РК1

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Задачи 10, 30.

Задача 10

Для набора данных проведите устранение пропусков для одного (произвольного) категориального признака с использованием метода заполнения наиболее распространенным значением.

```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
%matplotlib inline
sns.set(style="ticks")
import plotly.express as px
from sklearn.impute import SimpleImputer
```

```
df = pd.read_csv('Car Ownership.csv')
```

```
df
```

```
                Occupation Monthly Income  Credit Score Years of
Employment  \
0                  Teacher          40000         750.0
10
1                 Engineer          60000         800.0
8
2                    Nurse          25000         650.0
5
3                   Doctor          80000         900.0
12
4              Businessman         100000         700.0
15
..                     ...            ...           ...
...
495        Project Manager         $7,000         730.0             5
years
496                   Chef         $4,500         680.0             4
years
497      Interior Designer         $5,500         690.0             4
```

```
years
498     Medical Assistant        $3,500          640.0             3
years
499  Customer Service Rep        $3,200          641.0             4
years

    Finance Status            Finance History  Car Number of Children

0             Good                  No issues  Yes                  2

1             Good                  No issues  Yes                  1

2             Fair  Late payment 2 months ago   No                  0

3        Excellent                  No issues  Yes                  3

4             Good  Late payment 6 months ago  Yes                  2

..             ...                        ...  ...                ...

495         Stable      No significant issues  Yes                  0

496         Stable      No significant issues  Yes                  0

497         Stable      No significant issues  Yes                  1

498         Stable      No significant issues   No                  1

499         Stable      No significant issues   No                  2


[500 rows x 8 columns]
```

Найдем пропуски

```
def draw_missing(df):
    total = df.isnull().sum().sort_values(ascending=False)
    percent =
(df.isnull().sum()/df.isnull().count()).sort_values(ascending=False)*1
00
    missing_data = pd.concat([total, percent], axis=1, keys=['Total',
'Percent'])
    return missing_data

draw_missing(df).round(1)

                     Total  Percent
Number of Children     125     25.0
Years of Employment     43      8.6
Credit Score            40      8.0
Finance History         28      5.6
```

```
Finance Status            23      4.6
Car                       20      4.0
Monthly Income            13      2.6
Occupation                10      2.0
```

```
cat_temp_data = df[['Finance Status']]
cat_temp_data.head()
```

```
  Finance Status
0           Good
1           Good
2           Fair
3      Excellent
4           Good
```

```
cat_temp_data['Finance Status'].unique()
```

```
array(['Good', 'Fair', 'Excellent', 'Poor', nan, 'Stable', 'Unstable',
       'Unknow', 'Unkonw'], dtype=object)
```

Присутствует пустое значение nan

```
cat_temp_data[cat_temp_data['Finance Status'].isnull()].shape
```

```
(23, 1)
```

```
# Импьютация наиболее частыми значениями
imp2 = SimpleImputer(missing_values=np.nan, strategy='most_frequent')
data_imp2 = imp2.fit_transform(cat_temp_data)
data_imp2
```

```
array([['Good'],
       ['Good'],
       ['Fair'],
       ['Excellent'],
       ['Good'],
       ['Fair'],
       ['Fair'],
       ['Poor'],
       ['Excellent'],
       ['Good'],
       ['Stable'],
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       ['Stable']], dtype=object)

# Пустые значения отсутствуют
np.unique(data_imp2)

array(['Excellent', 'Fair', 'Good', 'Poor', 'Stable', 'Unknow',
'Unkonw',
       'Unstable'], dtype=object)
```

Задача N°30

Для набора данных проведите удаление повторяющихся признаков.

Создам колонку, которая будет повторять значения профессии

```
df["col2"]= df['Occupation']

df

               Occupation Monthly Income  Credit Score Years of 
Employment  \
0                 Teacher          40000         750.0              
10   
1                Engineer          60000         800.0               
8   
2                   Nurse          25000         650.0               
5   
3                  Doctor          80000         900.0              
12   
4             Businessman         100000         700.0              
15   
..                    ...            ...           ...             
...   
495       Project Manager         $7,000         730.0             5 
years   
496                  Chef         $4,500         680.0             4 
years   
497     Interior Designer         $5,500         690.0             4 
years   
498     Medical Assistant         $3,500         640.0             3 
years   
499  Customer Service Rep         $3,200         641.0             4 
years   

    Finance Status            Finance History  Car Number of Children
\
0             Good                  No issues  Yes                  2   

1             Good                  No issues  Yes                  1   

2             Fair  Late payment 2 months ago   No                  0   

3        Excellent                  No issues  Yes                  3   

4             Good  Late payment 6 months ago  Yes                  2   

..             ...                        ...  ...                ...   

495         Stable       No significant issues  Yes                  0   
```

```
496          Stable      No significant issues  Yes                    0

497          Stable      No significant issues  Yes                    1

498          Stable      No significant issues   No                    1

499          Stable      No significant issues   No                    2


                      col2
0                  Teacher
1                 Engineer
2                    Nurse
3                   Doctor
4              Businessman
..                     ...
495        Project Manager
496                   Chef
497      Interior Designer
498      Medical Assistant
499   Customer Service Rep

[500 rows x 9 columns]
```

```
def get_duplicates(X):
    """
    Поиск дубликатов в колонках
    X - DataFrame
    """

    pairs = {}
    dups = []

    # Перебор всех колонок (внешний)
    for i in range(X.shape[1]):

        # текущая колонка
        feat_outer = X.columns[i]

        # если текущая колонка не является дублем
        if feat_outer not in dups:

            # создаем запись в словаре, колонка является ключом
            pairs[feat_outer] = []

            # Перебор оставшихся колонок (внутренний)
            for feat_inner in X.columns[i + 1:]:

                # Если колонки идентичны
                if X[feat_outer].equals(X[feat_inner]):
```

```
                    # добавление в словарь и список дубликатов
                    pairs[feat_outer].append(feat_inner)
                    dups.append(feat_inner)


    return dups, pairs


get_duplicates(df)
```

```
(['col2'],
 {'Occupation': ['col2'],
  'Monthly Income': [],
  'Credit Score': [],
  'Years of Employment': [],
  'Finance Status': [],
  'Finance History': [],
  'Car': [],
  'Number of Children': []})
```

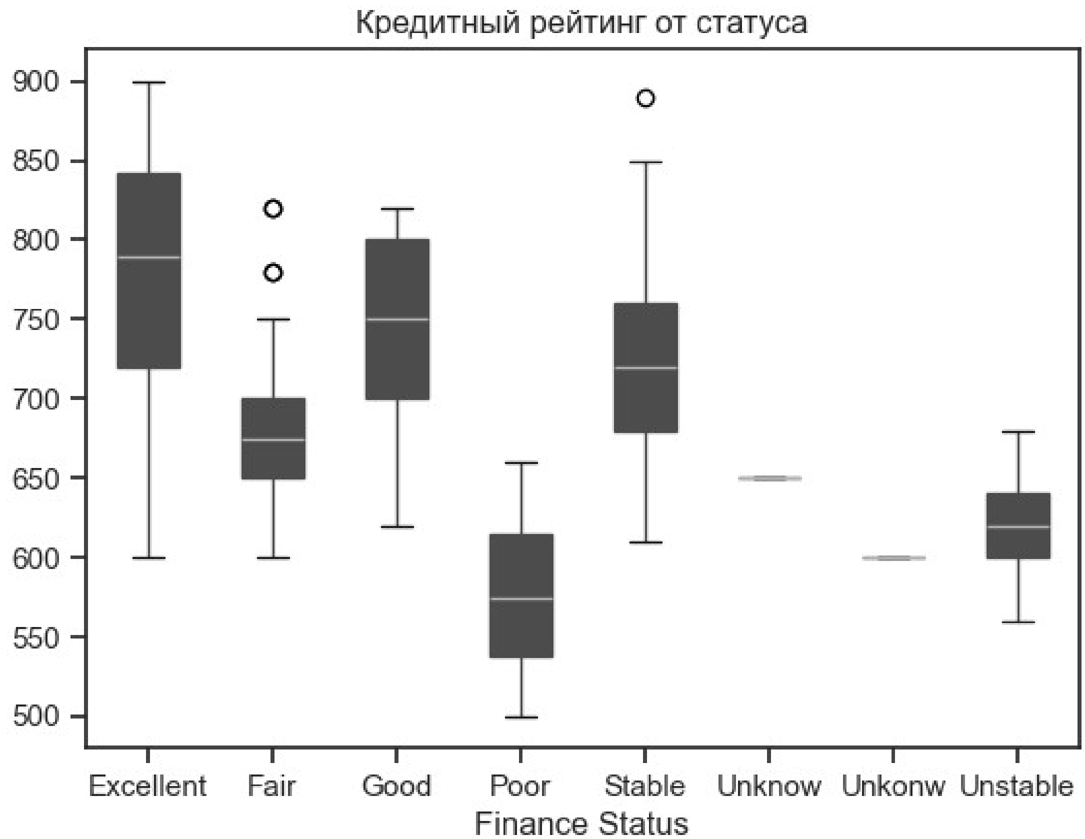
```
duplicates, _ = get_duplicates(df)

cols_to_drop = [item for item in duplicates]
cols_to_drop = [col for col in cols_to_drop if col in df.columns]
df_cleaned = df.drop(columns=cols_to_drop)

df_cleaned
```

```
               Occupation Monthly Income  Credit Score Years of 
Employment  \
0                 Teacher          40000         750.0              
10    
1                Engineer          60000         800.0              
8     
2                   Nurse          25000         650.0              
5     
3                  Doctor          80000         900.0              
12    
4             Businessman         100000         700.0              
15    
..                    ...            ...           ...              
...   
495       Project Manager        $7,000          730.0             5 
years   
496                  Chef        $4,500          680.0             4 
years   
497     Interior Designer        $5,500          690.0             4 
years   
498     Medical Assistant        $3,500          640.0             3 
years
```

```
499  Customer Service Rep        $3,200         641.0            4 
years
    Finance Status            Finance History  Car Number of Children
0             Good                  No issues  Yes                  2
1             Good                  No issues  Yes                  1
2             Fair  Late payment 2 months ago   No                  0
3        Excellent                  No issues  Yes                  3
4             Good  Late payment 6 months ago  Yes                  2
..             ...                        ...  ...                ...
495         Stable     No significant issues  Yes                  0
496         Stable     No significant issues  Yes                  0
497         Stable     No significant issues  Yes                  1
498         Stable     No significant issues   No                  1
499         Stable     No significant issues   No                  2

[500 rows x 8 columns]
```

Для произвольной колонки данных построить график "Ящик с усами (boxplot)".

```
plt.figure(figsize=(10, 6))
df.boxplot(column='Credit Score', by='Finance Status', grid=False, 
patch_artist=True)
plt.title('Кредитный рейтинг от статуса')

plt.suptitle('')
plt.show()

<Figure size 1000x600 with 0 Axes>
```


Кредитный рейтинг от статуса
900
850
800
750
700
650
600
550
500
Excellent
Fair
Good
Poor
Stable
Unknow
Unkonw
Unstable
Finance Status