Package ‘InterVA4’

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Title Replicate and Analyse ‘InterVA4’
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Description Provides an R version of the ‘InterVA4’ software (<http://www.interva.net>) for cod-
ing cause of death from verbal autopsies. It also provides simple graphical representation of indi-
vidual and population level statistics.
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**InterVA4-package**

*Perform InterVA4 algorithm and provide graphical summarization of COD distribution.*

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### Description

Computes individual cause of death and population cause-specific mortality fractions using the InterVA4 algorithm. Provides a simple graphical representation of the result.

### Details

To get the most up-to-date version of the package, as well as the past versions, please check the github repository at: [https://github.com/richardli/InterVA4/](https://github.com/richardli/InterVA4/)

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<td>Version:</td>
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### Author(s)

Zehang Li, Tyler McCormick, Sam Clark

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### References

http://www.interva.net/

### Examples

```r
data(SampleInput)
sample.output <- InterVA(SampleInput, HIV = "h", Malaria = "v", write=FALSE)
```

---

**causetext**

*Translation list of COD codes*

---

### Description

This is the translation of COD abbreviation codes into their corresponding full names.
Format
A data frame with the translation of COD codes to their names on 68 CODs (both the version of COD only and COD with group code).

Examples

data(causetext)

CSMF  Summarize and plot a population level distribution of va probabilities.

Description
The function takes input of a list of va object and produces a summary plot for the population distribution.

Usage

CSMF(va, top.aggregate = NULL, InterVA.rule = FALSE, noplot = FALSE, type = "bar", top.plot = 10, min.prob = 0, ...)

Arguments

va  The list of va object to summarize.
top.aggregate  Integer indicating how many causes from the top need to go into summary. The rest of the probabilities goes into an extra category "Undetermined". When set to NULL, default is all causes to be considered. This is only used when InterVA.rule set to "FALSE".
InterVA.rule  If it is set to "TRUE", only the top 3 causes reported by InterVA4 is calculated into CSMF as in InterVA4. The rest of probabilities goes into an extra category "Undetermined". Default set to "FALSE".
noplot  A logical value indicating whether the plot will be shown. If it is set to "TRUE", only the CSMF will be returned.
type  An indicator of the type of chart to plot. "pie" for pie chart; "bar" for bar chart.
top.plot  the maximum number of causes to plot in bar plot
min.prob  The minimum probability that is to be plotted in bar chart, or to be labeled in pie chart.
...  Arguments to be passed to/from graphic function barplot, pie, and more graphical paramters (see par). They will affect the main title, size and font of labels, and the radius of the pie chart.

Value

dist.cod  The population probability of CODs.
Author(s)
Zehang LI, Tyler McCormick, Sam Clark

See Also
CSMF.interVA4

Examples

data(SampleInput)
sample.output <- InterVA(SampleInput, HIV = "h", Malaria = "v", write=FALSE)

## Get CSMF without plots
population.summary <- CSMF(sample.output$VA, noplot = TRUE)

## Get CSMF by considering only top 3 causes for each death.
population.summary <- CSMF(sample.output$VA, top.aggregate = 3, noplot = TRUE)

## Get CSMF by considering only top 3 causes reported by InterVA.
## This is equivalent to using CSMF.interVA4() command Note that
## it's different from using all top 3 causes, since they may not
## all be reported
CSMF.summary <- CSMF(sample.output, InterVA.rule = TRUE, noplot = TRUE)

## Population level summary using pie chart
CSMF.summary2 <- CSMF(sample.output, type = "pie",
  min.prob = 0.01, main = "population COD distribution using pie chart",
  clockwise = FALSE, radius = 0.7, cex = 0.7, cex.main = 0.8)

## Population level summary using bar chart
CSMF.summary3 <- CSMF(sample.output, type = "bar",
  min.prob = 0.01, main = "population COD distribution using bar chart",
  cex.main = 1)
CSMF.summary4 <- CSMF(sample.output, type = "bar",
  top.plot = 5, main = "Top 5 population COD distribution",
  cex.main = 1)

CSMF.interVA4

Summarize population level cause-specific mortality fraction as InterVA4 suggested.

Description
The function takes input of a list of va object and calculates the cause-specific mortality fraction. It only calculates CSMF as aggregation of up to the third largest causes.
**Usage**

```r
cSMF.interVA4(va)
```

**Arguments**

- `va` The list of `va` object to summarize.

**Value**

- `dist.cod` The cause-specific mortality fraction (including undetermined category).

**Author(s)**

Zehang LI, Tyler McCormick, Sam Clark

**See Also**

`C`S`M`F

**Examples**

```r
data(SampleInput)
sample.output <- InterVA(SampleInput, HIV = "h", Malaria = "v", write=FALSE)
## Get CSMF without plots
csmf<- CSMF.interVA4(sample.output$VA)
data(SampleInput)
```

---

**InterVA**

*Provide InterVA4 analysis on the data input.*

**Description**

This function implements the algorithm in the InterVA4 software. It produces individual cause of death and population cause-specific mortality fractions.

**Usage**

```r
InterVA(Input, HIV, Malaria, directory = NULL, filename = "VA_result",
        output = "classic", append = FALSE, groupcode = FALSE,
        replicate = FALSE, replicate.bug1 = FALSE, replicate.bug2 = FALSE,
        write = TRUE, ...)
```
Arguments

Input
A matrix input, or data read from csv files in the same format as required by InterVA4. Sample input is included as data(SampleInput).

HIV
An indicator of the level of prevalence of HIV. The input should be one of the following: "h"(high),"l"(low), or "v"(very low).

Malaria
An indicator of the level of prevalence of Malaria. The input should be one of the following: "h"(high),"l"(low), or "v"(very low).

directory
The directory to store the output from InterVA4. It should either be an existing valid directory, or a new folder to be created. If no path is given, the current working directory will be used.

filename
The filename the user wish to save the output. No extension needed. The output is in .csv format by default.

output
"classic": The same delimited output format as InterVA4; or "extended": delimited output followed by full distribution of cause of death proability.

append
A logical value indicating whether or not the new output should be appended to the existing file.

groupcode
A logical value indicating whether or not the group code will be included in the output causes.

replicate
A logical value indicating whether or not the calculation should replicate original InterVA4 software (version 4.02) exactly. If replicate = F, causes with small probability are not dropped out of calculation in intermediate steps, and a possible bug in original InterVA4 implementation is fixed. If replicate=T, then the output values will be exactly as they would be from calling the InterVA4 program (version 4.02). If replicate=F, the output values will be the same as calling the InterVA4 program (version 4.03). Since version 1.7.3, setting replicate to be FALSE also includes changes to data checking rules and pre-set conditional probabilities to be the same as the official version 4.03 software. Since version 1.6, two control variables are added to control the two bugs respectively. Setting this to TRUE will overwrite both to TRUE.

replicate.bug1
This logical indicator controls whether or not the bug in InterVA4.2 involving the symptom "skin_les" will be replicated or not. It is suggested to set to FALSE.

replicate.bug2
This logical indicator controls whether the causes with small probability are dropped out of calculation in intermediate steps or not. It is suggested to set to FALSE.

write
A logical value indicating whether or not the output (including errors and warnings) will be saved to file.

Details

InterVA performs the same tasks as the InterVA4. The output is saved in a .csv file specified by user. The calculation is based on the conditional and prior distribution of 68 CODs. The function also could save the full probability distribution of each individual to file. All information about each individual is saved to a va class object.
Be careful if the input file does not match InterVA input format strictly. The function will run normally as long as the number of symptoms are correct. Any inconsistent symptom names will be printed in console as warning. If there's wrong match of symptom from warning, please change in the input to correct orders.

**Value**

<table>
<thead>
<tr>
<th>ID</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALPREV</td>
<td>selected malaria prevalence</td>
</tr>
<tr>
<td>HIVPREV</td>
<td>selected HIV prevalence</td>
</tr>
<tr>
<td>PREGSTAT</td>
<td>most likely pregnancy status</td>
</tr>
<tr>
<td>PREGLIK</td>
<td>likelihood of PREGSTAT</td>
</tr>
<tr>
<td>PRMAT</td>
<td>likelihood of maternal death</td>
</tr>
<tr>
<td>INDET</td>
<td>indeterminate outcome</td>
</tr>
<tr>
<td>CAUSE1</td>
<td>most likely cause</td>
</tr>
<tr>
<td>LIK1</td>
<td>likelihood of 1st cause</td>
</tr>
<tr>
<td>CAUSE2</td>
<td>second likely cause</td>
</tr>
<tr>
<td>LIK2</td>
<td>likelihood of 2nd cause</td>
</tr>
<tr>
<td>CAUSE3</td>
<td>third likely cause</td>
</tr>
<tr>
<td>LIK3</td>
<td>likelihood of 3rd cause</td>
</tr>
<tr>
<td>wholeprob</td>
<td>full distribution of causes of death</td>
</tr>
</tbody>
</table>

**Author(s)**

Zehang Li, Tyler McCormick, Sam Clark

**References**

http://www.interva.net/

**See Also**

*InterVA.plot*

**Examples**

data(SampleInput)
## to get easy-to-read version of causes of death make sure the column
## orders match interVA4 standard input this can be monitored by checking
## the warnings of column names
sample.output1 <- InterVA(SampleInput, HIV = "h", Malaria = "l", write=FALSE, replicate = FALSE)

## to get causes of death with group code for further usage
sample.output2 <- InterVA(SampleInput, HIV = "h", Malaria = "l", write=FALSE, replicate = FALSE, groupcode = TRUE)
InterVA.plot  

*Plot a individual level distribution of va probabilities.*

**Description**

The function takes input of a single va object and produces a summary plot for it.

**Usage**

```r
InterVA.plot(va, type = "bar", min.prob = 0.01, ...)
```

**Arguments**

- **va**  
  A va object

- **type**  
  An indicator of the type of chart to plot. "pie" for pie chart; "bar" for bar chart.

- **min.prob**  
  The minimum probability that is to be plotted in bar chart, or to be labeled in pie chart.

- **...**  
  Arguments to be passed to/from graphic function `barplot`, `pie`, and more graphical parameters (see `par`). They will affect the main title, size and font of labels, and the radius of the pie chart.

**See Also**

CSMF

**Examples**

```r
data(SampleInput)
sample.output <- InterVA(SampleInput, HIV = "h", Malaria = "v", write=FALSE)

## Individual level summary using pie chart
InterVA.plot(sample.output$VA[[7]], type = "pie", min.prob = 0.01,
             main = "1st sample VA analysis using pie chart", clockwise = FALSE,
             radius = 0.6, cex = 0.6, cex.main = 0.8)

## Individual level summary using bar chart
InterVA.plot(sample.output$VA[[7]], type = "bar", min.prob = 0.01,
             main = "2nd sample VA analysis using bar chart", cex.main = 0.8)
```
Population.summary

Summarize and plot a population level distribution of va probabilities.

Description

This function has been deprecated as of version 1.6. Use 'CSMF' instead.

Usage

Population.summary(va, top.aggregate = NULL, InterVA.rule = FALSE, 
                   noplot = FALSE, type = "bar", min.prob = 0.01, ...)  

Arguments

va  
   The list of va object to summarize.

   top.aggregate  
   Integer indicating how many causes from the top need to go into summary. The rest of the probabilities goes into an extra category "Undetermined". When set to NULL, default is all causes to be considered. This is only used when InterVA.rule set to "FALSE".

   InterVA.rule  
   If it is set to "TRUE", only the top 3 causes reported by InterVA4 is calculated into CSMF as in InterVA4. The rest of probabilities goes into an extra category "Undetermined". Default set to "FALSE".

   noplot  
   A logical value indicating whether the plot will be shown. If it is set to "TRUE", only the CSMF will be returned.

   type  
   An indicator of the type of chart to plot. "pie" for pie chart; "bar" for bar chart.

   min.prob  
   The minimum probability that is to be plotted in bar chart, or to be labeled in pie chart.

   ...  
   Arguments to be passed to/from graphic function barplot, pie, and more graphical parameters (see par). They will affect the main title, size and font of labels, and the radius of the pie chart.

Value

   dist.cod  
   The population probability of CODs.

Author(s)

   Zehang Li, Tyler McCormick, Sam Clark

See Also

CSMF.interVA4
print.interVA_summary  

*Print method for summary of the results obtained from InterVA4 algorithm*

---

**Description**

This function prints the summary message of the fitted results.

**Usage**

```r
## S3 method for class 'interVA_summary'
print(x, ...)
```

**Arguments**

- `x`  
  summary of InterVA results
- `...`  
  not used

---

**probbase**  

*Conditional probability of InterVA4.02*

---

**Description**

This is the table of conditional probabilities of symptoms given CODs. The values are from InterVA-4.02.

**Format**

A data frame with 246 observations on 81 variables. Each observation is the conditional probability.

**Examples**

```r
data(probbase)
```
Description

This is the table of conditional probabilities of symptoms given CODs. The values are from InterVA-4.03.

Format

A data frame with 246 observations on 81 variables. Each observation is the conditional probability.

Examples

data(probbase)

SampleInput

10 records of Sample Input

Description

This is a dataset consisting of 10 arbitrary sample input deaths in the acceptable format of InterVA4. Any data that needs to be analyzed by this package should be in the same format. The orders of the input fields must not be changed.

Format

10 arbitrary input records.

Examples

data(SampleInput)
summary.interVA  Summary of the results obtained from InterVA4 algorithm

Description

This function prints the summary message of the fitted results.

Usage

## S3 method for class 'interVA'
summary(object, top = 5, id = NULL,
    InterVA.rule = TRUE, ...)

Arguments

- object: fitted object from InterVA()
- top: number of top CSMF to show
- id: the ID of a specific death to show
- InterVA.rule: If it is set to "TRUE", only the top 3 causes reported by InterVA4 is calculated into CSMF as in InterVA4. The rest of probabilities goes into an extra category "Undetermined". Default set to "TRUE".
- ...: not used

References

http://www.interva.net/

Examples

data(SampleInput)
## to get easy-to-read version of causes of death make sure the column
## orders match interVA4 standard input this can be monitored by checking
## the warnings of column names
sample.output1 <- InterVA(SampleInput, HIV = "h", Malaria = "l", write=FALSE, replicate = FALSE)

summary(sample.output1)
sample.output1, top = 10)
sample.output1, id = "100532")
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