1. Рубежный контроль №1

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1.1. Задание

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?

1.2. Решение

1.2.1. Загрузка и предобработка данных

```
In [1]: import numpy as np
        import pandas as pd
        import seaborn as sns
        %matplotlib inline
```

```
In [2]: data = pd.read_csv("dc-wikia-data.csv")
```

```
In [3]: data.dtypes
```

```
Out[3]: page_id              int64
        name                object
        urlslug             object
        ID                  object
        ALIGN               object
        EYE                 object
        HAIR                object
        SEX                 object
        GSM                 object
        ALIVE               object
        APPEARANCES        float64
        FIRST APPEARANCE    object
        YEAR               float64
        dtype: object
```

```
In [4]: data.head()
```

```
Out[4]:    page_id                        name                                urls
        0     1422         Batman (Bruce Wayne)         \/wiki\/Batman_(Bruce_Wayn
        1    23387        Superman (Clark Kent)        \/wiki\/Superman_(Clark_Ken
        2     1458   Green Lantern (Hal Jordan)   \/wiki\/Green_Lantern_(Hal_Jorda
        3     1659     James Gordon (New Earth)     \/wiki\/James_Gordon_(New_Eart
        4     1576  Richard Grayson (New Earth)  \/wiki\/Richard_Grayson_(New_Eart

                       ID            ALIGN         EYE        HAIR              S
        0  Secret Identity  Good Characters   Blue Eyes  Black Hair  Male Characte
        1  Secret Identity  Good Characters   Blue Eyes  Black Hair  Male Characte
        2  Secret Identity  Good Characters  Brown Eyes  Brown Hair  Male Characte
```

```
3  Public Identity  Good Characters  Brown Eyes  White Hair  Male Characte
4  Secret Identity  Good Characters   Blue Eyes  Black Hair  Male Characte

   GSM              ALIVE  APPEARANCES FIRST APPEARANCE    YEAR
0  NaN  Living Characters       3093.0        1939, May  1939.0
1  NaN  Living Characters       2496.0    1986, October  1986.0
2  NaN  Living Characters       1565.0    1959, October  1959.0
3  NaN  Living Characters       1316.0   1987, February  1987.0
4  NaN  Living Characters       1237.0      1940, April  1940.0
```

In [5]:
```
data.shape
```

Out[5]:
```
(6896, 13)
```

In [6]:
```
data.isnull().sum()
```

Out[6]:
```
page_id                0
name                   0
urlslug                0
ID                  2013
ALIGN                601
EYE                 3628
HAIR                2274
SEX                  125
GSM                 6832
ALIVE                  3
APPEARANCES          355
FIRST APPEARANCE      69
YEAR                  69
dtype: int64
```

In [7]:
```
d = data[["name", "SEX", "APPEARANCES"]]
d = d.dropna(axis=0, how="any")
```

In [8]:
```
d.head()
```

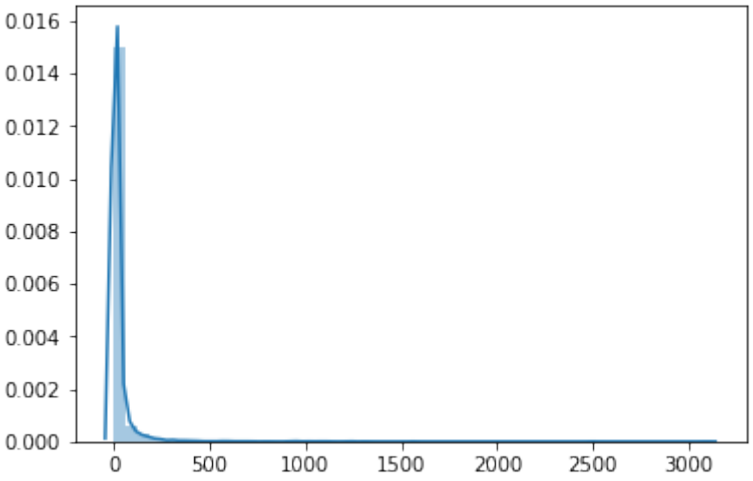
Out[8]:
```
                          name              SEX  APPEARANCES
0         Batman (Bruce Wayne)  Male Characters       3093.0
1        Superman (Clark Kent)  Male Characters       2496.0
2   Green Lantern (Hal Jordan)  Male Characters       1565.0
3     James Gordon (New Earth)  Male Characters       1316.0
4  Richard Grayson (New Earth)  Male Characters       1237.0
```

In [9]:
```
d.shape
```

Out[9]:
```
(6427, 3)
```

1.2.2. Масштабирование данных

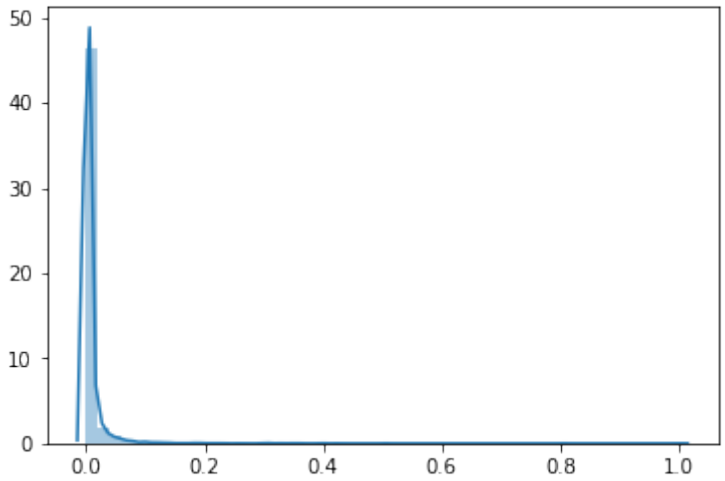
In [10]:
```
sns.distplot(d[["APPEARANCES"]]);
```




```
In [11]: from sklearn.preprocessing import MinMaxScaler
         sc = MinMaxScaler()
         sc_data = sc.fit_transform(d[["APPEARANCES"]])

         sns.distplot(sc_data)
```

```
Out[11]: <matplotlib.axes._subplots.AxesSubplot at 0x169b1e72dd8>
```




```
In [12]: d["APPEARANCES_SCALED"] = sc_data
```

1.2.3. Преобразование категориальных признаков

```
In [13]: from sklearn.preprocessing import LabelEncoder, OneHotEncoder
```

Label encoding

```
In [14]: le = LabelEncoder()
         sex_le = le.fit_transform(d["SEX"])

In [15]: np.unique(sex_le)

Out[15]: array([0, 1, 2, 3])

In [16]: le.inverse_transform(np.unique(sex_le))

Out[16]: array(['Female Characters', 'Genderless Characters', 'Male Characters',
                'Transgender Characters'], dtype=object)

In [17]: d["SEX_INDEX"] = sex_le
```

One Hot encoding

```
In [18]: ohe = OneHotEncoder()
         sex_ohe = ohe.fit_transform(d[["SEX"]])

In [19]: sex_ohe.todense()[0:10]

Out[19]: matrix([[0., 0., 1., 0.],
                 [0., 0., 1., 0.],
                 [0., 0., 1., 0.],
                 [0., 0., 1., 0.],
                 [0., 0., 1., 0.],
                 [1., 0., 0., 0.],
                 [0., 0., 1., 0.],
                 [0., 0., 1., 0.],
                 [1., 0., 0., 0.],
                 [0., 0., 1., 0.]])

In [20]: d["SEX"].head(10)

Out[20]: 0      Male Characters
         1      Male Characters
         2      Male Characters
         3      Male Characters
         4      Male Characters
         5    Female Characters
         6      Male Characters
         7      Male Characters
         8    Female Characters
         9      Male Characters
         Name: SEX, dtype: object

In [21]: ohe_names = ohe.get_feature_names()
         ohe_names

Out[21]: array(['x0_Female Characters', 'x0_Genderless Characters',
                'x0_Male Characters', 'x0_Transgender Characters'], dtype=object)

In [22]: for idx, name in enumerate(ohe_names):
             d[name] = sex_ohe[:, idx].todense()
```

1.2.4. Получившийся набор данных

```
In [23]: d.head(10)
```

Out[23]:

	name	SEX	APPEARANCES
0	Batman (Bruce Wayne)	Male Characters	3093.0
1	Superman (Clark Kent)	Male Characters	2496.0
2	Green Lantern (Hal Jordan)	Male Characters	1565.0
3	James Gordon (New Earth)	Male Characters	1316.0
4	Richard Grayson (New Earth)	Male Characters	1237.0
5	Wonder Woman (Diana Prince)	Female Characters	1231.0
6	Aquaman (Arthur Curry)	Male Characters	1121.0
7	Timothy Drake (New Earth)	Male Characters	1095.0
8	Dinah Laurel Lance (New Earth)	Female Characters	1075.0
9	Flash (Barry Allen)	Male Characters	1028.0

	APPEARANCES_SCALED	SEX_INDEX	x0_Female Characters
0	1.000000	2	0.0
1	0.806921	2	0.0
2	0.505821	2	0.0
3	0.425291	2	0.0
4	0.399741	2	0.0
5	0.397801	0	1.0
6	0.362225	2	0.0
7	0.353816	2	0.0
8	0.347348	0	1.0
9	0.332147	2	0.0

	x0_Genderless Characters	x0_Male Characters	x0_Transgender Characte
0	0.0	1.0	0
1	0.0	1.0	0
2	0.0	1.0	0
3	0.0	1.0	0
4	0.0	1.0	0
5	0.0	0.0	0
6	0.0	1.0	0
7	0.0	1.0	0
8	0.0	0.0	0
9	0.0	1.0	0