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ФАКУЛЬТЕТ Информатика и системы управления

КАФЕДРА Системы обработки информации и управления

Отчёт по рубежному контролю №1

По дисциплине:
«Технологии машинного обучения»

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Москва, 2021

Задание

Для заданного набора данных проведите обработку пропусков в данных для одного категориального и одного количественного признака. Какие способы обработки пропусков в данных для категориальных и количественных признаков Вы использовали? Какие признаки Вы будете использовать для дальнейшего построения моделей машинного обучения и почему?

Набор данных:

<https://www.kaggle.com/san-francisco/sf-restaurant-scores-lives-standard>

РК ИУ5-61Б Пахомкин Кирсан

Импорт библиотек

```
In [1]: import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
from pandas.plotting import scatter_matrix
import warnings
warnings.filterwarnings('ignore')
sns.set(style="ticks")
%matplotlib inline
```

```
In [2]: data = pd.read_csv('restaurant-scores-lives-standard.csv')
```

```
In [3]: data.head()
```

```
Out[3]:
```

	business_id	business_name	business_address	business_city	business_state	business
0	101192	Cochinita #2	2 Marina Blvd Fort Mason	San Francisco	CA	
1	97975	BREADBELLY	1408 Clement St	San Francisco	CA	
2	92982	Great Gold Restaurant	3161 24th St.	San Francisco	CA	
3	101389	HOMAGE	214 CALIFORNIA ST	San Francisco	CA	
4	85986	Pronto Pizza	798 Eddy St	San Francisco	CA	

5 rows x 23 columns

```
In [4]: data.dtypes
```

```

Out[4]: business_id          int64
        business_name       object
        business_address    object
        business_city       object
        business_state      object
        business_postal_code object
        business_latitude    float64
        business_longitude   float64
        business_location    object
        business_phone_number float64
        inspection_id       object
        inspection_date      object
        inspection_score     float64
        inspection_type      object
        violation_id        object
        violation_description object
        risk_category        object
        Neighborhoods (old)  float64
        Police Districts    float64
        Supervisor Districts float64
        Fire Prevention Districts float64
        Zip Codes           float64
        Analysis Neighborhoods float64
        dtype: object

```

```

In [5]: data.isnull().sum()
        # проверим есть ли пропущенные значения

```

```

Out[5]: business_id          0
        business_name       0
        business_address    0
        business_city       0
        business_state      0
        business_postal_code 1018
        business_latitude    19556
        business_longitude   19556
        business_location    19556
        business_phone_number 36938
        inspection_id       0
        inspection_date      0
        inspection_score     13610
        inspection_type      0
        violation_id        12870
        violation_description 12870
        risk_category        12870
        Neighborhoods (old)  19594
        Police Districts    19594
        Supervisor Districts 19594
        Fire Prevention Districts 19646
        Zip Codes           19576
        Analysis Neighborhoods 19594
        dtype: int64

```

```

In [6]: data.info()

```

```

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 53973 entries, 0 to 53972
Data columns (total 23 columns):
#   Column                                Non-Null Count  Dtype
---  -
0   business_id                          53973 non-null  int64
1   business_name                        53973 non-null  object
2   business_address                     53973 non-null  object
3   business_city                        53973 non-null  object
4   business_state                       53973 non-null  object
5   business_postal_code                 52955 non-null  object
6   business_latitude                    34417 non-null  float64
7   business_longitude                   34417 non-null  float64
8   business_location                    34417 non-null  object
9   business_phone_number                17035 non-null  float64
10  inspection_id                        53973 non-null  object
11  inspection_date                      53973 non-null  object
12  inspection_score                     40363 non-null  float64
13  inspection_type                      53973 non-null  object
14  violation_id                         41103 non-null  object
15  violation_description                 41103 non-null  object
16  risk_category                       41103 non-null  object
17  Neighborhoods (old)                  34379 non-null  float64
18  Police Districts                     34379 non-null  float64
19  Supervisor Districts                 34379 non-null  float64
20  Fire Prevention Districts            34327 non-null  float64
21  Zip Codes                            34397 non-null  float64
22  Analysis Neighborhoods               34379 non-null  float64
dtypes: float64(10), int64(1), object(12)
memory usage: 9.5+ MB

```

Обработка пропусков

```

In [7]: # Удаляем столбцы, которые не несут значимой информации
data.drop(['business_name', 'business_address'], axis = 1, inplace = True)

```

```

In [8]: data.info()

```

```

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 53973 entries, 0 to 53972
Data columns (total 21 columns):
#   Column                                Non-Null Count  Dtype
---  -
0   business_id                           53973 non-null  int64
1   business_city                         53973 non-null  object
2   business_state                        53973 non-null  object
3   business_postal_code                 52955 non-null  object
4   business_latitude                     34417 non-null  float64
5   business_longitude                   34417 non-null  float64
6   business_location                    34417 non-null  object
7   business_phone_number                17035 non-null  float64
8   inspection_id                        53973 non-null  object
9   inspection_date                      53973 non-null  object
10  inspection_score                     40363 non-null  float64
11  inspection_type                      53973 non-null  object
12  violation_id                         41103 non-null  object
13  violation_description                41103 non-null  object
14  risk_category                       41103 non-null  object
15  Neighborhoods (old)                 34379 non-null  float64
16  Police Districts                   34379 non-null  float64
17  Supervisor Districts               34379 non-null  float64
18  Fire Prevention Districts          34327 non-null  float64
19  Zip Codes                          34397 non-null  float64
20  Analysis Neighborhoods             34379 non-null  float64
dtypes: float64(10), int64(1), object(10)
memory usage: 8.6+ MB

```

Обработка пропусков в числовых данных

```

In [9]: # Заполняем отсутствующие значения
data['business_latitude'] = data['business_latitude'].replace(0,np.nan)
data['business_latitude'] = data['business_latitude'].fillna(data['business_latitude'].mean())

```

```

In [10]: data.head()

```

```

Out[10]:

```

	business_id	business_city	business_state	business_postal_code	business_latitude	business_longitude
0	101192	San Francisco	CA	NaN	37.771619	-122.421516
1	97975	San Francisco	CA	94118	37.771619	-122.421516
2	92982	San Francisco	CA	94110	37.771619	-122.421516
3	101389	San Francisco	CA	94111	37.771619	-122.421516
4	85986	San Francisco	CA	94109	37.771619	-122.421516

5 rows x 7 columns

```

In [11]: data.isnull().sum()
# проверим есть ли пропущенные значения в столбце business_latitude

```

```
Out[11]: business_id          0
business_city              0
business_state             0
business_postal_code      1018
business_latitude          0
business_longitude        19556
business_location          19556
business_phone_number      36938
inspection_id              0
inspection_date            0
inspection_score           13610
inspection_type            0
violation_id              12870
violation_description      12870
risk_category              12870
Neighborhoods (old)        19594
Police Districts           19594
Supervisor Districts       19594
Fire Prevention Districts  19646
Zip Codes                  19576
Analysis Neighborhoods     19594
dtype: int64
```

Обработка пропусков в категориальных данных

```
In [12]: total_count = data.shape[0]
print('Всего строк: {}'.format(total_count))
```

Всего строк: 53973

```
In [13]: # Выберем категориальные колонки с пропущенными значениями
# Цикл по колонкам датасета
cat_cols = []
for col in data.columns:
    # Количество пустых значений
    temp_null_count = data[data[col].isnull()].shape[0]
    dt = str(data[col].dtype)
    if temp_null_count > 0 and (dt == 'object'):
        cat_cols.append(col)
        temp_perc = round((temp_null_count / total_count) * 100.0, 2)
        print('Колонка {}. Тип данных {}. Количество пустых значений {}, {'
```

Колонка business_postal_code. Тип данных object. Количество пустых значений 1018, 1.89%.

Колонка business_location. Тип данных object. Количество пустых значений 19556, 36.23%.

Колонка violation_id. Тип данных object. Количество пустых значений 12870, 23.85%.

Колонка violation_description. Тип данных object. Количество пустых значений 12870, 23.85%.

Колонка risk_category. Тип данных object. Количество пустых значений 12870, 23.85%.

```
In [14]: # Заполняем отсутствующие значения
data['violation_id'] = data.fillna("None")
data.head()
```


Out[14]:

	business_id	business_city	business_state	business_postal_code	business_latitude	bu
0	101192	San Francisco	CA	NaN	37.771619	
1	97975	San Francisco	CA	94118	37.771619	
2	92982	San Francisco	CA	94110	37.771619	
3	101389	San Francisco	CA	94111	37.771619	
4	85986	San Francisco	CA	94109	37.771619	

5 rows x 21 columns

In [15]:

```
data.isnull().sum()  
# проверим есть ли пропущенные значения в столбце violation_id
```

Out[15]:

```
business_id          0  
business_city        0  
business_state       0  
business_postal_code 1018  
business_latitude    0  
business_longitude   19556  
business_location    19556  
business_phone_number 36938  
inspection_id        0  
inspection_date       0  
inspection_score     13610  
inspection_type       0  
violation_id         0  
violation_description 12870  
risk_category        12870  
Neighborhoods (old)   19594  
Police Districts     19594  
Supervisor Districts 19594  
Fire Prevention Districts 19646  
Zip Codes            19576  
Analysis Neighborhoods 19594  
dtype: int64
```