DMV3 Data Cleaning and Preparation

October 26, 2023

[1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler, LabelEncoder

df = pd.read_csv("C:/Users/hp/Downloads/Practical_Data/telecom_churn.csv")
df.head()
```

```
C:\Users\hp\anaconda3\lib\site-packages\scipy\__init__.py:146: UserWarning: A
NumPy version >=1.16.5 and <1.23.0 is required for this version of SciPy
(detected version 1.25.2
  warnings.warn(f"A NumPy version >={np_minversion} and <{np_maxversion}"
```

[1]:

	customer_id	telecom_partner	gender	age	state	city	pincode	date_of_registration	num_dependents	estimated_salary	calls_made	sms_sent	data_used	churn
0	1	Reliance Jio	F	25	Karnataka	Kolkata	755597	2020-01-01	4	124962	44	45	-361	0
1	2	Reliance Jio	F	55	Mizoram	Mumbai	125926	2020-01-01	2	130556	62	39	5973	0
2	3	Vodafone	F	57	Arunachal Pradesh	Delhi	423976	2020-01-01	0	148828	49	24	193	1
3	4	BSNL	M	46	Tamil Nadu	Kolkata	522841	2020-01-01	1	38722	80	25	9377	1
4	5	BSNL	F	26	Tripura	Delhi	740247	2020-01-01	2	55098	78	15	1393	0

[2]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
```

```
RangeIndex: 243553 entries, 0 to 243552
Data columns (total 14 columns):
 #   Column                Non-Null Count   Dtype
---  ------                --------------   -----
 0   customer_id           243553 non-null  int64
 1   telecom_partner       243553 non-null  object
 2   gender                243553 non-null  object
 3   age                   243553 non-null  int64
 4   state                 243553 non-null  object
 5   city                  243553 non-null  object
 6   pincode               243553 non-null  int64
 7   date_of_registration  243553 non-null  object
 8   num_dependents        243553 non-null  int64
 9   estimated_salary      243553 non-null  int64
 10  calls_made            243553 non-null  int64
 11  sms_sent              243553 non-null  int64
 12  data_used             243553 non-null  int64
 13  churn                 243553 non-null  int64
dtypes: int64(9), object(5)
memory usage: 26.0+ MB
```

[3]:
```
df.describe()
```

[3]:

	customer_id	age	pincode	num_dependents
count	243553.000000	243553.000000	243553.000000	243553.000000
mean	121777.000000	46.077609	549501.270541	1.997500
std	70307.839393	16.444029	259808.860574	1.414941
min	1.000000	18.000000	100006.000000	0.000000
25%	60889.000000	32.000000	324586.000000	1.000000
50%	121777.000000	46.000000	548112.000000	2.000000
75%	182665.000000	60.000000	774994.000000	3.000000
max	243553.000000	74.000000	999987.000000	4.000000

	estimated_salary	calls_made	sms_sent	data_used
count	243553.000000	243553.000000	243553.000000	243553.000000
mean	85021.137839	49.010548	23.945404	4993.186025
std	37508.963233	29.453556	14.733575	2942.019547
min	20000.000000	-10.000000	-5.000000	-987.000000
25%	52585.000000	24.000000	11.000000	2490.000000
50%	84990.000000	49.000000	24.000000	4987.000000
75%	117488.000000	74.000000	36.000000	7493.000000
max	149999.000000	108.000000	53.000000	10991.000000

	churn
count	243553.000000
mean	0.200478
std	0.400359

```
min         0.000000
25%         0.000000
50%         0.000000
75%         0.000000
max         1.000000
```

[4]:
```
df.shape
```

[4]:
```
(243553, 14)
```

[5]:
```
df.isna().sum()
```

[5]:
```
customer_id             0
telecom_partner         0
gender                  0
age                     0
state                   0
city                    0
pincode                 0
date_of_registration    0
num_dependents          0
estimated_salary        0
calls_made              0
sms_sent                0
data_used               0
churn                   0
dtype: int64
```

[6]:
```
df.dropna(inplace=True)
```

[7]:
```
df.duplicated().sum()
```

[7]:
```
0
```

[8]:
```
df.drop_duplicates(inplace=True)
```

[9]:
```
df.columns
```

[9]:
```
Index(['customer_id', 'telecom_partner', 'gender', 'age', 'state', 'city',
       'pincode', 'date_of_registration', 'num_dependents', 'estimated_salary',
       'calls_made', 'sms_sent', 'data_used', 'churn'],
      dtype='object')
```

[10]:
```
df.
  ↪drop(['customer_id','state','city',"pincode",'telecom_partner','date_of_registration'],␣
  ↪inplace=True, axis=1)
df.head()
```

[10]:
```
  gender  age  num_dependents  estimated_salary  calls_made  sms_sent  \
0      F   25               4            124962          44        45
1      F   55               2            130556          62        39
2      F   57               0            148828          49        24
3      M   46               1             38722          80        25
4      F   26               2             55098          78        15

   data_used  churn
0       -361      0
1       5973      0
2        193      1
3       9377      1
4       1393      0
```

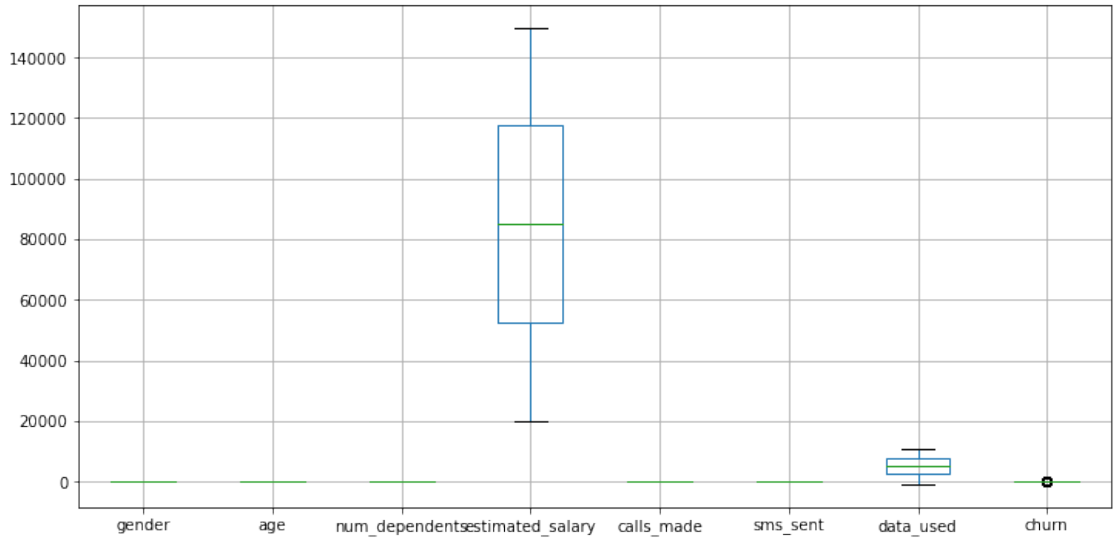
[11]:
```
le = LabelEncoder()
df['gender'] = le.fit_transform(df['gender'])

df.head()
```

[11]:
```
   gender  age  num_dependents  estimated_salary  calls_made  sms_sent  \
0       0   25               4            124962          44        45
1       0   55               2            130556          62        39
2       0   57               0            148828          49        24
3       1   46               1             38722          80        25
4       0   26               2             55098          78        15

   data_used  churn
0       -361      0
1       5973      0
2        193      1
3       9377      1
4       1393      0
```

[12]:
```
plt.figure(figsize=(12,6))
df.boxplot()
plt.show()
```



[13]:
```
df.dtypes
```

[13]:
```
gender              int32
age                 int64
num_dependents      int64
estimated_salary    int64
calls_made          int64
sms_sent            int64
data_used           int64
churn               int64
dtype: object
```

[14]:
```
X = df.drop(columns=['churn'])
y = df['churn']

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2,␣
 ↪random_state=42)
```

[15]:
```
sc = StandardScaler()
X_train = sc.fit_transform(X_train)
X_test = sc.transform(X_test)
```

[16]:
```
df.to_csv("Cleaned_Telecom_Customer_Churn.csv", index=False)
```

[ ]:
```

```