

МОСКОВСКИЙ ГОСУДАРСТВЕННЫЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ
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Кафедра «Систем обработки информации и управления»

ОТЧЕТ

Рубежный контроль № 1

Выполнил:

студент группы ИУ5И-22М

Вей Пхьюу Ту

Москва - 2021

Рубежный контроль (Вариант 16)

Задача №16.

Для набора данных проведите нормализацию для одного (произвольного) числового признака с использованием преобразования Бокса-Кокса (Box-Cox transformation).

Решение

Загрузка и предобработка данных

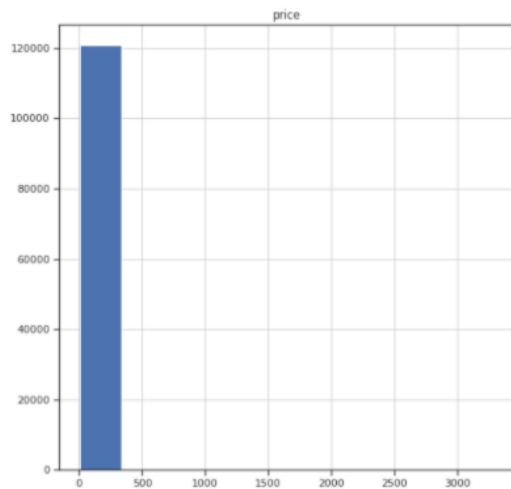
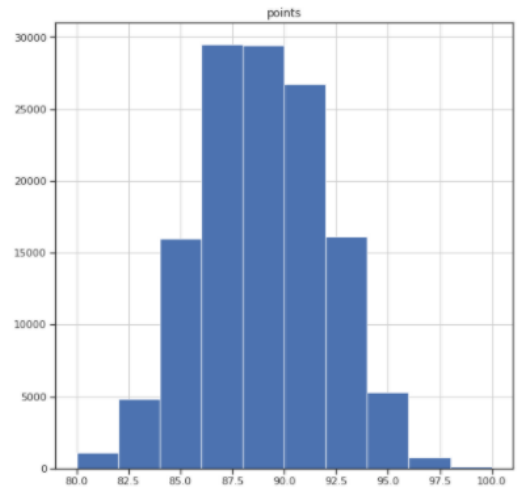
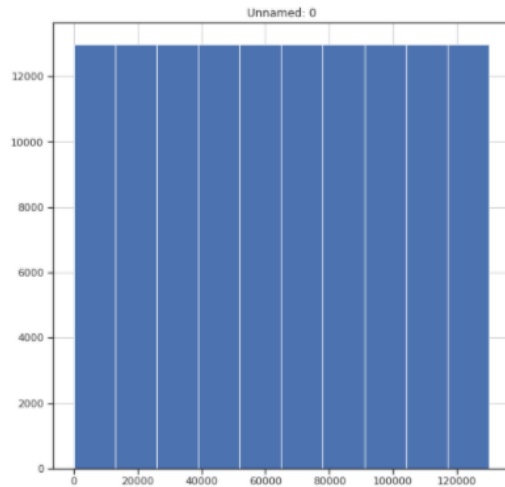
```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.datasets import load_wine
from sklearn.datasets import load_boston
import scipy.stats as stats
from sklearn.svm import SVR
from sklearn.svm import LinearSVC
from sklearn.feature_selection import SelectFromModel
from sklearn.linear_model import Lasso
from sklearn.linear_model import LogisticRegression
from sklearn.neighbors import KNeighborsClassifier
from sklearn.neighbors import KNeighborsRegressor
from sklearn.tree import DecisionTreeClassifier
from sklearn.ensemble import RandomForestClassifier
from sklearn.ensemble import GradientBoostingClassifier
from sklearn.tree import DecisionTreeRegressor
from sklearn.ensemble import RandomForestRegressor
from sklearn.ensemble import GradientBoostingRegressor
from sklearn.metrics import mean_squared_error
from sklearn.model_selection import train_test_split
from sklearn.feature_selection import VarianceThreshold
from sklearn.feature_selection import mutual_info_classif, mutual_info_regression
from sklearn.feature_selection import SelectKBest, SelectPercentile
from IPython.display import Image
%matplotlib inline
sns.set(style="ticks")
```

```
def diagnostic_plots(df, variable):
    plt.figure(figsize=(15,6))
    # гистограмма
    plt.subplot(1, 2, 1)
    df[variable].hist(bins=30)
    ## Q-Q plot
    plt.subplot(1, 2, 2)
    stats.probplot(df[variable], dist="norm", plot=plt)
    plt.show()
```

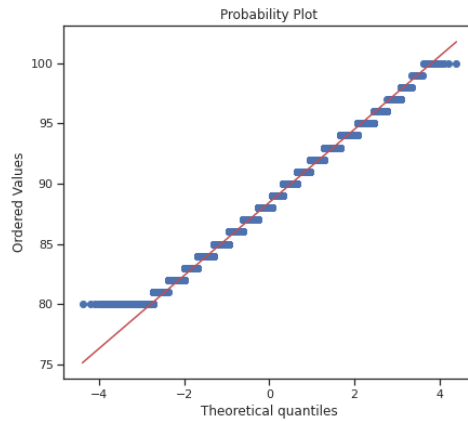
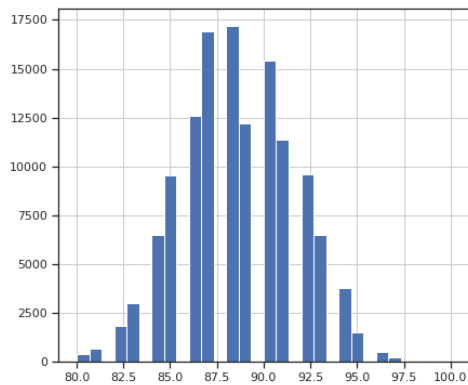
```
[ ] data = pd.read_csv('./winemag-data-130k-v2.csv', sep=',')
data.head()
```

| | Unnamed: 0 | country | description | designation | points | price | province | region_1 | region_2 | taster_name | taster_twitter_handle | title | variety | winery |
|---|------------|----------|---|------------------------------------|--------|-------|-------------------|---------------------|-------------------|--------------------|-----------------------|---|----------------|---------------------|
| 0 | 0 | Italy | Aromas include tropical fruit, broom, brimston... | Vulkà Bianco | 87 | NaN | Sicily & Sardinia | Etna | NaN | Kerin O'Keefe | @kerinokeefe | Nicosia 2013 Vulkà Bianco (Etna) | White Blend | Nicosia |
| 1 | 1 | Portugal | This is ripe and fruity, a wine that is smooth... | Avidagos | 87 | 15.0 | Douro | NaN | NaN | Roger Voss | @vossroger | Quinta dos Avidagos 2011 Avidagos Red (Douro) | Portuguese Red | Quinta dos Avidagos |
| 2 | 2 | US | Tart and snappy, the flavors of lime flesh and... | NaN | 87 | 14.0 | Oregon | Willamette Valley | Willamette Valley | Paul Gregutt | @paulgwine | Rainstorm 2013 Pinot Gris (Willamette Valley) | Pinot Gris | Rainstorm |
| 3 | 3 | US | Pineapple rind, lemon pith and orange blossom ... | Reserve Late Harvest | 87 | 13.0 | Michigan | Lake Michigan Shore | NaN | Alexander Peartree | NaN | St. Julian 2013 Reserve Late Harvest Riesling ... | Riesling | St. Julian |
| 4 | 4 | US | Much like the regular bottling from 2012, this... | Vintner's Reserve Wild Child Block | 87 | 65.0 | Oregon | Willamette Valley | Willamette Valley | Paul Gregutt | @paulgwine | Sweet Cheeks 2012 Vintner's Reserve Wild Child... | Pinot Noir | Sweet Cheeks |

```
In [29]: data.hist(figsize=(20,20))
plt.show()
```

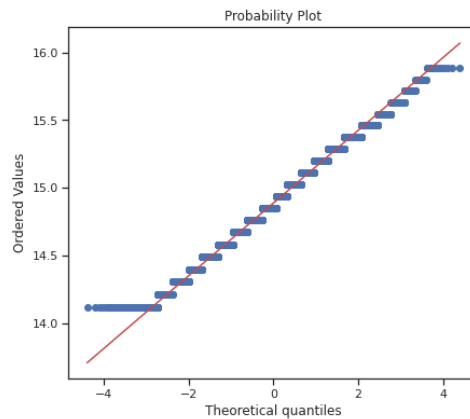
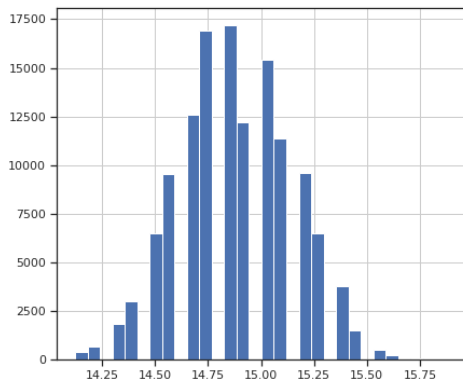


```
In [65]: diagnostic_plots(data, 'points')
```



```
In [31]: data['points_boxcox'], param = stats.boxcox(data['points'])
print('Оптимальное значение  $\lambda$  = {}'.format(param))
diagnostic_plots(data, 'points_boxcox')
```

Оптимальное значение λ = 0.459462888617044



Задача №36.

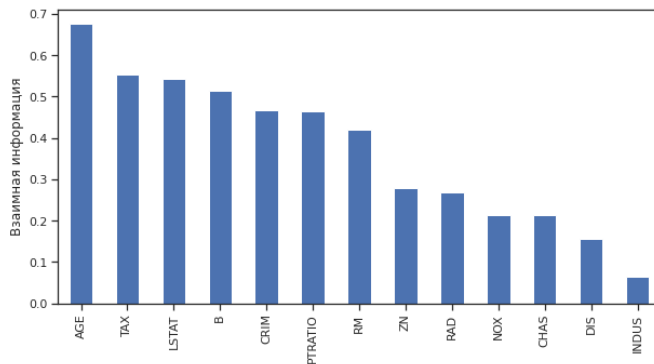
Для набора данных проведите процедуру отбора признаков (feature selection). Используйте класс `SelectKBest` для 5 лучших признаков, и метод, основанный на взаимной информации.

```
In [12]: wine = load_wine()
wine_X = wine.data
wine_y = wine.target
wine_feature_names = wine['feature_names']
wine_x_df = pd.DataFrame(data=wine['data'], columns=wine['feature_names'])
```

```
In [13]: boston = load_boston()
boston_X = boston.data
boston_y = boston.target
boston_feature_names = boston['feature_names']
boston_x_df = pd.DataFrame(data=boston['data'], columns=boston['feature_names'])
```

```
In [14]: mi = mutual_info_regression(wine_X, wine_y)
mi = pd.Series(mi)
mi.index = boston_feature_names
mi.sort_values(ascending=False).plot.bar(figsize=(10,5))
plt.ylabel('Взаимная информация')
```

```
Out[14]: Text(0, 0.5, 'Взаимная информация')
```



```
In [15]: sel_mi = SelectKBest(mutual_info_regression, k=5).fit(wine_X, wine_y)
list(zip(boston_feature_names, sel_mi.get_support()))
```

```
Out[15]: [('CRIM', True),
          ('ZN', False),
          ('INDUS', False),
          ('CHAS', False),
          ('NOX', False),
          ('RM', False),
          ('AGE', True),
          ('DIS', False),
          ('RAD', False),
          ('TAX', True),
          ('PTRATIO', False),
          ('B', True),
          ('LSTAT', True)]
```

```
In [16]: boston_feature_names[sel_mi.get_support()]
```

```
Out[16]: array(['CRIM', 'AGE', 'TAX', 'B', 'LSTAT'], dtype='<U7')
```

```
wine = load_wine()
wine_X = wine.data
wine_y = wine.target
wine_feature_names = wine['feature_names']
wine_x_df = pd.DataFrame(data=wine['data'], columns=wine['feature_names'])
```

```
boston = load_boston()
boston_X = boston.data
boston_y = boston.target
boston_feature_names = boston['feature_names']
boston_x_df = pd.DataFrame(data=boston['data'], columns=boston['feature_names'])
```

```
sel_mi = SelectKBest(mutual_info_regression, k=5).fit(wine_X, wine_y)
list(zip(boston_feature_names, sel_mi.get_support()))
```

```
[('CRIM', True),
 ('ZN', False),
 ('INDUS', False),
 ('CHAS', False),
 ('NOX', False),
 ('RM', False),
 ('AGE', True),
 ('DIS', False),
 ('RAD', False),
 ('TAX', True),
 ('PTRATIO', False),
 ('B', True),
 ('LSTAT', True)]
```

```
boston_feature_names[sel_mi.get_support()]
```

```
array(['CRIM', 'AGE', 'TAX', 'B', 'LSTAT'], dtype='<U7')
```