

Package ‘accept’

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Title The Acute COPD Exacerbation Prediction Tool (ACCEPT)

Version 1.0.0

Description Allows clinicians to predict the rate and severity of future acute exacerbation in Chronic Obstructive Pulmonary Disease (COPD) patients, based on the clinical prediction models published in Adibi et al. (2020) <doi:10.1016/S2213-2600(19)30397-2> and Safari et al. (2022) <doi:10.1016/j.eclinm.2022.101574>.

Depends R (>= 3.6.0)

License GPL-3

Encoding UTF-8

LazyData true

Imports stats, dplyr, reldist, splines

Suggests plotly, spelling

RoxygenNote 7.2.3

Language en-US

NeedsCompilation no

Author Amin Adibi [aut, cre],
Mohsen Sadatsafavi [aut, cph],
Abdollah Safari [aut],
Ainsleigh Hill [aut]

Maintainer Amin Adibi <adibi@alumni.ubc.ca>

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accept	<i>A flexible version of ACCEPT 2.0 model, which imputes predictors using MICE approach.</i>
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Description

A flexible version of ACCEPT 2.0 model, which imputes predictors using MICE approach.

Usage

```
accept(data, version = "flexexcept", prediction_interval = FALSE, ...)
```

Arguments

data	new patient data with missing values to be imputed before prediction with the same format as accept samplePatients.
version	indicates which version of ACCEPT needs to be called.
prediction_interval	default is FALSE If set to true, returns prediction intervals of the predictions.
...	for other versions of accept.

Value

patientData with prediction.

Examples

```
results <- accept(data = samplePatients)
```

accept1	<i>Predicts COPD exacerbation rate by severity level based on Acute COPD Exacerbation Tool (ACCEPT)</i>
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Description

Predicts COPD exacerbation rate by severity level based on Acute COPD Exacerbation Tool (ACCEPT)

Usage

```
accept1(
  patientData,
  random_sampling_N = 100,
  lastYrExacCol = "LastYrExacCount",
  lastYrSevExacCol = "LastYrSevExacCount",
  ...
)
```

Arguments

patientData patient data matrix. Can have one or many patients in it
 random_sampling_N number of random sampling. Default is 100.
 lastYrExacCol the column specifying last year all exacerbation count
 lastYrSevExacCol the column specifying last year severe exacerbation count
 ... for backward compatibility

Value

patientData with prediction

Examples

```
results <- accept1(samplePatients)
```

accept2	<i>Predicts COPD exacerbation rate by severity level based on the updated accept2 model, which improves accuracy in patients without an exacerbation history.</i>
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Description

Predicts COPD exacerbation rate by severity level based on the updated accept2 model, which improves accuracy in patients without an exacerbation history.

Usage

```
accept2(  
  patientData,  
  random_sampling_N = 100,  
  lastYrExacCol = "LastYrExacCount",  
  lastYrSevExacCol = "LastYrSevExacCount",  
  KeepSGRQ = TRUE,  
  KeepMeds = TRUE,  
  ...  
)
```

Arguments

patientData patient data matrix. Can have one or many patients in it
 random_sampling_N number of random sampling. Default is 100.
 lastYrExacCol the column specifying last year all exacerbation count

lastYrSevExacCol	the column specifying last year severe exacerbation count
KeepSGRQ	default is TRUE. If set to false, the reduced model without SGRQ will be used.
KeepMeds	default is TRUE. If set to false, the reduced model without medication predictors will be used.
...	for backward compatibility

Value

patientData with prediction

Examples

```
results <- accept2(samplePatients)
```

plotExacerbations	<i>Creates bar graph comparing no treatment with azithromycin treatment</i>
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Description

Creates bar graph comparing no treatment with azithromycin treatment

Usage

```
plotExacerbations(
  patientResults,
  type = "rate",
  interval = "PI",
  colors = c("#007bff", "rgb(204,204,204)")
)
```

Arguments

patientResults	patient results vector, produced by accept.
type	string: either "probability" or "rate"
interval	string: either "CI" or "PI" PI = Predicted Interval CI = Confidence Interval
colors	vector: a vector of colors to be used in the graph must be length 2 can use hexadecimal, rgb, or R color codes

Value

a bar graph

Examples

```
results <- accept1(samplePatients[1,])
plotExacerbations(results)
```

plotHeatMap	<i>Creates heatmap of number of exacerbations</i>
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Description

Creates heatmap of number of exacerbations

Usage

```
plotHeatMap(patientResults, n = 10, shortened = TRUE)
```

Arguments

patientResults	patient results vector, produced by accept.
n	how many exacerbations to consider
shortened	boolean

Value

a heatmap

Examples

```
results <- accept1(samplePatients[1,])  
plotHeatMap(results)
```

predictCountProb	<i>Predicts probability of observing n exacerbations in the next year</i>
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Description

Predicts probability of observing n exacerbations in the next year

Usage

```
predictCountProb(patientResults, n = 10, shortened = TRUE)
```

Arguments

patientResults	patient results vector, produced by accept.
n	how many exacerbations
shortened	boolean: Shortened results groups into 0, 1, 2, and 3 or more exacerbations

Value

a matrix of probabilities with the number of exacerbations as rows and number of severe exacerbations as columns

Examples

```
results <- accept2(samplePatients[1,])
predictCountProb (results)
```

samplePatients	<i>Sample Patient Characteristics Inputs</i>
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Description

A dataset containing sample patient characteristics to run the prediction model variables are as follows:

Format

A data frame with 2 rows and 19 variables

Details

- ID. A unique character string identifying a patients
- male. whether the patient is male (0,1)
- age. the age of the patient (40–90)
- smoker. whether the patient is currently a smoker (0,1)
- oxygen. whether the patient has had supplemental oxygen therapy within the past year (0,1)
- FEV1. forced expiratory volume in 1 second in L (0–5)
- BMI. body mass index (10–60)
- SGRQ. St. George’s Respiratory Questionnaire score (0–100)
- statin. whether the patient is taking statins due to cardiovascular conditions (0,1)
- LAMA. whether the patient is on long acting muscarinic antagonist (0,1)
- LABA. whether the patient is on long acting beta agonist (0,1)
- ICS. whether the patient is on inhaled corticosteroids (0,1)
- randomizedLAMA. whether the patient was randomized to receive long acting muscarinic antagonist. Should be 0 for prediction.(0,1)
- randomizedLABA. whether the patient was randomized to receive on long acting beta agonist. Should be 0 for prediction (0,1)
- randomizedICS. whether the patient was randomized to receive on inhaled corticosteroids. Should be 0 for prediction (0,1)
- randomizedAzithromycin. whether the patient was was randomized to receive long-term azithromycin therapy. Should be 0 for prediction (0,1)

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