Рубежный контроль №1 по курсу "Методы машинного обучения"

Вариант: 2

Выполнил: Арбузов А.П. группа ИУ5-24М

Задание:

Задача №2: Для набора данных проведите кодирование одного (произвольного) категориального признака с использованием метода "target (mean) encoding".

Задача №22: Для набора данных проведите масштабирование данных для одного (произвольного) числового признака с использованием масштабирования по максимальному значению.

Дополнительное условие: Для произвольной колонки данных построить график "Скрипичная диаграмма (violin plot)".

В [3]:

```python
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
from category_encoders.target_encoder import TargetEncoder as ce_TargetEncoder
%matplotlib inline
sns.set(style="ticks")
```

age - возраст workclass - работа fnlwgt
education - образование
education-num - код образования
marital-status - брак occupation - наименование работы relationship - муж/жена/не в браке race - раса
sex - пол
capital-gain - прирост капитала
capital-loss - снижение капитала
hours-per-week - занятость в неделю
native-country - место рождения, Родина salary - зарплата

В [4]:

```
loadedData = pd.read_csv('adultData.csv', sep=",")
print("Размер датасета:", loadedData.shape)
loadedData.head()
```

```
Размер датасета: (32561, 15)
```

Out[4]:

	age	workclass	fnlwgt	education	education-num	marital-status	occupation	relationship	race	se
0	39	State-gov	77516	Bachelors	13	Never-married	Adm-clerical	Not-in-family	White	Mal
1	50	Self-emp-not-inc	83311	Bachelors	13	Married-civ-spouse	Exec-managerial	Husband	White	Mal
2	38	Private	215646	HS-grad	9	Divorced	Handlers-cleaners	Not-in-family	White	Mal
3	53	Private	234721	11th	7	Married-civ-spouse	Handlers-cleaners	Husband	Black	Mal
4	28	Private	338409	Bachelors	13	Married-civ-spouse	Prof-specialty	Wife	Black	Femal

В [5]:

```
data_features = list(zip(
[i for i in loadedData.columns],
zip(
    [str(i) for i in loadedData.dtypes],
    [i for i in loadedData.isnull().sum()]
)))
data_features
```

Out[5]:

```
[('age', ('int64', 0)),
 ('workclass', ('object', 0)),
 ('fnlwgt', ('int64', 0)),
 ('education', ('object', 0)),
 ('education-num', ('int64', 0)),
 ('marital-status', ('object', 0)),
 ('occupation', ('object', 0)),
 ('relationship', ('object', 0)),
 ('race', ('object', 0)),
 ('sex', ('object', 0)),
 ('capital-gain', ('int64', 0)),
 ('capital-loss', ('int64', 0)),
 ('hours-per-week', ('int64', 0)),
 ('native-country', ('object', 0)),
 ('salary', ('object', 0))]
```

В [6]:

```
#Добавим закодированный целевой признак gender_code
dct = {'Female': 0, 'Male': 1}
loadedData['gender_code'] = loadedData['sex'].map(dct)
loadedData.head()
```

Out[6]:

	age	workclass	fnlwgt	education	education-num	marital-status	occupation	relationship	race	se
0	39	State-gov	77516	Bachelors	13	Never-married	Adm-clerical	Not-in-family	White	Mal
1	50	Self-emp-not-inc	83311	Bachelors	13	Married-civ-spouse	Exec-managerial	Husband	White	Mal
2	38	Private	215646	HS-grad	9	Divorced	Handlers-cleaners	Not-in-family	White	Mal
3	53	Private	234721	11th	7	Married-civ-spouse	Handlers-cleaners	Husband	Black	Mal
4	28	Private	338409	Bachelors	13	Married-civ-spouse	Prof-specialty	Wife	Black	Femal

В [7]:

```
ce_TargetEncoder1 = ce_TargetEncoder()
loadedData_MEAN_ENC = ce_TargetEncoder1.fit_transform(loadedData[loadedData.colum
loadedData_MEAN_ENC.head()
```

```
C:\Users\Alexei Arbuzov\anaconda3\lib\site-packages\category_encoders\utils.py:
21: FutureWarning: is_categorical is deprecated and will be removed in a future
version.  Use is_categorical_dtype instead
  elif pd.api.types.is_categorical(cols):
```

Out[7]:

	age	capital-gain	capital-loss	education	education-num	fnlwgt	hours-per-week	marital-status	native-country	occupation	
0	39	2174	0	0.697666	13	77516	40	0.553777	0.668084	0.327056	(
1	50	0	0	0.697666	13	83311	13	0.889356	0.668084	0.714953	(
2	38	0	0	0.677174	9	215646	40	0.398605	0.668084	0.880292	(
3	53	0	0	0.632340	7	234721	40	0.889356	0.668084	0.880292	(
4	28	0	0	0.697666	13	338409	40	0.889356	0.578947	0.634058	(

В [8]:

```
loadedData['education'].unique()
```

Out[8]:

```
array(['Bachelors', 'HS-grad', '11th', 'Masters', '9th', 'Some-college',
       'Assoc-acdm', 'Assoc-voc', '7th-8th', 'Doctorate', 'Prof-school',
       '5th-6th', '10th', '1st-4th', 'Preschool', '12th'], dtype=object)
```

В [9]:

```
loadedData_MEAN_ENC['education'].unique()
```

Out[9]:

```
array([0.69766573, 0.6771736 , 0.63234043, 0.68891468, 0.71984436,
       0.61514196, 0.6054358 , 0.6382055 , 0.75232198, 0.79176755,
       0.84027778, 0.74774775, 0.68381565, 0.72619048, 0.68627451,
       0.66743649])
```

Задача №22

В [50]:

```
#Только числовые признаки
x_col = loadedData.drop(loadedData.columns[[1,3,5,6,7,8,9,10,11,13,14]], axis = 1
x_fin = x_col.drop('gender_code', axis = 1)
x_fin.head()
```

Out[50]:

	age	fnlwgt	education-num	hours-per-week
0	39	77516	13	40
1	50	83311	13	13
2	38	215646	9	40
3	53	234721	7	40
4	28	338409	13	40

В [51]:

```
#Функция для восстановления датафрейма на основе масштабирования данных
def arr_to_df(arr_scaled):
    res = pd.DataFrame(arr_scaled, columns = x_fin.columns)
    return res
```

В [52]:

```
from sklearn.preprocessing import MaxAbsScaler
cs51 = MaxAbsScaler()
data_cs51_scaled_temp = cs51.fit_transform(x_fin)
#Формируем DataFrame
data_cs51_scaled = arr_to_df(data_cs51_scaled_temp)
data_cs51_scaled.describe()
```

Out[52]:

	age	fnlwgt	education-num	hours-per-week
count	32561.000000	32561.000000	32561.000000	32561.000000
mean	0.428685	0.127822	0.630042	0.408459
std	0.151560	0.071092	0.160795	0.124722
min	0.188889	0.008274	0.062500	0.010101
25%	0.311111	0.079361	0.562500	0.404040
50%	0.411111	0.120129	0.625000	0.404040
75%	0.533333	0.159662	0.750000	0.454545
max	1.000000	1.000000	1.000000	1.000000

Дополнительное условие

В [36]:

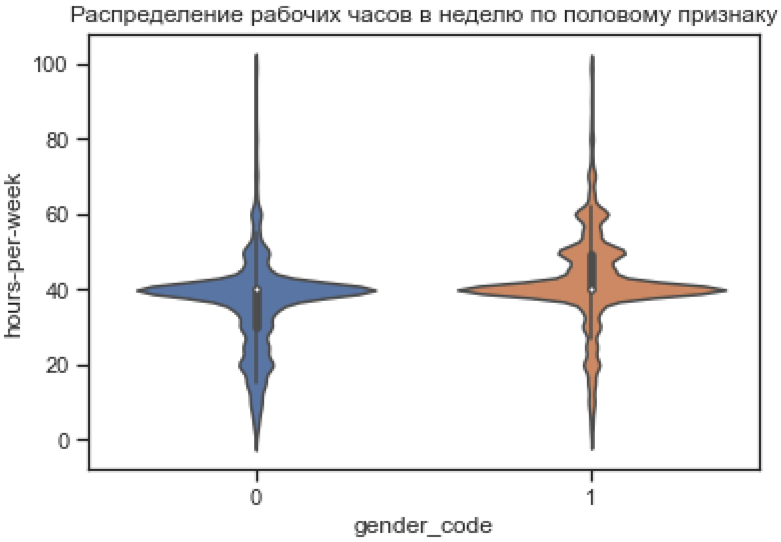
```
fig, ax = plt.subplots()

xdata = loadedData["gender_code"].astype(str).astype(int)
ydata = loadedData["hours-per-week"].astype(str).astype(int)

ax = sns.violinplot(x = xdata, y = ydata)

ax.set_title('Распределение рабочих часов в неделю по половому признаку')
plt.show()

# Male   - 1
# Female  - 0
```


Распределение рабочих часов в неделю по половому признаку
hours-per-week
gender_code