

Package ‘TCPMOR’

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Title Two Cut-Points with Maximum Odds Ratio

Version 1.0

Description Enables the computation of the 'two cut-points with maximum odds ratio (OR) value method' for data analysis, particularly suited for binary classification tasks. Users can identify optimal cut-points in a continuous variable by maximizing the odds ratio while maintaining an equal risk level, useful for tasks such as medical diagnostics, risk assessment, or predictive modeling.

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Imports SemiPar, stats

Suggests testthat (>= 3.0.0)

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NeedsCompilation no

Author Xianying He [aut],
Shuo Yang [aut, cre],
Yi Fei [ctb],
Jinxin Zhang [aut]

Maintainer Shuo Yang <yangsh223@mail2.sysu.edu.cn>

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calculateCutoffs	<i>Calculate data filtering results and two cutoffs for given sensitivity and specificity threshold</i>
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Description

Calculate data filtering results and two cutoffs for given sensitivity and specificity threshold

Usage

```
calculateCutoffs(dataC, seThreshold = 0.1, spThreshold = 0.1)
```

Arguments

dataC	Data frame containing columns: se, sp, age, y0, OR, y
seThreshold	Sensitivity threshold
spThreshold	Specificity threshold

Value

A list with two elements: filteredData(the filtered dataset) and cutoffs(the calculated two cutoffs)

Examples

```
# Generate simulated data dataC
dataC <- createData(200)

# Fit the semi-parametric model
spm.fit <- fitSemiParamModel(dataC)

# Find two cut-off points
dataC <- findCutoffs(spm.fit, dataC)

# Output the two cut-off points after limiting sensitivity se and specificity sp
result <- calculateCutoffs(dataC)
cutoffs <- result$cutoffs
dataC2 <- result$filteredData
print(cutoffs)
```

createData	<i>Generate simulation data</i>
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Description

Generate simulation data

Usage

```
createData(n, seed = 123589)
```

Arguments

n	The total number of observations to generate
seed	Randomized seeds for ensuring reproducible results

Value

A data frame containing age and a binary outcome variable

Examples

```
dataC <- createData(200)
```

discretizeAge	<i>Discretize the age variable according to the two cut-off points</i>
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Description

Discretize the age variable according to the two cut-off points

Usage

```
discretizeAge(data, cutoffs)
```

Arguments

data	Data frame with column: age
cutoffs	The cut-off points of the age range

Value

A modified data frame with a new column: age_p

Examples

```
# Generate simulated data dataC
dataC <- createData(200)

# Fit the semi-parametric model
spm.fit <- fitSemiParamModel(dataC)

# Find two cut-off points
dataC <- findCutoffs(spm.fit, dataC)

# Calculate the two cut-off points after limiting sensitivity se and specificity sp
result <- calculateCutoffs(dataC)
cutoffs <- result$cutoffs
dataC2 <- result$filteredData

# Discretize age variable based on the two cutoffs
dataC2 <- discretizeAge(dataC2, cutoffs)
```

findCutoffs	<i>Finding the two cut-off points</i>
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Description

Finding the two cut-off points

Usage

```
findCutoffs(spm.fit, dataC)
```

Arguments

spm.fit	Fitted semi-parametric model object
dataC	Data frame containing age and binary outcome variables

Value

Data frame containing age, fitted lnOR, OR, se, sp, sse, and ssp

Examples

```
# Generate simulated data dataC
dataC <- createData(200)

# Fit the semi-parametric model
spm.fit <- fitSemiParamModel(dataC)

# Find two cut-off points
dataC <- findCutoffs(spm.fit, dataC)
```

fitLogisticRegression *Fit a logistic regression model and return the OR and 95% confidence interval*

Description

Fit a logistic regression model and return the OR and 95% confidence interval

Usage

```
fitLogisticRegression(data)
```

Arguments

data A data frame with columns: y, age_p

Value

A matrix of OR and 95% confidence intervals

Examples

```
# Generate simulated data dataC
dataC <- createData(200)

# Fit the semi-parametric model
spm.fit <- fitSemiParamModel(dataC)

# Find two cut-off points
dataC <- findCutoffs(spm.fit, dataC)

# Calculate the two cut-off points after limiting sensitivity se and specificity sp
result <- calculateCutoffs(dataC)
cutoffs <- result$cutoffs
dataC2 <- result$filteredData

# Discretize age variable based on the two cutoffs
dataC2 <- discretizeAge(dataC2, cutoffs)

# Fitting logistic regression models and obtaining OR values and 95% confidence intervals
OR_Results <- fitLogisticRegression(dataC2)
print(round(OR_Results, 3))
```

fitSemiParamModel	<i>Fit the data using a semi-parametric model to explore the nonlinear dose-response relationship between the independent variable and lnOR</i>
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Description

Fit the data using a semi-parametric model to explore the nonlinear dose-response relationship between the independent variable and lnOR

Usage

```
fitSemiParamModel(dataC)
```

Arguments

dataC Data frame containing age and binary outcome variables

Value

Fitted semi-parametric model object

Examples

```
# Generate simulated data dataC
dataC <- createData(200)

# Plot the nonlinear dose-response relationship between the independent variable and lnOR
spm.fit <- fitSemiParamModel(dataC)
plot(spm.fit, ylab = "lnOR", xlab = "age", shade = FALSE)
summary(spm.fit)
```

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