
toad

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CHAPTER 1

Installation

via pip

```
pip install toad
```

via anaconda

```
conda install toad --channel conda-forge
```

via source code

```
python setup.py install
```


CHAPTER 2

Tutorial

A [basic tutorial](#) is provided.

3.1 toad package

3.2 Submodules

3.2.1 toad.detector module

Command line tools for detecting csv data

Team: ESC

Examples

```
python detector.py -i xxx.csv -o report.csv
```

```
toad.detector.getTopValues (series, top=5, reverse=False)
```

Get top/bottom n values

Parameters

- **series** (*Series*) – data series
- **top** (*number*) – number of top/bottom n values
- **reverse** (*bool*) – it will return bottom n values if True is given

Returns Series of top/bottom n values and percentage. ['value:percent', None]

Return type Series

```
toad.detector.getDescribe (series, percentiles=[0.25, 0.5, 0.75])
```

Get describe of series

Parameters

- **series** (*Series*) – data series

- **percentiles** – the percentiles to include in the output

Returns the describe of data include mean, std, min, max and percentiles

Return type Series

`toad.detector.countBlank(series, blanks=[None])`

Count number and percentage of blank values in series

Parameters

- **series** (*Series*) – data series
- **blanks** (*list*) – list of blank values

Returns number of blanks str: the percentage of blank values

Return type number

`toad.detector.isNumeric(series)`

Check if the series's type is numeric

Parameters **series** (*Series*) – data series

Returns bool

`toad.detector.detect(dataframe)`

Detect data

Parameters **dataframe** (*DataFrame*) – data that will be detected

Returns report of detecting

Return type DataFrame

3.2.2 toad.merge module

`toad.merge.ChiMerge()`

Chi-Merge

Parameters

- **feature** (*array-like*) – feature to be merged
- **target** (*array-like*) – a array of target classes
- **n_bins** (*int*) – n bins will be merged into
- **min_samples** (*number*) – min sample in each group, if float, it will be the percentage of samples
- **min_threshold** (*number*) – min threshold of chi-square

Returns array of split points

Return type array

`toad.merge.DTMerge()`

Merge by Decision Tree

Parameters

- **feature** (*array-like*) –
- **target** (*array-like*) – target will be used to fit decision tree
- **nan** (*number*) – value will be used to fill nan

- **n_bins** (*int*) – n groups that will be merged into
- **min_samples** (*int*) – min number of samples in each leaf nodes

Returns array of split points

Return type array

`toad.merge.KMeansMerge()`
Merge by KMeans

Parameters

- **feature** (*array-like*) –
- **target** (*array-like*) – target will be used to fit kmeans model
- **nan** (*number*) – value will be used to fill nan
- **n_bins** (*int*) – n groups that will be merged into
- **random_state** (*int*) – random state will be used for kmeans model

Returns split points of feature

Return type array

`toad.merge.QuantileMerge()`
Merge by quantile

Parameters

- **feature** (*array-like*) –
- **nan** (*number*) – value will be used to fill nan
- **n_bins** (*int*) – n groups that will be merged into
- **q** (*array-like*) – list of percentage split points

Returns split points of feature

Return type array

`toad.merge.StepMerge()`
Merge by step

Parameters

- **feature** (*array-like*) –
- **nan** (*number*) – value will be used to fill nan
- **n_bins** (*int*) – n groups that will be merged into
- **clip_v** (*number | tuple*) – min/max value of clipping
- **clip_std** (*number | tuple*) – min/max std of clipping
- **clip_q** (*number | tuple*) – min/max quantile of clipping

Returns split points of feature

Return type array

`toad.merge.merge`
merge feature into groups

Parameters

- **feature** (*array-like*) –
- **target** (*array-like*) –
- **method** (*str*) – ‘dt’, ‘chi’, ‘quantile’, ‘step’, ‘kmeans’ - the strategy to be used to merge feature
- **return_splits** (*bool*) – if needs to return splits
- **n_bins** (*int*) – n groups that will be merged into

Returns a array of merged label with the same size of feature array: list of split points

Return type array

3.2.3 toad.metrics module

`toad.metrics.KS(score, target)`
calculate ks value

Parameters

- **score** (*array-like*) – list of score or probability that the model predict
- **target** (*array-like*) – list of real target

Returns the max KS value

Return type float

`toad.metrics.KS_bucket(score, target, bucket=10, method='quantile', return_splits=False, **kwargs)`
calculate ks value by bucket

Parameters

- **score** (*array-like*) – list of score or probability that the model predict
- **target** (*array-like*) – list of real target
- **bucket** (*int*) – n groups that will bin into
- **method** (*str*) – method to bin score. *quantile* (default), *step*
- **return_splits** (*bool*) – if need to return splits of bucket

Returns DataFrame

`toad.metrics.KS_by_col(df, by='feature', score='score', target='target')`

`toad.metrics.SSE(y_pred, y)`
sum of squares due to error

`toad.metrics.MSE(y_pred, y)`
mean of squares due to error

`toad.metrics.AIC(y_pred, y, k, llf=None)`
Akaike Information Criterion

Parameters

- **y_pred** (*array-like*) –
- **y** (*array-like*) –
- **k** (*int*) – number of featuers

- **llf** (*float*) – result of log-likelihood function

`toad.metrics.BIC(y_pred, y, k, llf=None)`

Bayesian Information Criterion

Parameters

- **y_pred** (*array-like*) –
- **y** (*array-like*) –
- **k** (*int*) – number of features
- **llf** (*float*) – result of log-likelihood function

`toad.metrics.F1(score, target, split='best', return_split=False)`

calculate f1 value

Parameters

- **score** (*array-like*) –
- **target** (*array-like*) –

Returns best f1 score float: best splitter

Return type float

`toad.metrics.AUC(score, target, return_curve=False)`

AUC Score

Parameters

- **score** (*array-like*) – list of score or probability that the model predict
- **target** (*array-like*) – list of real target
- **return_curve** (*bool*) – if need return curve data for ROC plot

Returns auc score

Return type float

`toad.metrics.PSI(test, base, combiner=None, return_frame=False)`

calculate PSI

Parameters

- **test** (*array-like*) – data to test PSI
- **base** (*array-like*) – base data for calculate PSI
- **combiner** (*Combiner|list|dict*) – combiner to combine data
- **return_frame** (*bool*) – if need to return frame of proportion

Returns float|Series

`toad.metrics.matrix(y_pred, y, splits=None)`

confusion matrix of target

Parameters

- **y_pred** (*array-like*) –
- **y** (*array-like*) –
- **splits** (*float|list*) – split points of y_pred

Returns confusion matrix with true labels in rows and predicted labels in columns

Return type DataFrame

3.2.4 toad.plot module

`toad.plot.badrates_plot` (*frame*, *x=None*, *target='target'*, *by=None*, *freq=None*, *format=None*, *return_counts=False*, *return_proportion=False*, *return_frame=False*)

plot for badrate

Parameters

- **frame** (*DataFrame*) –
- **x** (*str*) – column in frame that will be used as x axis
- **target** (*str*) – target column in frame
- **by** (*str*) – column in frame that will be calculated badrate by it
- **freq** (*str*) – offset aliases string by pandas <http://pandas.pydata.org/pandas-docs/stable/timeseries.html#offset-aliases>
- **format** (*str*) – format string for time
- **return_counts** (*bool*) – if need return counts plot
- **return_frame** (*bool*) – if need return frame

Returns badrate plot Axes: counts plot Axes: proportion plot DataFrame: grouping detail data

Return type Axes

`toad.plot.corr_plot` (*frame*, *figure_size=(20, 15)*)

plot for correlation

Parameters **frame** (*DataFrame*) – frame to draw plot

Returns Axes

`toad.plot.proportion_plot` (*x=None*, *keys=None*)

plot for comparing proportion in different dataset

Parameters

- **x** (*Series/list*) – series or list of series data for plot
- **keys** (*str/list*) – keys for each data

Returns Axes

`toad.plot.roc_plot` (*score*, *target*)

plot for roc

Parameters

- **score** (*array-like*) – predicted score
- **target** (*array-like*) – true target

Returns Axes

`toad.plot.bin_plot` (*frame*, *x=None*, *target='target'*, *iv=True*, *annotate_format='.2f'*)

plot for bins

Parameters

- **frame** (*DataFrame*) –

- **x** (*str*) – column in frame that will be used as x axis
- **target** (*str*) – target column in frame
- **iv** (*bool*) – if need to show iv in plot
- **annotate_format** (*str*) – format str for axis annotation of chart

Returns bins' proportion and badrate plot

Return type Axes

3.2.5 toad.scorecard module

```
class toad.scorecard.ScoreCard (pdo=60, rate=2, base_odds=35, base_score=750, card=None,
                                combiner={}, transe=None, **kwargs)
Bases: sklearn.base.BaseEstimator, toad.utils.mixin.RulesMixin, toad.utils.
mixin.BinsMixin
```

coef_
coef of LR model

intercept_

n_features_

features_

combiner

fit (*X*, *y*)

Parameters

- **X** (*2D DataFrame*) –
- **Y** (*array-like*) –

predict (*X*, **kwargs)

predict score :param X: X to predict :type X: 2D array-like :param return_sub: if need to return sub score, default *False* :type return_sub: bool

Returns predicted score DataFrame: sub score for each feature

Return type array-like

proba_to_score (*prob*)

covert probability to score

odds = (1 - prob) / prob score = factor * log(odds) * offset

bin_to_score (*bins*, *return_sub=False*)

predict score from bins

woe_to_score (*woe*, *weight=None*)

calculate score by woe

after_export (*card*, *to_frame=False*, *to_json=None*, *to_csv=None*)

generate a scorecard object

Parameters

- **to_frame** (*bool*) – return DataFrame of card
- **to_json** (*str* | *IOBase*) – io to write json file

- **to_csv** (*filepath/IOBase*) – file to write csv

Returns dict

testing_frame (***kwargs*)
get testing frame with score

Returns testing frame with score

Return type DataFrame

3.2.6 toad.selection module

class toad.selection.**StatsModel** (*estimator='ols', criterion='aic', intercept=False*)

Bases: object

get_estimator (*name*)

stats (*X, y*)

get_criterion (*pre, y, k*)

t_value (*pre, y, X, coef*)

p_value (*t, n*)

loglikelihood (*pre, y, k*)

toad.selection.**stepwise** (*frame, target='target', estimator='ols', direction='both', criterion='aic', p_enter=0.01, p_remove=0.01, p_value_enter=0.2, intercept=False, max_iter=None, return_drop=False, exclude=None*)

stepwise to select features

Parameters

- **frame** (*DataFrame*) – dataframe that will be use to select
- **target** (*str*) – target name in frame
- **estimator** (*str*) – model to use for stats
- **direction** (*str*) – direction of stepwise, support 'forward', 'backward' and 'both', suggest 'both'
- **criterion** (*str*) – criterion to statistic model, support 'aic', 'bic'
- **p_enter** (*float*) – threshold that will be used in 'forward' and 'both' to keep features
- **p_remove** (*float*) – threshold that will be used in 'backward' to remove features
- **intercept** (*bool*) – if have intercept
- **p_value_enter** (*float*) – threshold that will be used in 'both' to remove features
- **max_iter** (*int*) – maximum number of iterate
- **return_drop** (*bool*) – if need to return features' name who has been dropped
- **exclude** (*array-like*) – list of feature names that will not be dropped

Returns selected dataframe array: list of feature names that has been dropped

Return type DataFrame

toad.selection.**drop_empty** (*frame, threshold=0.9, nan=None, return_drop=False, exclude=None*)
drop columns by empty

Parameters

- **frame** (*DataFrame*) – dataframe that will be used
- **threshold** (*number*) – drop the features whose empty num is greater than threshold. if threshold is float, it will be use as percentage
- **nan** (*any*) – values will be look like empty
- **return_drop** (*bool*) – if need to return features' name who has been dropped
- **exclude** (*array-like*) – list of feature names that will not be dropped

Returns selected dataframe array: list of feature names that has been dropped

Return type DataFrame

`toad.selection.drop_var(frame, threshold=0, return_drop=False, exclude=None)`
drop columns by variance

Parameters

- **frame** (*DataFrame*) – dataframe that will be used
- **threshold** (*float*) – drop features whose variance is less than threshold
- **return_drop** (*bool*) – if need to return features' name who has been dropped
- **exclude** (*array-like*) – list of feature names that will not be dropped

Returns selected dataframe array: list of feature names that has been dropped

Return type DataFrame

`toad.selection.drop_corr(frame, target=None, threshold=0.7, by='IV', return_drop=False, exclude=None)`
drop columns by correlation

Parameters

- **frame** (*DataFrame*) – dataframe that will be used
- **target** (*str*) – target name in dataframe
- **threshold** (*float*) – drop features that has the smallest weight in each groups whose correlation is greater than threshold
- **by** (*array-like*) – weight of features that will be used to drop the features
- **return_drop** (*bool*) – if need to return features' name who has been dropped
- **exclude** (*array-like*) – list of feature names that will not be dropped

Returns selected dataframe array: list of feature names that has been dropped

Return type DataFrame

`toad.selection.drop_iv(frame, target='target', threshold=0.02, return_drop=False, return_iv=False, exclude=None)`
drop columns by IV

Parameters

- **frame** (*DataFrame*) – dataframe that will be used
- **target** (*str*) – target name in dataframe
- **threshold** (*float*) – drop the features whose IV is less than threshold
- **return_drop** (*bool*) – if need to return features' name who has been dropped

- **return_iv** (*bool*) – if need to return features' IV
- **exclude** (*array-like*) – list of feature names that will not be dropped

Returns selected dataframe array: list of feature names that has been dropped Series: list of features' IV

Return type DataFrame

`toad.selection.drop_vif` (*frame*, *threshold=3*, *return_drop=False*, *exclude=None*)
variance inflation factor

Parameters

- **frame** (*DataFrame*) –
- **threshold** (*float*) – drop features until all vif is less than threshold
- **return_drop** (*bool*) – if need to return features' name who has been dropped
- **exclude** (*array-like*) – list of feature names that will not be dropped

Returns selected dataframe array: list of feature names that has been dropped

Return type DataFrame

`toad.selection.select` (*frame*, *target='target'*, *empty=0.9*, *iv=0.02*, *corr=0.7*, *return_drop=False*, *exclude=None*)
select features by rate of empty, iv and correlation

Parameters

- **frame** (*DataFrame*) –
- **target** (*str*) – target's name in dataframe
- **empty** (*number*) – drop the features which empty num is greater than threshold. if threshold is float, it will be use as percentage
- **iv** (*float*) – drop the features whose IV is less than threshold
- **corr** (*float*) – drop features that has the smallest IV in each groups which correlation is greater than threshold
- **return_drop** (*bool*) – if need to return features' name who has been dropped
- **exclude** (*array-like*) – list of feature name that will not be dropped

Returns selected dataframe dict: list of dropped feature names in each step

Return type DataFrame

3.2.7 toad.stats module

`toad.stats.gini` (*target*)
get gini index of a feature

Parameters **target** (*array-like*) – list of target that will be calculate gini

Returns gini value

Return type number

`toad.stats.gini_cond`
get conditional gini index of a feature

Parameters

- **feature** (*array-like*) –
- **target** (*array-like*) –

Returns conditional gini value. If feature is continuous, it will return the best gini value when the feature bins into two groups

Return type number

`toad.stats.entropy(target)`
get information entropy of a feature

Parameters **target** (*array-like*) –

Returns information entropy

Return type number

`toad.stats.entropy_cond`
get conditional entropy of a feature

Parameters

- **feature** (*array-like*) –
- **target** (*array-like*) –

Returns conditional information entropy. If feature is continuous, it will return the best entropy when the feature bins into two groups

Return type number

`toad.stats.probability(target, mask=None)`
get probability of target by mask

`toad.stats.WOE(y_prob, n_prob)`
get WOE of a group

Parameters

- **y_prob** – the probability of grouped y in total y
- **n_prob** – the probability of grouped n in total n

Returns woe value

Return type number

`toad.stats.IV`
get the IV of a feature

Parameters

- **feature** (*array-like*) –
- **target** (*array-like*) –
- **n_bins** (*int*) – n groups that the feature will bin into
- **method** (*str*) – the strategy to be used to merge feature, default is 'dt'
- **()** (***kwargs*) – other options for merge function

`toad.stats.badrate(target)`
calculate badrate

Parameters **target** (*array-like*) – target array which *I* is bad

Returns float

`toad.stats.VIF (frame)`
calculate vif

Parameters `frame` (*ndarray|DataFrame*) –

Returns Series

`toad.stats.column_quality (feature, target, name='feature', iv_only=False, **kwargs)`
calculate quality of a feature

Parameters

- **feature** (*array-like*) –
- **target** (*array-like*) –
- **name** (*str*) – feature's name that will be setted in the returned Series
- **iv_only** (*bool*) – if only calculate IV

Returns a list of quality with the feature's name

Return type Series

`toad.stats.quality (dataframe, target='target', iv_only=False, **kwargs)`
get quality of features in data

Parameters

- **dataframe** (*DataFrame*) – dataframe that will be calculate quality
- **target** (*str*) – the target's name in dataframe
- **iv_only** (*bool*) – if only calculate IV

Returns quality of features with the features' name as row name

Return type DataFrame

3.2.8 toad.transform module

class `toad.transform.Transformer`

Bases: `sklearn.base.TransformerMixin`, `toad.utils.mixin.RulesMixin`

Base class for transformers

fit ()

fit method, see details in *fit_* method

transform (*X*, **args*, ***kwargs*)

transform method, see details in *transform_* method

default_rule ()

export (***kwargs*)

fit_transform (*X*, *y=None*, ***fit_params*)

Fit to data, then transform it.

Fits transformer to *X* and *y* with optional parameters *fit_params* and returns a transformed version of *X*.

Parameters

- **X** (*numpy array of shape [n_samples, n_features]*) – Training set.
- **y** (*numpy array of shape [n_samples]*) – Target values.

- **fit_params** (*dict*) – Additional fit parameters.

Returns **X_new** – Transformed array.

Return type numpy array of shape [n_samples, n_features_new]

load (*rules*, *update=False*, ***kwargs*)

rules

update (**args*, ***kwargs*)

class toad.transform.WOETransformer

Bases: *toad.transform.Transformer*

WOE transformer

fit_ (*X*, *y*)

fit WOE transformer

Parameters

- **X** (*DataFrame/array-like*) –
- **y** (*str/array-like*) –
- **select_dtypes** (*str/numpy.dtypes*) – ‘object’, ‘number’ etc. only selected dtypes will be transform

transform_ (*rule*, *X*, *default='min'*)

transform function for single feature

Parameters

- **X** (*array-like*) –
- **default** (*str*) – ‘min’(default), ‘max’ - the strategy to be used for unknown group

Returns array-like

default_rule ()

export (***kwargs*)

fit ()

fit method, see details in *fit_* method

fit_transform (*X*, *y=None*, ***fit_params*)

Fit to data, then transform it.

Fits transformer to X and y with optional parameters *fit_params* and returns a transformed version of X.

Parameters

- **X** (*numpy array of shape [n_samples, n_features]*) – Training set.
- **y** (*numpy array of shape [n_samples]*) – Target values.
- **fit_params** (*dict*) – Additional fit parameters.

Returns **X_new** – Transformed array.

Return type numpy array of shape [n_samples, n_features_new]

load (*rules*, *update=False*, ***kwargs*)

rules

transform (*X*, **args*, ***kwargs*)
transform method, see details in *transform_* method

update (**args*, ***kwargs*)

class toad.transform.Combiner

Bases: *toad.transform.Transformer*, *toad.utils.mixin.BinsMixin*

Combiner for merge data

fit_ (*X*, *y=None*, *method='chi'*, *empty_separate=False*, ***kwargs*)
fit combiner

Parameters

- **X** (*DataFrame* / *array-like*) – features to be combined
- **y** (*str* / *array-like*) – target data or name of target in *X*
- **method** (*str*) – the strategy to be used to merge *X*, same as *.merge*, default is *chi*
- **n_bins** (*int*) – counts of bins will be combined
- **empty_separate** (*bool*) – if need to combine empty values into a separate group

transform_ (*rule*, *X*, *labels=False*, *ellipsis=16*, ***kwargs*)
transform *X* by combiner

Parameters

- **X** (*DataFrame* / *array-like*) – features to be transformed
- **labels** (*bool*) – if need to use labels for resulting bins, *False* by default
- **ellipsis** (*int*) – max length threshold that labels will not be ellipsis, *None* for skipping ellipsis

Returns array-like

set_rules (*map*, *reset=False*)
set rules for combiner

Parameters

- **map** (*dict* / *array-like*) – map of splits
- **reset** (*bool*) – if need to reset combiner

Returns self

ELSE_GROUP = 'else'

EMPTY_BIN = -1

NUMBER_EXP = `re.compile('\\\\[(-inf|-?\\\\d+(.\\\\d+)?)\\\\s*[~]\\\\s*(inf|-?\\\\d+(.\\\\d+)?)\\\\\\\\')`

default_rule ()

export (***kwargs*)

fit ()
fit method, see details in *fit_* method

fit_transform (*X*, *y=None*, ***fit_params*)
Fit to data, then transform it.

Fits transformer to *X* and *y* with optional parameters *fit_params* and returns a transformed version of *X*.

Parameters

- **X** (*numpy array of shape [n_samples, n_features]*) – Training set.
- **y** (*numpy array of shape [n_samples]*) – Target values.
- ****fit_params** (*dict*) – Additional fit parameters.

Returns **X_new** – Transformed array.

Return type *numpy array of shape [n_samples, n_features_new]*

classmethod **format_bins** (*bins, index=False, ellipsis=None*)
format bins to label

Parameters

- **bins** (*ndarray*) – bins to format
- **index** (*bool*) – if need index prefix
- **ellipsis** (*int*) – max length threshold that labels will not be ellipsis, *None* for skipping ellipsis

Returns array of labels

Return type *ndarray*

load (*rules, update=False, **kwargs*)

classmethod **parse_bins** (*bins*)

rules

transform (*X, *args, **kwargs*)
transform method, see details in *transform_* method

update (**args, **kwargs*)

class **toad.transform.GBDTTransformer**

Bases: *toad.transform.Transformer*

GBDT transformer

fit_ (*X, y, **kwargs*)
fit GBDT transformer

Parameters

- **X** (*DataFrame/array-like*) –
- **y** (*str/array-like*) –
- **select_dtypes** (*str/numpy.dtypes*) – ‘object’, ‘number’ etc. only selected dtypes will be transform,

transform_ (*rules, X*)
transform woe

Parameters **X** (*DataFrame/array-like*) –

Returns array-like

default_rule ()

export (***kwargs*)

fit ()
fit method, see details in *fit_* method

fit_transform (*X*, *y=None*, ***fit_params*)

Fit to data, then transform it.

Fits transformer to *X* and *y* with optional parameters *fit_params* and returns a transformed version of *X*.

Parameters

- **X** (*numpy array of shape [n_samples, n_features]*) – Training set.
- **y** (*numpy array of shape [n_samples]*) – Target values.
- ****fit_params** (*dict*) – Additional fit parameters.

Returns *X_new* – Transformed array.

Return type *numpy array of shape [n_samples, n_features_new]*

load (*rules*, *update=False*, ***kwargs*)

rules

transform (*X*, **args*, ***kwargs*)

transform method, see details in *transform_* method

update (**args*, ***kwargs*)

3.2.9 toad.preprocessing module

toad.preprocessing.process module

class *toad.preprocessing.process.Processing* (*data*)

Bases: *object*

Example:

```
>>> (Processing(data)
...   .groupby('id')
...   .partitionby(TimePartition(
...     'base_time',
...     'filter_time',
...     ['30d', '60d', '180d', '365d', 'all']
...   ))
...   .apply({'A': ['max', 'min', 'mean']})
...   .apply({'B': ['max', 'min', 'mean']})
...   .apply({'C': 'nunique'})
...   .apply({'D': {
...     'f': len,
...     'name': 'normal_count',
...     'mask': Mask().isin(['normal']),
...   }})
...   .apply({'id': 'count'})
...   .exec()
... )
```

groupby (*name*)

group data by name

Parameters *name* (*str*) – column name in data

apply (*f*)

apply functions to data

Parameters *f* (*dict/function*) – a config dict that keys are the column names and values are the functions, it will take the column series as the functions argument. if *f* is a function, it will take the whole dataframe as the argument.

append_func (*col, func*)

partitionby (*p*)

partition data to multiple pieces, processing will process to all the pieces

Parameters *p* (*Partition*) –

exec ()

process (*data*)

class toad.preprocessing.process.**Mask** (*column=None*)

Bases: object

a placeholder to select dataframe

push (*op, value*)

replay (*data*)

isin (*other*)

isna ()

class toad.preprocessing.process.**F** (*f, name=None, mask=None*)

Bases: object

function class for processing

name

is_buildin

need_filter

filter (*data*)

toad.preprocessing.partition module

class toad.preprocessing.partition.**Partition**

Bases: object

partition (*data*)

class toad.preprocessing.partition.**TimePartition** (*base, filter, times*)

Bases: *toad.preprocessing.partition.Partition*

partition (*data*)

partition data

Parameters *data* (*DataFrame*) – dataframe

Returns mask of partition data iterator -> str: suffix string of current partition

Return type iterator -> ndarray[bool]

class toad.preprocessing.partition.**ValuePartition** (*column*)

Bases: *toad.preprocessing.partition.Partition*

partition (*data*)

3.2.10 toad.utils module

toad.utils.func module

class toad.utils.func.Parallel

Bases: object

apply (*func*, *args*=(), *kwargs*={})

join ()

toad.utils.func.**np_count** (*arr*, *value*, *default*=None)

toad.utils.func.**has_nan** (*arr*)

toad.utils.func.**np_unique** (*arr*, ***kwargs*)

toad.utils.func.**to_ndarray** (*s*, *dtype*=None)

toad.utils.func.**fillna** (*feature*, *by*=-1)

toad.utils.func.**bin_by_splits** (*feature*, *splits*)

Bin feature by split points

toad.utils.func.**feature_splits** (*feature*, *target*)

find possibility spilt points

toad.utils.func.**iter_df** (*dataframe*, *feature*, *target*, *splits*)

iterate dataframe by split points

Returns iterator (df, splitter)

toad.utils.func.**inter_feature** (*feature*, *splits*)

toad.utils.func.**is_continuous** (*series*)

toad.utils.func.**split_target** (*frame*, *target*)

toad.utils.func.**unpack_tuple** (*x*)

toad.utils.func.**generate_str** (*size*=6, *chars*='ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789')

toad.utils.func.**save_json** (*contents*, *file*, *indent*=4)

save json file

Parameters

- **contents** (*dict*) – contents to save
- **file** (*str* | *IOBase*) – file to save

toad.utils.func.**read_json** (*file*)

read json file

toad.utils.func.**clip** (*series*, *value*=None, *std*=None, *quantile*=None)

clip series

Parameters

- **series** (*array-like*) – series need to be clipped
- **value** (*number* | *tuple*) – min/max value of clipping
- **std** (*number* | *tuple*) – min/max std of clipping
- **quantile** (*number* | *tuple*) – min/max quantile of clipping

toad.utils.func.**diff_time** (*base*, *target*, *format*=None, *time*='day')

`toad.utils.func.diff_time_frame` (*base, frame, format=None*)

`toad.utils.func.flatten_columns` (*columns, sep='_'*)
 flatten multiple columns to 1-dim columns joined with '_'

`toad.utils.func.bin_to_number` (*reg=None*)

Returns func(string) -> number

Return type function

`toad.utils.func.generate_target` (*size, rate=0.5, weight=None, reverse=False*)
 generate target for reject inference

Parameters

- **size** (*int*) – size of target
- **rate** (*float*) – rate of '1' in target
- **weight** (*array-like*) – weight of '1' to generate target
- **reverse** (*bool*) – if need reverse weight

Returns array

`toad.utils.func.get_dummies` (*dataframe, exclude=None, binary_drop=False, **kwargs*)
 get dummies

toad.utils.decorator module

class `toad.utils.decorator.Decorator` (**args, is_class=False, **kwargs*)

Bases: `object`

base decorater class

is_class = **False**

setup (**args, **kwargs*)

call (**args, **kwargs*)

wrapper (**args, **kwargs*)

class `toad.utils.decorator.frame_exclude` (**args, is_class=False, **kwargs*)

Bases: `toad.utils.decorator.Decorator`

decorator for exclude columns

wrapper (*X, *args, exclude=None, **kwargs*)

class `toad.utils.decorator.select_dtypes` (**args, is_class=False, **kwargs*)

Bases: `toad.utils.decorator.Decorator`

decorator for select frame by dtypes

wrapper (*X, *args, select_dtypes=None, **kwargs*)

class `toad.utils.decorator.save_to_json` (**args, is_class=False, **kwargs*)

Bases: `toad.utils.decorator.Decorator`

support save result to json file

wrapper (**args, to_json=None, **kwargs*)

```
class toad.utils.decorator.load_from_json(*args, is_class=False, **kwargs)
    Bases: toad.utils.decorator.Decorator
    support load data from json file
    require_first = False
    wrapper(*args, from_json=None, **kwargs)

class toad.utils.decorator.support_dataframe(*args, is_class=False, **kwargs)
    Bases: toad.utils.decorator.Decorator
    decorator for supporting dataframe
    require_target = True
    target = 'target'
    wrapper(frame, *args, **kwargs)

class toad.utils.decorator.proxy_docstring(*args, is_class=False, **kwargs)
    Bases: toad.utils.decorator.Decorator
    method_name = None
```

toad.utils.mixin module

```
class toad.utils.mixin.RulesMixin
    Bases: object
    default_rule()
    rules
    load(rules, update=False, **kwargs)
    export(**kwargs)
    update(*args, **kwargs)

class toad.utils.mixin.BinsMixin
    Bases: object
    EMPTY_BIN = -1
    ELSE_GROUP = 'else'
    NUMBER_EXP = re.compile('\[\[(-inf|-?\d+(\.\d+)?)\]\s*[\~]\s*(inf|-?\d+(\.\d+)?)\]\]\s*')
    classmethod parse_bins(bins)
    classmethod format_bins(bins, index=False, ellipsis=None)
        format bins to label
```

Parameters

- **bins** (*ndarray*) – bins to format
- **index** (*bool*) – if need index prefix
- **ellipsis** (*int*) – max length threshold that labels will not be ellipsis, *None* for skipping ellipsis

Returns array of labels

Return type ndarray

3.3 Module contents

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