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Вариант: 23; Задача: 3; Датасет: 7

Задача 3

Для заданного набора данных произведите масштабирование данных (для одного признака) и преобразование категориальных признаков в количественные двумя способами (label encoding, one hot encoding) для одного признака. Какие методы Вы использовали для решения задачи и почему?

Dataset: https://www.kaggle.com/mohansacharya/graduate-admissions

Импорт библиотек:

In [1]:
```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.impute import SimpleImputer
from sklearn.impute import MissingIndicator
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_postal_code	business_latitude	business_longitude	busi
0	101192	Cochinita #2	2 Marina Blvd Fort Mason	San Francisco	CA	NaN	NaN	NaN	
1	97975	BREADBELLY	1408 Clement St	San Francisco	CA	94118	NaN	NaN	
2	92982	Great Gold Restaurant	3161 24th St.	San Francisco	CA	94110	NaN	NaN	
3	101389	HOMAGE	214 CALIFORNIA ST	San Francisco	CA	94111	NaN	NaN	
4	85986	Pronto Pizza	798 Eddy St	San Francisco	CA	94109	NaN	NaN	

5 rows × 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
```

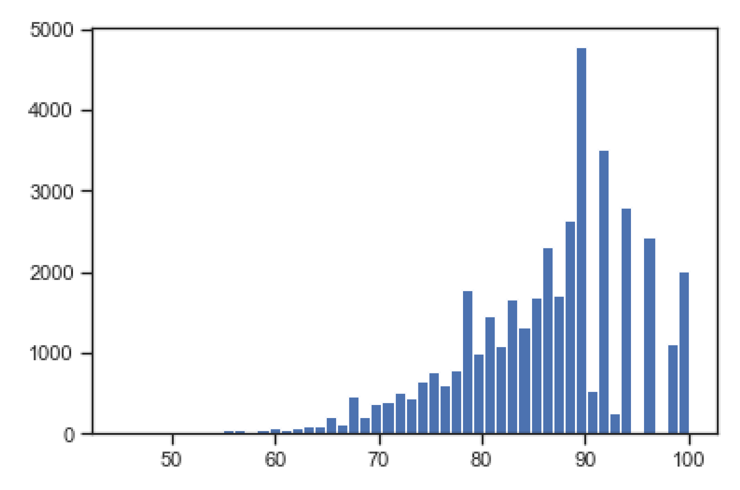
In [6]:
```
data.info()
```

```
<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
```

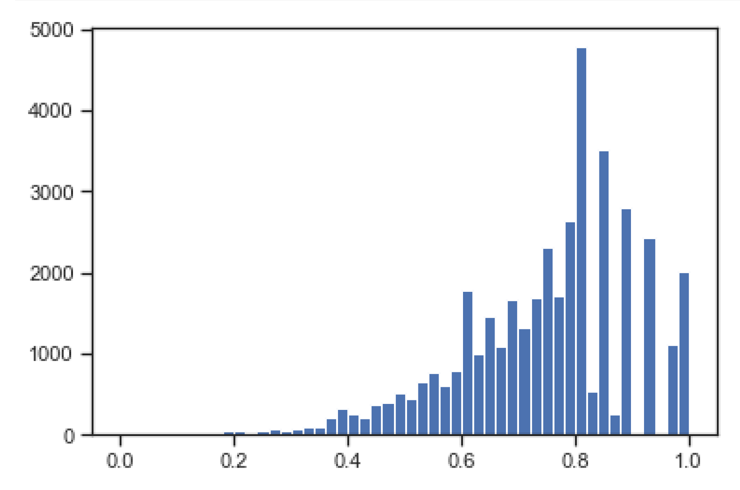
In [7]:
```
from sklearn.preprocessing import MinMaxScaler, StandardScaler, Normalizer
```

In [8]:
```
sc1 = MinMaxScaler()
sc1_data = sc1.fit_transform(data[['inspection_score']])
```

In [9]:
```
plt.hist(data['inspection_score'], 50)
plt.show()
```



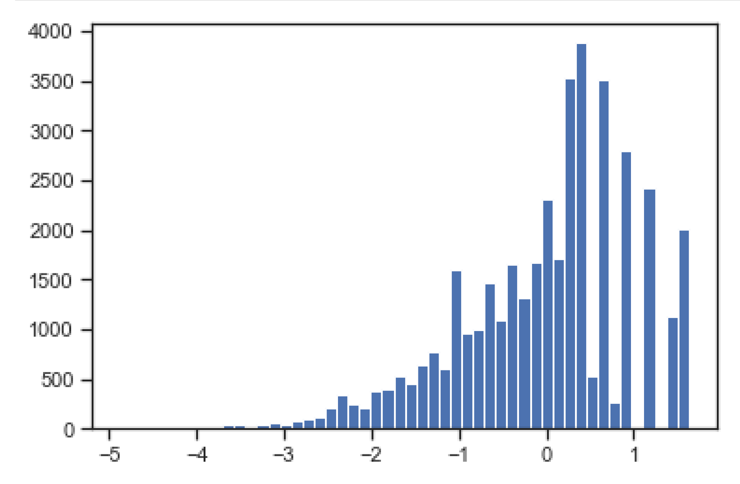
In [10]:
```
plt.hist(sc1_data, 50)
plt.show()
```



Масштабирование данных на основе Z-оценки - StandardScaler¶

In [11]:
```
sc2 = StandardScaler()
sc2_data = sc2.fit_transform(data[['inspection_score']])
```

In [12]:
```
plt.hist(sc2_data, 50)
plt.show()
```



In [13]:
```
cat_temp_data = data[['business_name']]
cat_temp_data.head()
```

Out[13]:

	business_name
0	Cochinita #2
1	BREADBELLY
2	Great Gold Restaurant
3	HOMAGE
4	Pronto Pizza

In [14]:
```
# Импьютация наиболее частыми значениями
imp2 = SimpleImputer(missing_values=np.nan, strategy='most_frequent')
data_imp2 = imp2.fit_transform(cat_temp_data)
data_imp2
```

Out[14]:
```
array([['Cochinita #2'],
       ['BREADBELLY'],
       ['Great Gold Restaurant'],
       ...,
       ['Philz Coffee'],
       ['El Gran Taco Loco'],
       ['Blue Bottle Coffee']], dtype=object)
```

In [15]:
```
cat_enc = pd.DataFrame({'business_name':data_imp2.T[0]})
cat_enc
```

Out[15]:

	business_name
0	Cochinita #2
1	BREADBELLY
2	Great Gold Restaurant
3	HOMAGE
4	Pronto Pizza
...	...
53968	Blue Bottle Coffee
53969	POKE KANA
53970	Philz Coffee
53971	El Gran Taco Loco
53972	Blue Bottle Coffee

53973 rows × 1 columns

In [16]:
```
from sklearn.preprocessing import LabelEncoder, OneHotEncoder
```

Кодирование категорий целочисленными значениями - label encoding

In [17]:
```
le = LabelEncoder()
cat_enc_le = le.fit_transform(cat_enc['business_name'])
```

In [18]:
```
cat_enc['business_name'].unique()
```

Out[18]:
```
array(['Cochinita #2', 'BREADBELLY', 'Great Gold Restaurant', ...,
       'LITTLE PARIS', 'Tosca Cafe', 'LITTLE SWEET'], dtype=object)
```

In [19]:
```
np.unique(cat_enc_le)
```

Out[19]:
```
array([   0,    1,    2, ..., 5569, 5570, 5571])
```

In [20]:
```
le.inverse_transform([0, 1, 2, 3])
```

Out[20]:
```
array(['#1 VERJUS CAVE, #2 VERJUS', '111 Minna Gallery',
       '12 Tribes Kosher Foods', '1428 Haight'], dtype=object)
```

Кодирование категорий наборами бинарных значений - one-hot encoding

In [21]:
```
ohe = OneHotEncoder()
cat_enc_ohe = ohe.fit_transform(cat_enc[['business_name']])
```

In [22]:
```
cat_enc.shape
```

Out[22]:
```
(53973, 1)
```

In [23]:
```
cat_enc_ohe.shape
```

Out[23]:
```
(53973, 5572)
```

In [24]:
```
cat_enc_ohe
```

Out[24]:
```
<53973x5572 sparse matrix of type '<class 'numpy.float64'>'
	with 53973 stored elements in Compressed Sparse Row format>
```

In [25]:
```
cat_enc_ohe.todense()[0:10]
```

Out[25]:
```
matrix([[0., 0., 0., ..., 0., 0., 0.],
        [0., 0., 0., ..., 0., 0., 0.],
        [0., 0., 0., ..., 0., 0., 0.],
        ...,
        [0., 0., 0., ..., 0., 0., 0.],
        [0., 0., 0., ..., 0., 0., 0.],
        [0., 0., 0., ..., 0., 0., 0.]])
```

In [26]:
```
cat_enc.head(10)
```

Out[26]:

	business_name
0	Cochinita #2
1	BREADBELLY
2	Great Gold Restaurant
3	HOMAGE
4	Pronto Pizza
5	Brickhouse
6	LAI HONG RESTAURANT
7	Fools Errand
8	MoBowL
9	CurveBall

Реализовываем "ящик с усами"

In [27]:
```
sns.boxplot(data['inspection_score'])
```

Out[27]:
```
<AxesSubplot:xlabel='inspection_score'>
```