Лабораторная работа №2 по курсу "Методы машинного обучения"

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Задание

Выбрать набор данных (датасет), содержащий категориальные и числовые признаки и пропуски в данных. Для выполнения следующих пунктов можно использовать несколько различных наборов данных (один для обработки пропусков, другой для категориальных признаков и т.д.) Просьба не использовать датасет, на котором данная задача решалась в лекции.</p>

Для выбранного датасета (датасетов) на основе материалов лекций решить следующие задачи:

- устранение пропусков в данных;
- кодирование категориальных признаков;
- нормализацию числовых признаков.

In [41]:
```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.impute import SimpleImputer
from sklearn.preprocessing import LabelEncoder
import scipy.stats as stats
import warnings
warnings.filterwarnings('ignore')
```

In [42]:
```
def diagnostic_plots(df, variable):
    plt.figure(figsize=(15,6))
    # гистограмма
    plt.subplot(1, 2, 1)
    df[variable].hist(bins=30)
    ## Q-Q plot
    plt.subplot(1, 2, 2)
    stats.probplot(df[variable], dist="norm", plot=plt)
    plt.show()
```

In [43]:
```
data = pd.read_csv('BankChurners.csv', sep=",")
data.head()
```

Out[43]:

	CLIENTNUM	Attrition_Flag	Customer_Age	Gender	Dependent_count	Education_Level	Marital_Status	Income_Category	Card_Category	Months_on_book	...	Credit_Limit	Total
0	768805383	Existing Customer	45	M	3	High School	Married	$60K - $80K	Blue	39	...	12691.0	
1	818770008	Existing Customer	49	F	5	Graduate	Single	Less than $40K	Blue	44	...	8256.0	
2	713982108	Existing Customer	51	M	3	Graduate	Married	$80K - $120K	Blue	36	...	3418.0	
3	769911858	Existing Customer	40	F	4	High School	NaN	Less than $40K	Blue	34	...	3313.0	
4	709106358	Existing Customer	40	M	3	Uneducated	Married	$60K - $80K	Blue	21	...	4716.0	

5 rows × 23 columns

Заполнение пустых значений

In [44]:
```
columnsWithNull = []

print("Столбцы с пустыми значениями (название (число уникальных значений): число пустых):\n")
for column in data.columns:
    if data[column].isnull().sum() > 0:
        columnsWithNull.append(column)
        print("\t", column,"(", len(data[column].unique()), "):\t", data[column].isnull().sum())
data[columnsWithNull].head(10)
```

```
Столбцы с пустыми значениями (название (число уникальных значений): число пустых):

         Education_Level ( 7 ):  1519
         Marital_Status ( 4 ):   749
         Income_Category ( 6 ):  1112
```

Out[44]:

	Education_Level	Marital_Status	Income_Category
0	High School	Married	$60K - $80K
1	Graduate	Single	Less than $40K
2	Graduate	Married	$80K - $120K
3	High School	NaN	Less than $40K
4	Uneducated	Married	$60K - $80K
5	Graduate	Married	$40K - $60K
6	NaN	Married	$120K +
7	High School	NaN	$60K - $80K
8	Uneducated	Single	$60K - $80K
9	Graduate	Single	$80K - $120K

In [45]:
```
imputer = SimpleImputer(missing_values=np.nan, strategy="constant", fill_value = "Unknown")
nullFixedData = pd.DataFrame(data = imputer.fit_transform(data), columns=data.columns)
nullFixedData[columnsWithNull].head(10)
```

Out[45]:

	Education_Level	Marital_Status	Income_Category
0	High School	Married	$60K - $80K
1	Graduate	Single	Less than $40K
2	Graduate	Married	$80K - $120K
3	High School	Unknown	Less than $40K
4	Uneducated	Married	$60K - $80K
5	Graduate	Married	$40K - $60K
6	Unknown	Married	$120K +
7	High School	Unknown	$60K - $80K
8	Uneducated	Single	$60K - $80K
9	Graduate	Single	$80K - $120K

Кодирование категориальных признаков

In [46]:
```
labelEnc = LabelEncoder()
for column in nullFixedData.columns:
    if nullFixedData[column].dtype not in ['float', 'int']:
        nullFixedData[column] = pd.DataFrame(labelEnc.fit_transform(nullFixedData[column].astype(str)), columns=[column])
nullFixedData.head(10)
```

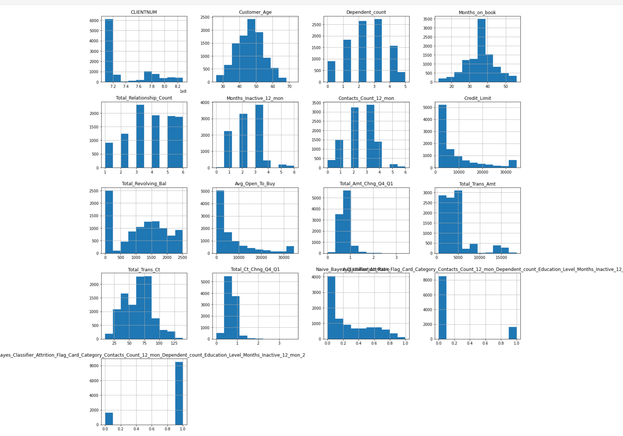
Out[46]:

	CLIENTNUM	Attrition_Flag	Customer_Age	Gender	Dependent_count	Education_Level	Marital_Status	Income_Category	Card_Category	Months_on_book	...	Credit_Limit	Total
0	7152	1	19	1	3	3	1	2	0	26	...	518	
1	9812	1	23	0	5	2	2	4	0	31	...	5723	
2	3053	1	25	1	3	2	1	3	0	23	...	3718	
3	7204	1	14	0	4	3	3	4	0	21	...	3612	
4	501	1	14	1	3	5	1	2	0	8	...	4463	
5	2544	1	18	1	2	2	1	1	0	23	...	4080	
6	9493	1	25	1	4	6	1	0	1	33	...	3747	
7	9818	1	6	1	0	3	3	2	3	14	...	3135	
8	1401	1	11	1	3	5	2	2	0	23	...	2206	
9	5893	1	22	1	2	2	2	3	0	23	...	332	

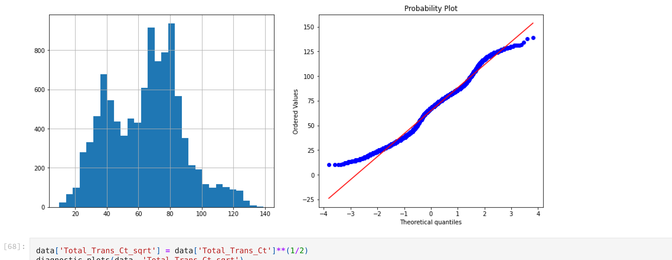
10 rows × 23 columns

Нормализация числовых признаков

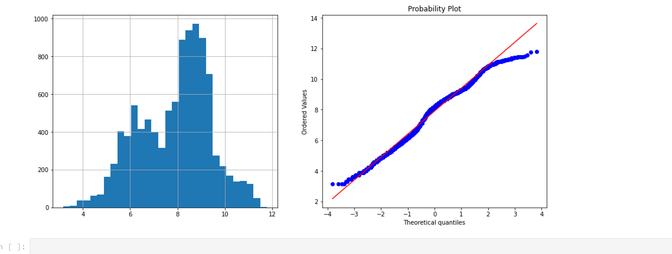
In [47]:
```
data.hist(figsize=(20,20))
plt.show()
```



In [57]:
```
diagnostic_plots(data, 'Total_Trans_Ct')
```



In [68]:
```
data['Total_Trans_Ct_sqrt'] = data['Total_Trans_Ct']**(1/2)
diagnostic_plots(data, 'Total_Trans_Ct_sqrt')
```



In [ ]:
```
```