic acid base described in .vcf file.

Exon_Start: The exon start position of the corresponding NM_ID.

Exon_End: The exon end position of the corresponding NM_ID.

Mutation_Position: The mutation position of the corresponding NM_ID.

Total_Depth: The sum depth of the reference and alternative nucleic acid base.

Tumor_Depth: The depth of the alternative nucleic acid base.

Wt_Peptide: The full-length of the wild-type peptide.

Mutant_Peptide: The full-length of the mutant peptide.

Total_RNA: The expression amount of the corresponding RNA.

Tumor_RNA_Ratio: The variant allele frequency of the corresponding RNA.

Tumor_RNA: The modified amount of the corresponding RNA level based on RNA Reads.

Tumor_RNA_based_on_DNA: The modified amount of the corresponding RNA level based on DNA Reads.

MutRatio: The mean value of the cancer cell fraction probability.

MutRatio_Min: The 1% percentile of the cancer cell fraction probability.

MutRatio_Max: The 99% percentile of the cancer cell fraction probability.

MainSNVClass2

Calculate Neoantigen Candidates on SNVs for MHC Class2

Description

Calculate Neoantigen Candidates on SNVs for MHC Class2

Usage

```

MainSNVClass2(
  input_file,
  hla_file = "here_is_a_table",
  hla_types = NA,
  file_name_in_hla_table = input_file,
  refflat_file = paste(hmdir, "lib/refFlat.txt", sep = "/"),
  refmrna_file = paste(hmdir, "lib/refMrna.fa", sep = "/"),
  hmdir = getwd(),
  job_id = "ID",
  export_dir = paste("result", job_id, "SNV2", sep = "."),
  rnaexp_file = NA,
  rnabam_file = NA,
  cnv_file = NA,
  purity = 1,
  netMHCIipan_dir = paste(hmdir, "lib/netMHCIipan-3.2/netMHCIipan", sep = "/"),
  refdna_file = NA,
  samtools_dir = "samtools",
  bcftools_dir = NA,
  chr_column = NA,
  mutation_start_column = NA,
  mutation_end_column = NA,
  mutation_ref_column = NA,
  mutation_alt_column = NA,
  nm_id_column = NA,
  depth_normal_column = NA,
  depth_tumor_column = NA,
  ambiguous_between_exon = 0,
  ambiguous_codon = 0,
  peptide_length = c(15),
  IgnoreShortPeptides = TRUE,
  SNPs = NA,
  multiple_variants = FALSE,
  apply_annotation = FALSE
)

```

Arguments

<code>input_file</code>	(Required) An input vcf file annotated by, e.g., ANNOVAR (http://annovar.openbioinformatics.org/en/latest/) or other softwares. See by <code>data(sample_vcf)</code> ; <code>sample_vcf</code> ;
<code>hla_file</code>	A tab separated file indicating HLA types. The 1st column is <code>input_file</code> name, and the following columns indicate HLA types. See by <code>data(sample_hla_table_c2)</code> ; <code>sample_hla_table_c2</code> ;
<code>hla_types</code>	Set a list of HLA types
<code>file_name_in_hla_table</code>	If the name (1st column) in HLA table is not the same as <code>input_file</code> , indicate the corresponding name (Default= <code>input_file</code>).
<code>refflat_file</code>	refFlat file to be used in constructing peptide. (Default= <code>paste(hmdir, "lib/refFlat.txt", sep="")</code>).

	See " https://github.com/hase62/Neoantimon "
refmrna_file	refMrna file to be used in constructing peptide (Default=paste(hmdir, "lib/refMrna.fa", sep="")). See " https://github.com/hase62/Neoantimon "
hmdir	Home directory for the analysis (Default = getwd()).
job_id	Job-Id to be attached in output files (Default = "NO_job_id").
export_dir	The directory will be stored results (Default = "paste("result", file_name_in_hla_table, job_id, sep=".")")
rnaexp_file	A file including RNA expressions (Default=NA). The 1st, 2nd and 3rd columns are "GeneSymbol Chr:Exonstart-Exonend (locus) ExpressionAmount", respectively. The 1st row should be any header. See by data(sample_rna_exp); sample_rna_exp;
rnabam_file	RNA bam file to calculate variant allele frequency of RNA at each mutation (Default=NA).
cnv_file	A file including copy number variation to calculate cancer cell fraction probability (CCFP) (Default=NA). The format is according to ASCAT output files. The columns are "SNPName Chromosome Position LogR segmentedLogR BAF segmentedBAF CopyNumber MinorAllele RawCopyNumber" The 1st row should be the above header. See data(sample_copynum); sample_copynum;
purity	Tumor purity or tumor contents ratio required to calculate CCFP (Default=1).
netMHCIIpan_dir	The file directory to netMHCpan (Default="lib/netMHCIIpan-3.2/netMHCpan").
refdna_file	refdna_file information to be used to calculate RNA VAF (Default=NA). See " https://github.com/hase62/Neoantimon "
samtools_dir	The file directory to samtools_0_x_x (Default="samtools"). It should be indicated when you indicate RNA-bam and try to calculate RNA VAF .
bcftools_dir	The file directory to netMHCpan (Default="bcftools"). It should be indicated when you indicate RNA-bam and try to calculate RNA VAF . samtools 0_x_x includes bcftools in the directory.
chr_column	The column number describing chromosome number in input_file (Default=NA, but will automatically search "Chr" in header).
mutation_start_column	The column number describing mutation start Position in input_file (Default=NA, but will automatically search "Start" in header) .
mutation_end_column	The column number describing mutation end Position in input_file (Default=NA, but will automatically search "End" in header).
mutation_ref_column	The column number describing mutation Ref in input_file (Default=NA, but will automatically search "Ref" in header).
mutation_alt_column	The column number describing mutation Alt in input_file (Default=NA, but will automatically search "Alt" in header).
nm_id_column	The column number describing NM IDs in input_file such as "SLCO1C1:NM_001145944:exon7:c.692_693insG;p.L231fs" (Default=NA).

depth_normal_column	The column number describing the read count from normal cells (Default = NA).
depth_tumor_column	The column number describing the read count from tumor cells (Default = NA).
ambiguous_between_exon	The maximum number to permit the differences between Exon-Lengths from refFlat and refMrna (Default=0).
ambiguous_codon	The maximum number to permit the differences between inputfile- and refMrna-oriented translation start/end position (Default=0).
peptide_length	Peptide Length to be generated (Default = 15 in HLA Class2).
IgnoreShortPeptides	Ignore to output results of Short Peptide Less Than min (peptide_length)
SNPs	Apply indivisual SNPs on peptides by indicate a vcf file.
multiple_variants	Reflect multiple variants on a peptide, e.g., SNVs on frameshift region.
apply_annotation	Anontate by Ensembl Variant Effect Predictor (VEP).

Value

void (Calculated Neoantigen Files will be generated as .tsv files.):

HLA: HLA type used to calculate neoantigen.

Pos: The position of a fraction of peptide used to be evaluated from the full-length peptide.

Gene: Gene symbol used to be evaluated in NetMHCpan.

Evaluated_Mutant_Peptide: The mutant peptide to be evaluated.

Mut_IC50: IC50 value for evaluated mutant peptide.

Mut_Rank: Rank value for evaluated mutanat peptide.

Evaluated_Wt_Peptide: The wild-type peptide to be evaluated.

Wt_IC50: IC50 value for evaluated wild-type peptide.

Wt_Rank: Rank value for evaluated wild-type peptide.

Chr: Chromosome Number of the mutation.

NM_ID: NM_ID used to construct peptides from the mutation.

Change: The annotation to be described in .vcf file.

Ref: reference type nucleic acid base.

Alt: alternative type nucleic acid base.

Prob: A probability of reference nucleic acid base described in .vcf file.

Mutation_Prob: A probability of alternative nucleic acid base described in .vcf file.

Exon_Start: The exon start position of the corrsponding NM_ID.

Exon_End: The exon end position of the corrsponding NM_ID.

Mutation_Position: The mutation position of the corrsponding NM_ID.

Total_Depth: The sum depth of the reference and alternative nucleic acid base.

Tumor_Depth: The depth of the alternative nucleic acid base.

Wt_Peptide: The full-length of the wild-type peptide.

Mutant_Peptide: The full-length of the mutant peptide.

Total_RNA: The expression amount of the corresponding RNA.

Tumor_RNA_Ratio: The variant allele frequency of the corresponding RNA.

Tumor_RNA: The modified amount of the corresponding RNA level based on RNA Reads.

Tumor_RNA_based_on_DNA: The modified amount of the corresponding RNA level based on DNA Reads.

MutRatio: The mean value of the cancer cell fraction probability.

MutRatio_Min: The 1% percentile of the cancer cell fraction probability.

MutRatio_Max: The 99% percentile of the cancer cell fraction probability.

MainSVFUSIONClass1	<i>Calculate Neoantigen Candidates on SV fusions for MHC Class I</i>
--------------------	--

Description

Calculate Neoantigen Candidates on SV fusions for MHC Class I

Usage

```
MainSVFUSIONClass1(
  input_file,
  hla_file = "here_is_a_table",
  hla_types = NA,
  file_name_in_hla_table = input_file,
  refflat_file = paste(hmdir, "lib/refFlat.txt", sep = "/"),
  refmrna_file = paste(hmdir, "lib/refMrna.fa", sep = "/"),
  hmdir = getwd(),
  job_id = "ID",
  export_dir = paste("result", job_id, "SV1", sep = "."),
  rnaexp_file = NA,
  rnabam_file = NA,
  cnv_file = NA,
  purity = 1,
  netMHCpan_dir = paste(hmdir, "lib/netMHCpan-4.0/netMHCpan", sep = "/"),
  refdna_file = NA,
  samtools_dir = NA,
  bcftools_dir = NA,
  chr_column = NA,
  mutation_start_column = NA,
  mutation_end_column = NA,
  mutation_ref_column = NA,
  mutation_alt_bnd_column = NA,
  depth_normal_column = NA,
  depth_tumor_column = NA,
  nm_id_column = NA,
  ambiguous_between_exon = 0,
  ambiguous_codon = 0,
  peptide_length = c(8, 9, 10, 11, 12, 13),
  gene_symbol_column = NA,
```

```

    mate_id_column = NA,
    IgnoreShortPeptides = TRUE
)

```

Arguments

input_file	(Required) An input vcf file (BND format) annotated by, e.g., ANNOVAR (http://annovar.openbioinformatics.org/en/latest/) or other softwares. See by data(sample_sv_bnd); sample_sv_bnd;
hla_file	(Required) A tab separated file indicating HLA types. The 1st column is input_file name, and the following columns indicate HLA types. See by data(sample_hla_table_c1); sample_hla_table_c1;
hla_types	Set a list of HLA types
file_name_in_hla_table	If the name (1st column) in HLA table is not the same as input_file, indicate the corresponding name (Default=input_file).
refflat_file	refFlat file to be used in constructing peptide. (Default=paste(hmdir, "lib/refFlat.txt", sep="")). See " https://github.com/hase62/Neoantimon "
refmrna_file	refMrna file to be used in constructing peptide (Default=paste(hmdir, "lib/refMrna.fa", sep="")). See " https://github.com/hase62/Neoantimon "
hmdir	Home directory for the analysis (Default = getwd()).
job_id	Job-Id to be attached in output files (Default = "NO_job_id").
export_dir	The directory will be stored results (Default = "paste("result", file_name_in_hla_table, job_id, sep=".")")
rnaexp_file	A file including RNA expressions (Default=NA). The 1st, 2nd and 3rd columns are "GeneSymbol Chr:Exonstart-Exonend (locus) ExpressionAmount", respectively. The 1st row should be any header. See by data(sample_rna_exp); sample_rna_exp;
rnabam_file	RNA bam file to calculate variant allele frequency of RNA at each mutation (Default=NA).
cnv_file	A file including copy number variation to calculate cancer cell fraction probability (CCFP) (Default=NA). The format is according to ASCAT output files. The columns are "SNPName Chromosome Position LogR segmentedLogR BAF segmentedBAF CopyNumber MinorAllele RawCopyNumber" The 1st row should be the above header. See data(sample_copynum); sample_copynum;
purity	Tumor purity or tumor contents ratio required to calculate CCFP (Default=1).
netMHCpan_dir	The file directory to netMHCpan (Default="lib/netMHCpan-4.0/netMHCpan").
refdna_file	(Required) refdna_file information to be used to create SVs Region (Default=NA). See " https://github.com/hase62/Neoantimon "
samtools_dir	The file directory to samtools_0_x_x (Default="samtools"). It should be indicated when you indicate RNA-bam and try to calculate RNA VAF .
bcftools_dir	The file directory to netMHCpan (Default="bcftools"). It should be indicated when you indicate RNA-bam and try to calculate RNA VAF . samtools 0_x_x includes bcftools in the directory.

chr_column	The column number describing chromosome number in input_file (Default=NA, but will automatically search "Chr" in header).
mutation_start_column	The column number describing mutation start Position in input_file (Default=NA, but will automatically search "Start" in header) .
mutation_end_column	The column number describing mutation end Position in input_file (Default=NA, but will automatically search "End" in header).
mutation_ref_column	The column number describing mutation Ref in input_file (Default=NA, but will automatically search "Ref" in header).
mutation_alt_bnd_column	The column number describing mutation Alt (BND format) in input_file (Default=NA, but will automatically search "Alt" in header).
depth_normal_column	The column number describing the read count from normal cells (Default = NA).
depth_tumor_column	The column number describing the read count from tumor cells (Default = NA).
nm_id_column	(Required if gene_symbol_column = NA) The column number describing NM IDs in input_file such as "SLCO1C1:NM_001145944:exon7:c.692_693insG:p.L231fs" (Default=NA).
ambiguous_between_exon	The maximum number to permit the differences between Exon-Lengths from refFlat and refMrna (Default=0).
ambiguous_codon	The maximum number to permit the differences between inputfile- and refMrna-oriented translation start/end position (Default=0).
peptide_length	Peptide Length to be generated (Default = 8,9,10,11,12,13).
gene_symbol_column	(Required if nm_id_column = NA) The column number describing gene symbol in input_file (Default=NA).
mate_id_column	(Required) The column indicating mateIDs or svIDs such as "SVMERGE1_1" (Default=NA).
IgnoreShortPeptides	Ignore Short Peptide Less Than min(peptide_length)

Value

void (Calculated Neoantigen Files will be generated as .tsv files.):

HLA: HLA type used to calculate neoantigen.

Pos: The position of the fraction of peptide used to be evaluated from the full-length peptide.

Gene: Gene symbol used to be evaluated in NetMHCpan.

Evaluated_Mutant_Peptide_Core: The core peptide of the mutant peptide to be evaluated in NetMHCpan.

Evaluated_Mutant_Peptide: The mutant peptide to be evaluated.

Mut_IC50: IC50 value for evaluated mutant peptide.

Mut_Rank: Rank value for evaluated mutant peptide.

Chr: Chromosome Number of the mutation.

NM_ID: NM_ID used to construct peptides from the mutation.

Change: The annotation to be described in .vcf file.

Ref: reference type nucleic acid base.

Alt: alternative type nucleic acid base.

Prob: A probability of reference nucleic acid base described in .vcf file.

Mutation_Prob: A probability of alternative nucleic acid base described in .vcf file.

Exon_Start: The exon start position of the corresponding NM_ID.

Exon_End: The exon end position of the corresponding NM_ID.

Mutation_Position: The mutation position of the corresponding NM_ID.

Total_Depth: The sum depth of the reference and alternative nucleic acid base.

Tumor_Depth: The depth of the alternative nucleic acid base.

Wt_Peptide: The full-length of the wild-type peptide.

Mutant_Peptide: The full-length of the mutant peptide.

Total_RNA: The expression amount of the corresponding RNA.

Tumor_RNA_Ratio: The variant allele frequency of the corresponding RNA.

Tumor_RNA: The modified amount of the corresponding RNA level based on RNA Reads.

Tumor_RNA_based_on_DNA: The modified amount of the corresponding RNA level based on DNA Reads.

MutRatio: The mean value of the cancer cell fraction probability.

MutRatio_Min: The 1% percentile of the cancer cell fraction probability.

MutRatio_Max: The 99% percentile of the cancer cell fraction probability.

MainSVFUSIONClass2	<i>Calculate Neoantigen Candidates on SV fusions for MHC Class2</i>
--------------------	---

Description

Calculate Neoantigen Candidates on SV fusions for MHC Class2

Usage

```
MainSVFUSIONClass2(
  input_file,
  hla_file = "here_is_a_table",
  hla_types = NA,
  file_name_in_hla_table = input_file,
  refflat_file = paste(hmdir, "lib/refFlat.txt", sep = "/"),
  refmrna_file = paste(hmdir, "lib/refMrna.fa", sep = "/"),
  hmdir = getwd(),
  job_id = "ID",
  export_dir = paste("result", job_id, "SV2", sep = "."),
  rnaexp_file = NA,
  rnabam_file = NA,
```



```

cnv_file = NA,
purity = 1,
netMHCIIPan_dir = paste(hmdir, "lib/netMHCIIPan-3.1/netMHCIIPan", sep = "/"),
refdna_file = NA,
samtools_dir = NA,
bcftools_dir = NA,
chr_column = NA,
mutation_start_column = NA,
mutation_end_column = NA,
mutation_ref_column = NA,
mutation_alt_bnd_column = NA,
depth_normal_column = NA,
depth_tumor_column = NA,
nm_id_column = NA,
ambiguous_between_exon = 0,
ambiguous_codon = 0,
peptide_length = c(15),
gene_symbol_column = NA,
mate_id_column = NA,
IgnoreShortPeptides = TRUE
)

```

Arguments

input_file	(Required) An input vcf file (BND format) annotated by, e.g., ANNOVAR (http://annovar.openbioinformatics.org/en/latest/) or other softwares. See by data(sample_sv_bnd); sample_sv_bnd;
hla_file	(Required) A tab separated file indicating HLA types. The 1st column is input_file name, and the following columns indicate HLA types. See by data(sample_hla_table_c1); sample_hla_table_c1;
hla_types	Set a list of HLA types
file_name_in_hla_table	If the name (1st column) in HLA table is not the same as input_file, indicate the corresponding name (Default=input_file).
refflat_file	refFlat file to be used in constructing peptide. (Default=paste(hmdir, "lib/refFlat.txt", sep="")). See " https://github.com/hase62/Neoantimon "
refmrna_file	refMrna file to be used in constructing peptide (Default=paste(hmdir, "lib/refMrna.fa", sep="")). See " https://github.com/hase62/Neoantimon "
hmdir	Home directory for the analysis (Default = getwd()).
job_id	Job-Id to be attached in output files (Default = "NO_job_id").
export_dir	The directory will be stored results (Default = "paste("result", file_name_in_hla_table, job_id, sep=".")")
rnaexp_file	A file including RNA expressions (Default=NA). The 1st, 2nd and 3rd columns are "GeneSymbol Chr:Exonstart-Exonend (locus) ExpressionAmount", respectively. The 1st row should be any header. See by data(sample_rna_exp); sample_rna_exp;

rnbam_file	RNA bam file to calculate variant allele frequency of RNA at each mutation (Default=NA).
cnv_file	A file including copy number variation to calculate cancer cell fraction probability (CCFP) (Default=NA). The format is according to ASCAT output files. The columns are "SNPName Chromosome Position LogR segmentedLogR BAF segmentedBAF CopyNumber MinorAllele RawCopyNumber" The 1st row should be the above header. See data(sample_copynum); sample_copynum;
purity	Tumor purity or tumor contents ratio required to calculate CCFP (Default=1).
netMHCIipan_dir	The file directory to netMHCpan (Default="lib/netMHCIipan-3.2/netMHCpan").
refdna_file	(Required) refdna_file information to be used to create SVs Region (Default=NA). See " https://github.com/hase62/Neoantimon "
samtools_dir	The file directory to samtools_0_x_x (Default="samtools"). It should be indicated when you indicate RNA-bam and try to calculate RNA VAF .
bcftools_dir	The file directory to netMHCpan (Default="bcftools"). It should be indicated when you indicate RNA-bam and try to calculate RNA VAF . samtools 0_x_x includes bcftools in the directory.
chr_column	The column number describing chromosome number in input_file (Default=NA, but will automatically search "Chr" in header).
mutation_start_column	The column number describing mutation start Position in input_file (Default=NA, but will automatically search "Start" in header) .
mutation_end_column	The column number describing mutation end Position in input_file (Default=NA, but will automatically search "End" in header).
mutation_ref_column	The column number describing mutation Ref in input_file (Default=NA, but will automatically search "Ref" in header).
mutation_alt_bnd_column	The column number describing mutation Alt (BND format) in input_file (Default=NA, but will automatically search "Alt" in header).
depth_normal_column	The column number describing the read count from normal cells (Default = NA).
depth_tumor_column	The column number describing the read count from tumor cells (Default = NA).
nm_id_column	(Required if gene_symbol_column = NA) The column number describing NM IDs in input_file such as "SLCO1C1:NM_001145944:exon7:c.692_693insG:p.L231fs" (Default=NA).
ambiguous_between_exon	The maximum number to permit the differences between Exon-Lengths from refFlat and refMrna (Default=0).
ambiguous_codon	The maximum number to permit the differences between inputfile- and refMrna-oriented translation start/end position (Default=0).
peptide_length	Peptide Length to be generated (Default = 15 in HLA Class2).
gene_symbol_column	(Required if nm_id_column = NA) The column number describing gene symbol in input_file (Default=NA).

mate_id_column (Required) The column indicating mateIDs or svIDs such as "SVMERGE1_1"
(Default=NA).

IgnoreShortPeptides

Ignore Short Peptide Less Than min(peptide_length)

Value

void (Calculated Neoantigen Files will be generated as .tsv files.):

HLA: HLA type used to calculate neoantigen.

Pos: The position of the fraction of peptide used to be evaluated from the full-length peptide.

Gene: Gene symbol used to be evaluated in NetMHCpan.

Evaluated_Mutant_Peptide_Core: The core peptide of the mutant peptide to be evaluated in NetMHCpan.

Evaluated_Mutant_Peptide: The mutant peptide to be evaluated.

Mut_IC50: IC50 value for evaluated mutant peptide.

Mut_Rank: Rank value for evaluated mutant peptide.

Chr: Chromosome Number of the mutation.

NM_ID: NM_ID used to construct peptides from the mutation.

Change: The annotation to be described in .vcf file.

Ref: reference type nucleic acid base.

Alt: alternative type nucleic acid base.

Prob: A probability of reference nucleic acid base described in .vcf file.

Mutation_Prob: A probability of alternative nucleic acid base described in .vcf file.

Exon_Start: The exon start position of the corresponding NM_ID.

Exon_End: The exon end position of the corresponding NM_ID.

Mutation_Position: The mutation position of the corresponding NM_ID.

Total_Depth: The sum depth of the reference and alternative nucleic acid base.

Tumor_Depth: The depth of the alternative nucleic acid base.

Wt_Peptide: The full-length of the wild-type peptide.

Mutant_Peptide: The full-length of the mutant peptide.

Total_RNA: The expression amount of the corresponding RNA.

Tumor_RNA_Ratio: The variant allele frequency of the corresponding RNA.

Tumor_RNA: The modified amount of the corresponding RNA level based on RNA Reads.

Tumor_RNA_based_on_DNA: The modified amount of the corresponding RNA level based on DNA Reads.

MutRatio: The mean value of the cancer cell fraction probability.

MutRatio_Min: The 1% percentile of the cancer cell fraction probability.

MutRatio_Max: The 99% percentile of the cancer cell fraction probability.

sample_copynum	<i>A Format / Sample file for Copy Number Information</i>
----------------	---

Description

A dataset containing the copy number information obtained by, e.g., ASCAT.

Usage

```
data(sample_copynum)
```

Format

A data frame with 7 rows and 9 variables

sample_hla_table_c1	<i>A Format / Sample file for HLA CLASS1 Table</i>
---------------------	--

Description

A dataset containing the HLA types of patients in each row.

Usage

```
data(sample_hla_table_c1)
```

Format

A data frame with 3 rows and at most 7 variables

sample_hla_table_c2	<i>A Format / Sample file for HLA CLASS2 Table</i>
---------------------	--

Description

A dataset containing the HLA types of patients in each row.

Usage

```
data(sample_hla_table_c2)
```

Format

A data frame with at least 3 row and at most 10 variables

sample_result_INDEL_CLASS1_ALL
<i>Analyzed Result for INDEL CLASS1</i>

Description

Analyzed Result for INDEL CLASS1

Usage

data(sample_result_INDEL_CLASS1_ALL)

sample_result_INDEL_CLASS2_ALL
<i>Analyzed Result for INDEL CLASS2</i>

Description

Analyzed Result for INDEL CLASS2

Usage

data(sample_result_INDEL_CLASS2_ALL)

sample_result_SeqFragment_CLASS1_ALL
<i>Analyzed Result for A DNA Fragment CLASS1</i>

Description

Analyzed Result for A DNA Fragment CLASS1

Usage

data(sample_result_SeqFragment_CLASS1_ALL)

sample_result_SeqFragment_CLASS2_ALL
<i>Analyzed Result for A DNA Fragment CLASS2</i>

Description

Analyzed Result for A DNA Fragment CLASS2

Usage

data(sample_result_SeqFragment_CLASS2_ALL)

sample_result_SNV_CLASS1_ALL
Analyzed Result for SNV CLASS1

Description

Analyzed Result for SNV CLASS1

Usage

data(sample_result_SNV_CLASS1_ALL)

sample_result_SNV_CLASS2_ALL
Analyzed Result for SNV CLASS2

Description

Analyzed Result for SNV CLASS2

Usage

data(sample_result_SNV_CLASS2_ALL)

sample_result_SVFusion_CLASS1_ALL
Analyzed Result for SV Fusion CLASS1

Description

Analyzed Result for SV Fusion CLASS1

Usage

data(sample_result_SVFusion_CLASS1_ALL)

sample_result_SVFusion_CLASS2_ALL
Analyzed Result for SVFusion CLASS2

Description

Analyzed Result for SVFusion CLASS2

Usage

data(sample_result_SVFusion_CLASS2_ALL)

sample_rna_exp	<i>A Format / Sample file for RNA Expression Information</i>
----------------	--

Description

A dataset containing the RNA expression amount of patient for each gene.

Usage

```
data(sample_rna_exp)
```

Format

A data frame with 22 rows and 3 variables

sample_sv_bnd	<i>A Format / Sample file for Annotated vcf file.</i>
---------------	---

Description

A dataset containing the variant information of a patient.

Usage

```
data(sample_sv_bnd)
```

Format

A data frame with 9 rows and variables including "Chr" "Start" "End" "Ref" "Alt (BND format)" "Func.refGene (exonic, intron, intergenic, ...)" "ExonicFunc.refGene (exonic nonsynonymous, synonymous, insertion, ...)" "mateID (e.g., SVMERGE1_1)"

sample_vcf	<i>A Format / Sample file for Annotated vcf file.</i>
------------	---

Description

A dataset containing the variant information of a patient.

Usage

```
data(sample_vcf)
```

Format

A data frame with 9 rows and variables including "Chr" "Start" "End" "Ref" "Alt" "Func.refGene (exonic, intron, intergenic, ...)" "ExonicFunc.refGene (exonic nonsynonymous, synonymous, insertion, ...)" "AAChange.refGene (e.g., SLCO1C1:NM_001145944:exon7:c.692_693insG:p.L231fs ...)"

TestAnalysis	<i>Execute Sample Analysis</i>
--------------	--------------------------------

Description

Execute Sample Analysis

Usage

TestAnalysis()

Value

void

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