RK1 Андрианов А.А. ИУ5-23М

Вариант Задачи №1 - 1

Для набора данных проведите кодирование одного (произвольного) категориального признака с использованием метода "count (frequency) encoding".

Вариант Задачи №2 - 21

Для набора данных проведите масштабирование данных для одного (произвольного) числового признака с использованием масштабирования по медиане.

Дополнительные требования по группе:

Для студентов групп ИУ5-23М, ИУ5И-23М - для произвольной колонки данных построить график "Ящик с усами (boxplot)".

Импорт необходимых библиотек

```
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import pandas as pd
import plotly.express as px
import seaborn as sns
from matplotlib.pyplot import figure
from IPython.display import Image
!pip install category_encoders
from category_encoders.count import CountEncoder as ce_CountEncoder
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Collecting category_encoders
  Downloading category_encoders-2.5.0-py2.py3-none-any.whl (69 kB)
     |████████████████████████████████| 69 kB 3.7 MB/s
Requirement already satisfied: patsy>=0.5.1 in /usr/local/lib/python3.7/dist-packages (from category_encoders) (0.5.2)
Requirement already satisfied: scipy>=1.0.0 in /usr/local/lib/python3.7/dist-packages (from category_encoders) (1.4.1)
Requirement already satisfied: statsmodels>=0.9.0 in /usr/local/lib/python3.7/dist-packages (from category_encoders) (0.10.2)
Requirement already satisfied: numpy>=1.14.0 in /usr/local/lib/python3.7/dist-packages (from category_encoders) (1.21.6)
Requirement already satisfied: pandas>=1.0.5 in /usr/local/lib/python3.7/dist-packages (from category_encoders) (1.3.5)
Requirement already satisfied: scikit-learn>=0.20.0 in /usr/local/lib/python3.7/dist-packages (from category_encoders) (1.0.2)
Requirement already satisfied: pytz>=2017.3 in /usr/local/lib/python3.7/dist-packages (from pandas>=1.0.5->category_encoders) (
Requirement already satisfied: python-dateutil>=2.7.3 in /usr/local/lib/python3.7/dist-packages (from pandas>=1.0.5->category_e
Requirement already satisfied: six in /usr/local/lib/python3.7/dist-packages (from patsy>=0.5.1->category_encoders) (1.15.0)
Requirement already satisfied: joblib>=0.11 in /usr/local/lib/python3.7/dist-packages (from scikit-learn>=0.20.0->category_enco
Requirement already satisfied: threadpoolctl>=2.0.0 in /usr/local/lib/python3.7/dist-packages (from scikit-learn>=0.20.0->categ
Installing collected packages: category-encoders
Successfully installed category-encoders-2.5.0
/usr/local/lib/python3.7/dist-packages/statsmodels/tools/_testing.py:19: FutureWarning: pandas.util.testing is deprecated. Use
  import pandas.util.testing as tm
```

Задача 1 (№1)

Для набора данных проведите кодирование одного (произвольного) категориального признака с использованием метода "count (frequency) encoding".

```
# Подключение к gogle диску
data = pd.read_csv('data.csv', sep=",")
data.head()
```

	type_school	school_accreditation	gender	interest	residence	parent_age	pa
0	Academic	A	Male	Less Interested	Urban	56	
1	Academic	A	Male	Less Interested	Urban	57	
2	Academic	B	Female	Very	Urban	50	

```
data_features = list(zip(
# признаки
[i for i in data.columns],
zip(
    # типы колонок
    [str(i) for i in data.dtypes],
    # проверим есть ли пропущенные значения
    [i for i in data.isnull().sum()]
)))
# Признаки с типом данных и количеством пропусков
data_features
```

```
[('type_school', ('object', 0)),
 ('school_accreditation', ('object', 0)),
 ('gender', ('object', 0)),
 ('interest', ('object', 0)),
 ('residence', ('object', 0)),
 ('parent_age', ('int64', 0)),
 ('parent_salary', ('int64', 0)),
 ('house_area', ('float64', 0)),
 ('average_grades', ('float64', 0)),
 ('parent_was_in_college', ('bool', 0)),
 ('in_college', ('bool', 0))]
```

```
data.isnull().sum()
```

```
type_school              0
school_accreditation     0
gender                   0
interest                 0
residence                0
parent_age               0
parent_salary            0
house_area               0
average_grades           0
parent_was_in_college    0
in_college               0
dtype: int64
```

```
ce_CountEncoder1 = ce_CountEncoder()
data_COUNT_ENC = ce_CountEncoder1.fit_transform(data[data.columns.difference(['in_college'])])
```

```
data_COUNT_ENC
```

	average_grades	gender	house_area	interest	parent_age	parent_salary	pare
0	84.09	515	83.0	229	56	6950000	
1	86.91	515	76.8	229	57	4410000	
2	87.43	485	80.6	324	50	6500000	
3	82.12	515	78.2	324	49	6600000	
4	86.79	485	75.1	324	57	5250000	
...	...	...	...	...	...	...	
995	85.99	485	63.6	324	49	7420000	
996	89.72	485	84.3	229	51	7480000	
997	79.56	515	75.2	229	49	5550000	
998	87.18	515	105.8	261	53	5840000	
999	86.13	515	69.1	100	50	2940000	

1000 rows × 10 columns

```
data['gender'].unique()
```

```
array(['Male', 'Female'], dtype=object)
```

```
data_COUNT_ENC['gender'].unique()
```

```
array([515, 485])
```

```
ce_CountEncoder2 = ce_CountEncoder(normalize=True)
data_FREQ_ENC = ce_CountEncoder2.fit_transform(data[data.columns.difference(['in_college'])])
```

```
data_FREQ_ENC
```

	average_grades	gender	house_area	interest	parent_age	parent_salary	pare
0	84.09	0.515	83.0	0.229	56	6950000	
1	86.91	0.515	76.8	0.229	57	4410000	
2	87.43	0.485	80.6	0.324	50	6500000	
3	82.12	0.515	78.2	0.324	49	6600000	
4	86.79	0.485	75.1	0.324	57	5250000	
...	...	...	...	...	...	...	
995	85.99	0.485	63.6	0.324	49	7420000	
996	89.72	0.485	84.3	0.229	51	7480000	
997	79.56	0.515	75.2	0.229	49	5550000	
998	87.18	0.515	105.8	0.261	53	5840000	
999	86.13	0.515	69.1	0.100	50	2940000	

1000 rows × 10 columns

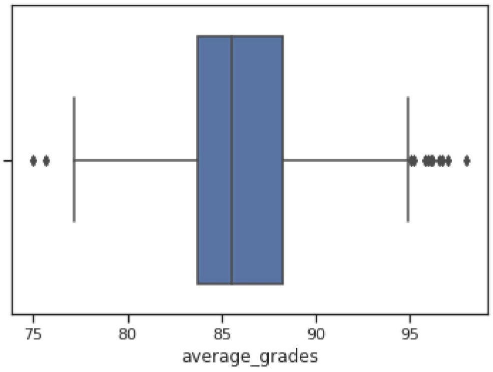
```
data_FREQ_ENC['gender'].unique()
```

```
array([0.515, 0.485])
```

Диаграмма "Ящик с усами"

```
#строим·график·"ящик·с·усами"
sns.boxplot(x=data["average_grades"])
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f33c440fa10>
```



Задача 2 (№21)

Для набора данных проведите масштабирование данных для одного (произвольного) числового признака с использованием масштабирования по медиане.

```
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np
import seaborn as sns
import scipy.stats as stats
import datetime
from sklearn.preprocessing import RobustScaler
from sklearn.preprocessing import MaxAbsScaler
from sklearn.preprocessing import MinMaxScaler
from sklearn.neighbors import KNeighborsClassifier
from sklearn.feature_selection import SelectFromModel
from sklearn.linear_model import LogisticRegression
from sklearn.feature_selection import VarianceThreshold
import joblib
# from mlxtend.feature_selection import SequentialFeatureSelector as SFS
from category_encoders.one_hot import OneHotEncoder as ce_OneHotEncoder
```

```
data.head()
```

	type_school	school_accreditation	gender	interest	residence	parent_age	pa
0	Academic	A	Male	Less Interested	Urban	56	
1	Academic	A	Male	Less Interested	Urban	57	
2	Academic	B	Female	Very Interested	Urban	50	
3	Vocational	B	Male	Very Interested	Rural	49	
4	Academic	A	Female	Very Interested	Urban	57	

```
data.describe()
```

	parent_age	parent_salary	house_area	average_grades
count	1000.000000	1.000000e+03	1000.000000	1000.000000
mean	52.208000	5.381570e+06	74.515300	86.097200
std	3.500427	1.397546e+06	15.293346	3.378738
min	40.000000	1.000000e+06	20.000000	75.000000
25%	50.000000	4.360000e+06	64.600000	83.737500
50%	52.000000	5.440000e+06	75.500000	85.575000
75%	54.000000	6.382500e+06	84.825000	88.262500
max	65.000000	1.000000e+07	120.000000	98.000000

```
data_new2 = data[["parent_age", "parent_salary", "house_area", "average_grades"]]
```

```
def arr_to_df(arr_scaled):
    res = pd.DataFrame(arr_scaled, columns=data_new2.columns)
    return res
```

```
def draw_graph(col_list, data1, data2, label1, label2):
    fig, (ax1, ax2) = plt.subplots(ncols = 2, figsize=(20,6))
    ax1.set_title(label1)
    sns.kdeplot(data=data1[col_list], ax=ax1)
    ax2.set_title(label2)
    sns.kdeplot(data=data2[col_list], ax=ax2)
    plt.show()
```

```
rs = RobustScaler()
data_median_scale_arr = rs.fit_transform(data_new2)
data_median_scale = arr_to_df(data_median_scale_arr)
data_median_scale.describe()
```

	parent_age	parent_salary	house_area	average_grades
count	1000.000000	1000.000000	1000.000000	1.000000e+03
mean	0.052000	-0.028890	-0.048687	1.154033e-01

```
draw_graph(["parent_age", "parent_salary", "house_area", "average_grades"], data, data_median_scale,'Без масштабирования', 'Масшта
```

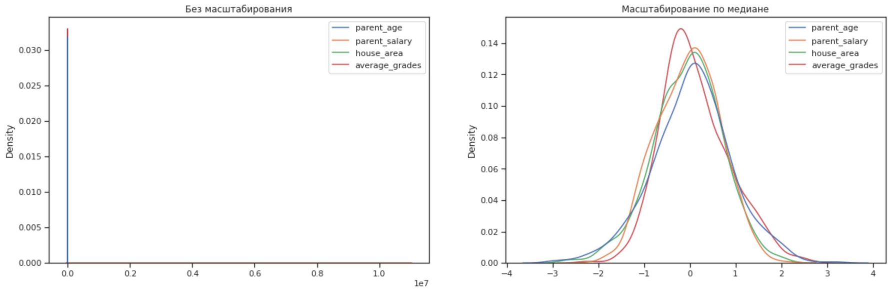
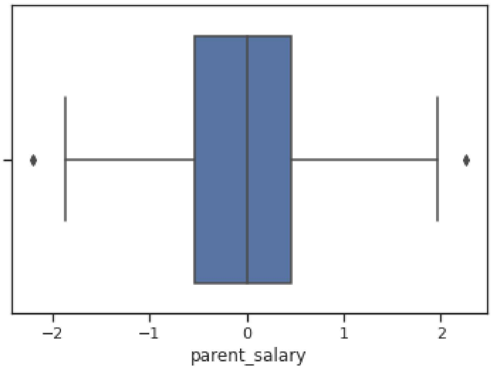


Диаграмма "Ящик с усами"

```
#строим график "ящик с усами"
sns.boxplot(x=data_median_scale["parent_salary"])
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f33c44c5750>
```


parent_salary