python-data-analysis

October 16, 2024

[5]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

1 Read The CSV File using Pandas

[3]:
```
data = pd.read_csv('/content/Customer Churn.csv')
```

[6]:
```
data.head()
```

[6]:

	customerID	gender	SeniorCitizen	Partner	Dependents	tenure	PhoneService	\
0	7590-VHVEG	Female	0	Yes	No	1	No	
1	5575-GNVDE	Male	0	No	No	34	Yes	
2	3668-QPYBK	Male	0	No	No	2	Yes	
3	7795-CFOCW	Male	0	No	No	45	No	
4	9237-HQITU	Female	0	No	No	2	Yes	

	MultipleLines	InternetService	OnlineSecurity	…	DeviceProtection	\
0	No phone service	DSL	No	…	No	
1	No	DSL	Yes	…	Yes	
2	No	DSL	Yes	…	No	
3	No phone service	DSL	Yes	…	Yes	
4	No	Fiber optic	No	…	No	

	TechSupport	StreamingTV	StreamingMovies	Contract	PaperlessBilling	\
0	No	No	No	Month-to-month	Yes	
1	No	No	No	One year	No	
2	No	No	No	Month-to-month	Yes	
3	Yes	No	No	One year	No	
4	No	No	No	Month-to-month	Yes	

	PaymentMethod	MonthlyCharges	TotalCharges	Churn
0	Electronic check	29.85	29.85	No
1	Mailed check	56.95	1889.5	No
2	Mailed check	53.85	108.15	Yes

```
 3  Bank transfer (automatic)          42.30       1840.75    No
 4           Electronic check          70.70        151.65   Yes

 [5 rows x 21 columns]
```

[7]:
```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 7043 entries, 0 to 7042
Data columns (total 21 columns):
 #   Column            Non-Null Count  Dtype
---  ------            --------------  -----
 0   customerID        7043 non-null   object
 1   gender            7043 non-null   object
 2   SeniorCitizen     7043 non-null   int64
 3   Partner           7043 non-null   object
 4   Dependents        7043 non-null   object
 5   tenure            7043 non-null   int64
 6   PhoneService      7043 non-null   object
 7   MultipleLines     7043 non-null   object
 8   InternetService   7043 non-null   object
 9   OnlineSecurity    7043 non-null   object
 10  OnlineBackup      7043 non-null   object
 11  DeviceProtection  7043 non-null   object
 12  TechSupport       7043 non-null   object
 13  StreamingTV       7043 non-null   object
 14  StreamingMovies   7043 non-null   object
 15  Contract          7043 non-null   object
 16  PaperlessBilling  7043 non-null   object
 17  PaymentMethod     7043 non-null   object
 18  MonthlyCharges    7043 non-null   float64
 19  TotalCharges      7043 non-null   object
 20  Churn             7043 non-null   object
dtypes: float64(1), int64(2), object(18)
memory usage: 1.1+ MB
```

Here we see that data type of total charges is object. Lets convert into float

[9]:
```
data['TotalCharges'] = data['TotalCharges'].replace(' ' , '0')
data['TotalCharges'] = data['TotalCharges'].astype('float')
```

[10]:
```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 7043 entries, 0 to 7042
Data columns (total 21 columns):
 #   Column            Non-Null Count  Dtype
---  ------            --------------  -----
```

```
 0   customerID        7043 non-null   object
 1   gender            7043 non-null   object
 2   SeniorCitizen     7043 non-null   int64
 3   Partner           7043 non-null   object
 4   Dependents        7043 non-null   object
 5   tenure            7043 non-null   int64
 6   PhoneService      7043 non-null   object
 7   MultipleLines     7043 non-null   object
 8   InternetService   7043 non-null   object
 9   OnlineSecurity    7043 non-null   object
 10  OnlineBackup      7043 non-null   object
 11  DeviceProtection  7043 non-null   object
 12  TechSupport       7043 non-null   object
 13  StreamingTV       7043 non-null   object
 14  StreamingMovies   7043 non-null   object
 15  Contract          7043 non-null   object
 16  PaperlessBilling  7043 non-null   object
 17  PaymentMethod     7043 non-null   object
 18  MonthlyCharges    7043 non-null   float64
 19  TotalCharges      7043 non-null   float64
 20  Churn             7043 non-null   object
dtypes: float64(2), int64(2), object(17)
memory usage: 1.1+ MB
```

[12]:
```
data.shape
```

[12]:
```
(7043, 21)
```

[8]:
```
data.describe()
```

[8]:

	SeniorCitizen	tenure	MonthlyCharges
count	7043.000000	7043.000000	7043.000000
mean	0.162147	32.371149	64.761692
std	0.368612	24.559481	30.090047
min	0.000000	0.000000	18.250000
25%	0.000000	9.000000	35.500000
50%	0.000000	29.000000	70.350000
75%	0.000000	55.000000	89.850000
max	1.000000	72.000000	118.750000

[15]:
```
data.isnull().sum().sum()
```

[15]:
```
0
```

[22]:
```
data['customerID'].duplicated().sum()
```

[22]:
```
0
```

Convert data in senior citizen column. 0 = no , 1 = yes

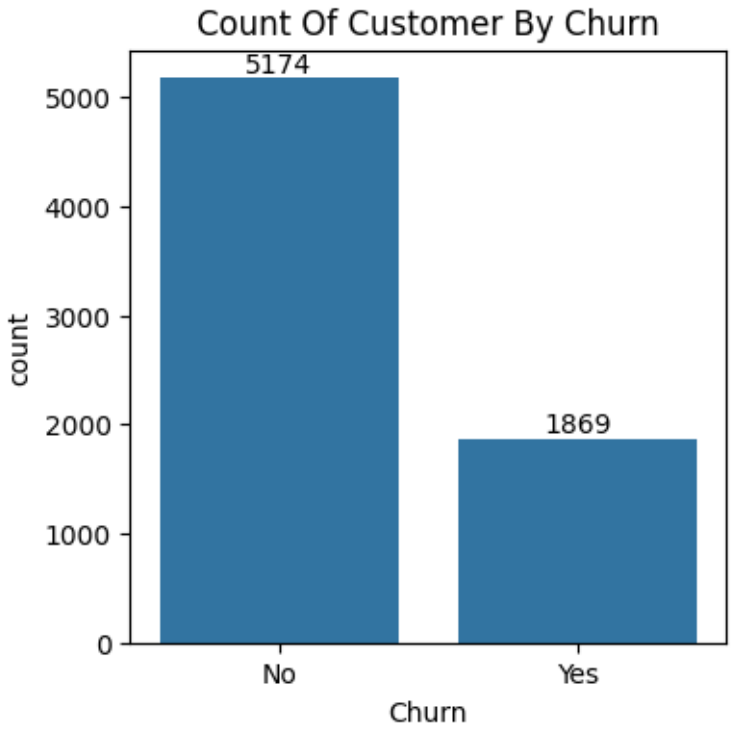
[23]:
```
def conv(value):
  if value == 0 :
    return "NO"
  else:
    return "Yes"

data['SeniorCitizen'] = data['SeniorCitizen'].apply(conv)
```

[24]:
```
data.head(2)
```

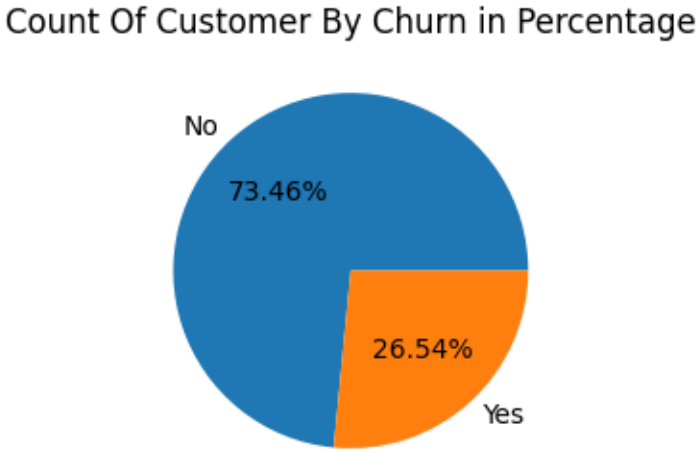
[24]:
```
   customerID  gender SeniorCitizen Partner Dependents  tenure PhoneService  \
0  7590-VHVEG  Female            NO     Yes         No       1           No
1  5575-GNVDE    Male            NO      No         No      34          Yes

      MultipleLines InternetService OnlineSecurity  … DeviceProtection  \
0  No phone service             DSL             No  …                No
1                No             DSL            Yes  …               Yes

  TechSupport StreamingTV StreamingMovies        Contract PaperlessBilling  \
0          No          No              No  Month-to-month              Yes
1          No          No              No        One year               No

      PaymentMethod MonthlyCharges  TotalCharges  Churn
0  Electronic check          29.85         29.85     No
1      Mailed check          56.95       1889.50     No

[2 rows x 21 columns]
```

2 EDA Start

[41]:
```
plt.figure(figsize=(4 , 4))
plt.title("Count Of Customer By Churn")
ax = sns.countplot( x = 'Churn' , data = data)
ax.bar_label(ax.containers[0])
plt.show()
```



[42]:
```
plt.figure(figsize=(3,3))
gb = data.groupby('Churn').agg({'Churn' : "count"})
gb
plt.pie(gb['Churn'] , labels = gb.index , autopct= "%1.2f%%")

plt.title("Count Of Customer By Churn in Percentage")
plt.show()
```



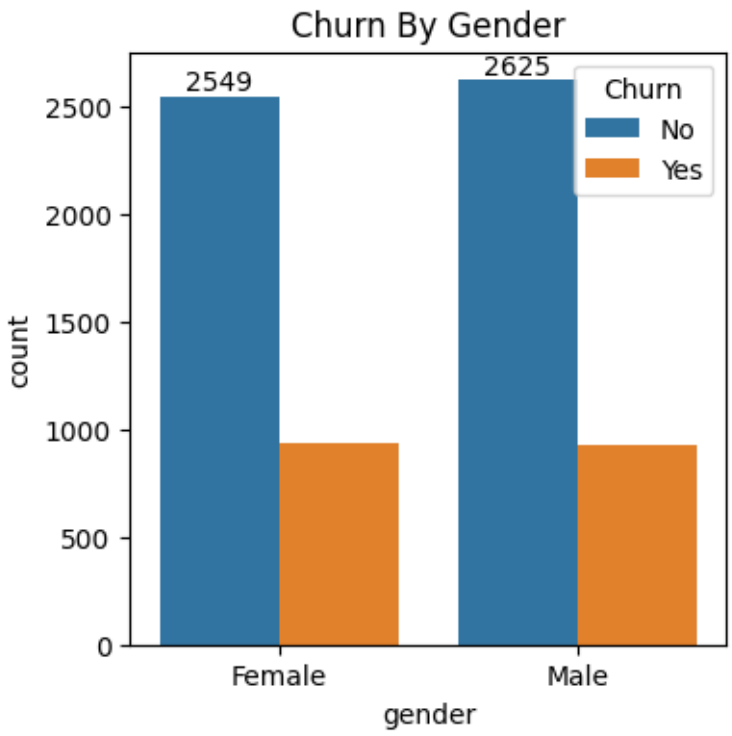
From the given chart we can conclude 26.54% customers have churn out.

3 Let's Find The Reason

[43]:
```
data.head(2)
```

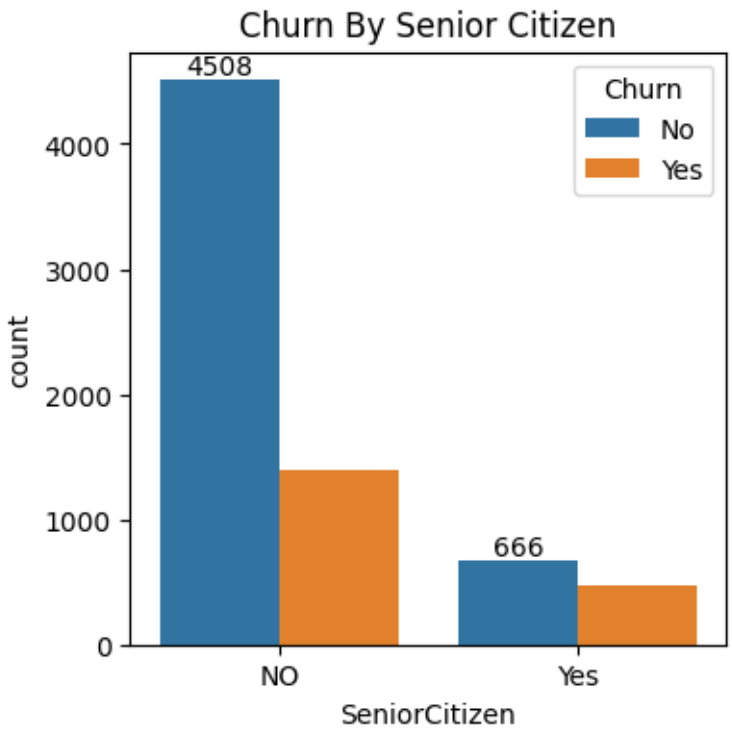
[43]:
```
   customerID  gender SeniorCitizen Partner Dependents  tenure PhoneService  \
0  7590-VHVEG  Female            NO     Yes         No       1           No
1  5575-GNVDE    Male            NO      No         No      34          Yes

      MultipleLines InternetService OnlineSecurity  … DeviceProtection  \
0  No phone service             DSL             No  …                No
1                No             DSL            Yes  …               Yes

  TechSupport StreamingTV StreamingMovies        Contract PaperlessBilling  \
0          No          No              No  Month-to-month              Yes
1          No          No              No        One year               No

      PaymentMethod MonthlyCharges  TotalCharges  Churn
0  Electronic check          29.85         29.85     No
1      Mailed check          56.95       1889.50     No

[2 rows x 21 columns]
```

[53]:
```
plt.figure(figsize= (4,4))
plt.title("Churn By Gender")
ax = sns.countplot(x = "gender" , data = data , hue = 'Churn')
ax.bar_label(ax.containers[0])
plt.show()
```



Primarily, we can say that Churning is not depends on Gender

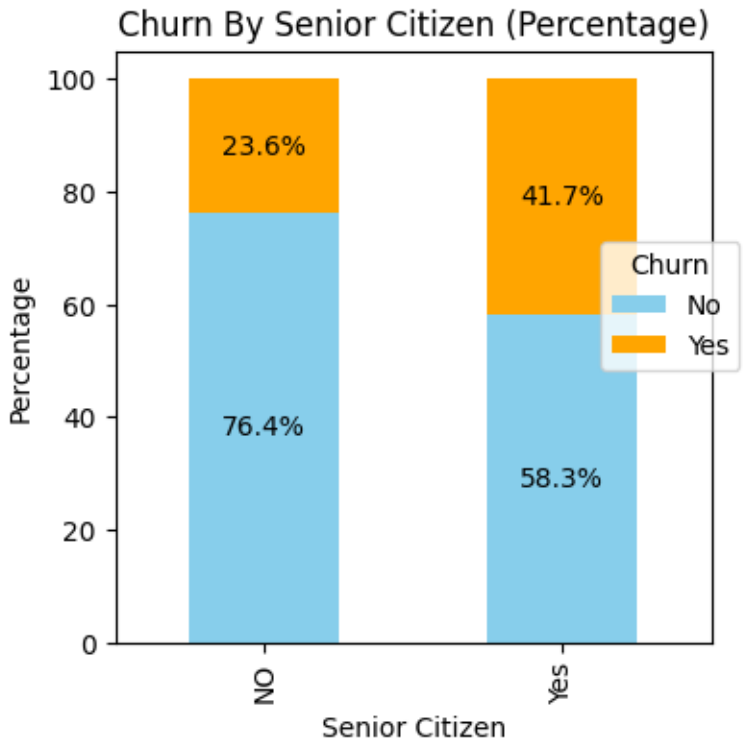
[58]:
```
plt.figure(figsize=(4,4))
ax = sns.countplot(x= "SeniorCitizen" , data = data , hue = 'Churn')
ax.bar_label(ax.containers[0])
plt.title("Churn By Senior Citizen")
plt.show()
```



[75]:
```
plt.figure(figsize=(4,4))
# Create a crosstab to get the counts
crosstab = pd.crosstab(data['SeniorCitizen'], data['Churn'], normalize='index')␣
 ↪* 100

# Plotting the stacked bar chart
crosstab.plot(kind='bar', stacked=True, figsize=(4, 4), color=['skyblue',␣
 ↪'orange'])

# Adding labels and title
plt.title("Churn By Senior Citizen (Percentage)")
plt.ylabel("Percentage")
plt.xlabel("Senior Citizen")

# Add percentage labels on each bar
for n, x in enumerate([0, 1]):
    for (i, pct) in enumerate(crosstab.values[:, n]):
        plt.text(i, crosstab.values[:i+1, :n+1].sum(axis=1)[i] - pct/2, f'{pct:.
 ↪1f}%',
                 ha='center', va='center', color='black')

# Display the plot
plt.legend(title='Churn', bbox_to_anchor=(1.07, 0.7) , loc='upper right')
```

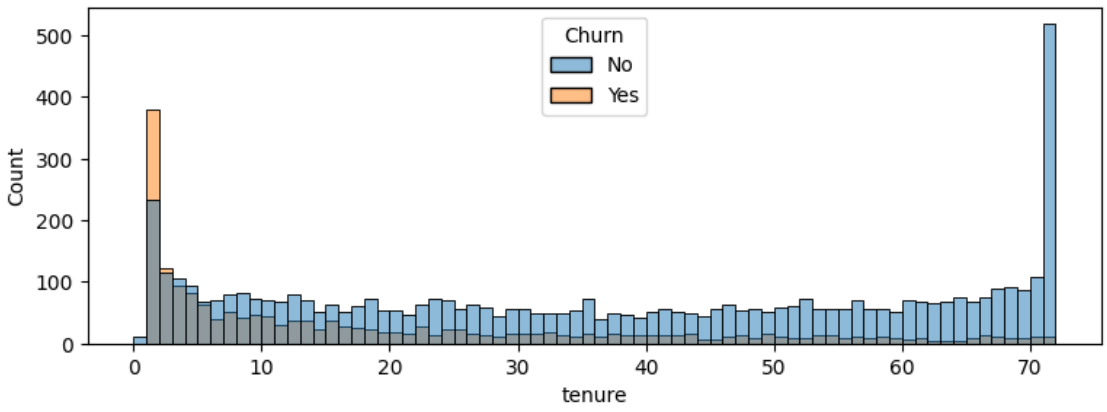
```
plt.show()
```

```
<Figure size 400x400 with 0 Axes>
```



From the above analysis we can conclude that 41.7% senior citizen are churned out. It's much higher that who are under senior citizen.

[82]:
```
plt.figure(figsize= (9, 3))
sns.histplot(x = 'tenure' ,  data = data , bins=72 , hue = 'Churn' )
plt.show()
```

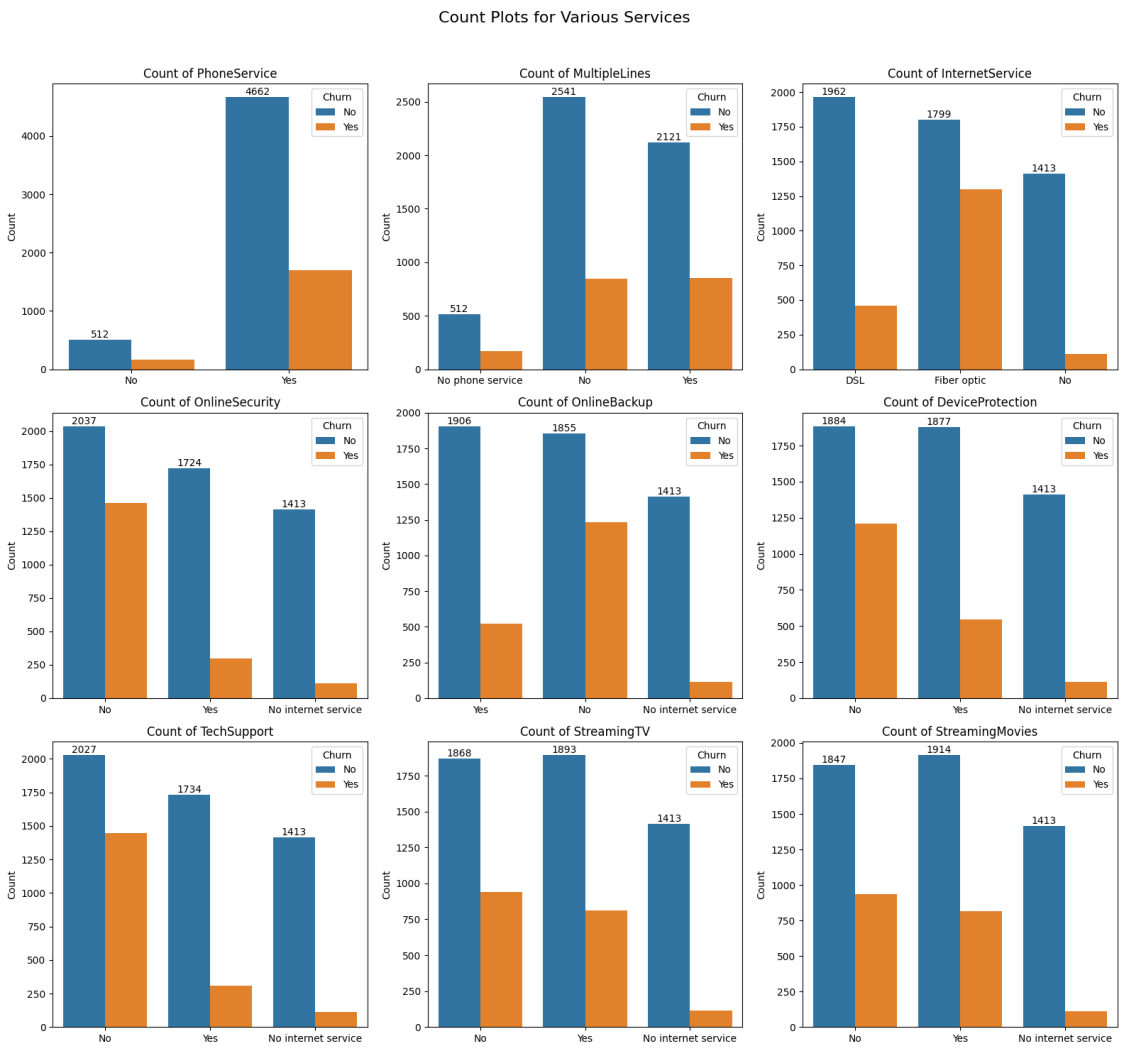


People who have uses our services long period have stayed and who have uses 1 or 2 months have churned out

[87]:
```
data.columns
```

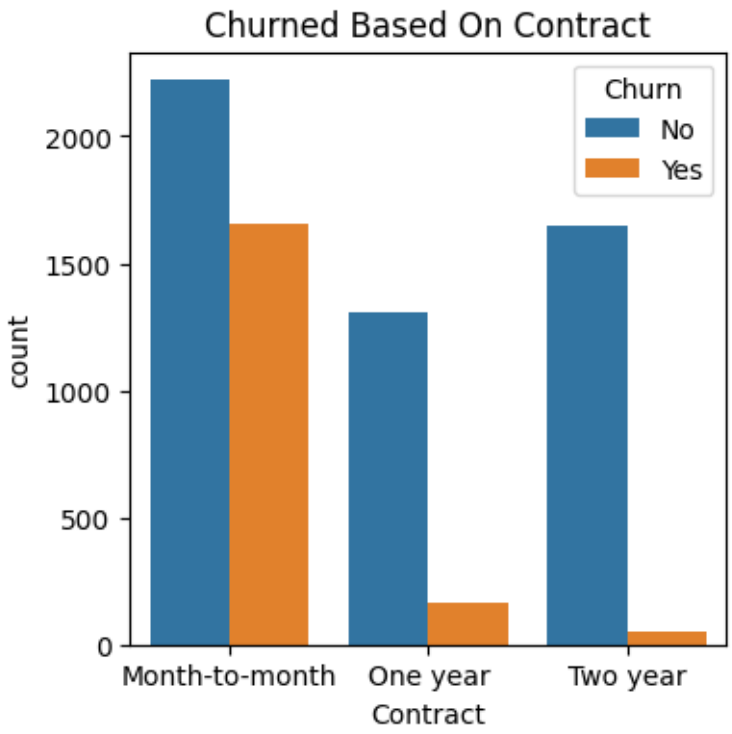
[87]:
```
Index(['customerID', 'gender', 'SeniorCitizen', 'Partner', 'Dependents',
       'tenure', 'PhoneService', 'MultipleLines', 'InternetService',
       'OnlineSecurity', 'OnlineBackup', 'DeviceProtection', 'TechSupport',
       'StreamingTV', 'StreamingMovies', 'Contract', 'PaperlessBilling',
       'PaymentMethod', 'MonthlyCharges', 'TotalCharges', 'Churn'],
      dtype='object')
```

[96]:
```
# List of columns you want to create count plots for
columns = ['PhoneService', 'MultipleLines', 'InternetService', 'OnlineSecurity',
           'OnlineBackup', 'DeviceProtection', 'TechSupport', 'StreamingTV',
           'StreamingMovies']

# Create subplots
fig, axes = plt.subplots(nrows=3, ncols=3, figsize=(16, 15))
fig.suptitle('Count Plots for Various Services', fontsize=16)

# Flatten the axes array for easy iteration
axes = axes.flatten()

# Loop through the columns and plot countplots
for i, col in enumerate(columns):
    ax = sns.countplot(x=col, data=data, ax=axes[i]   , hue="Churn")
    ax.bar_label(ax.containers[0])
    axes[i].set_title(f'Count of {col}')
    axes[i].set_xlabel('')  # Remove x labels to save space
    axes[i].set_ylabel('Count')

# Adjust layout to avoid overlapping
plt.tight_layout(rect=[0, 0, 1, 0.96])

# Show the plot
plt.show()
```



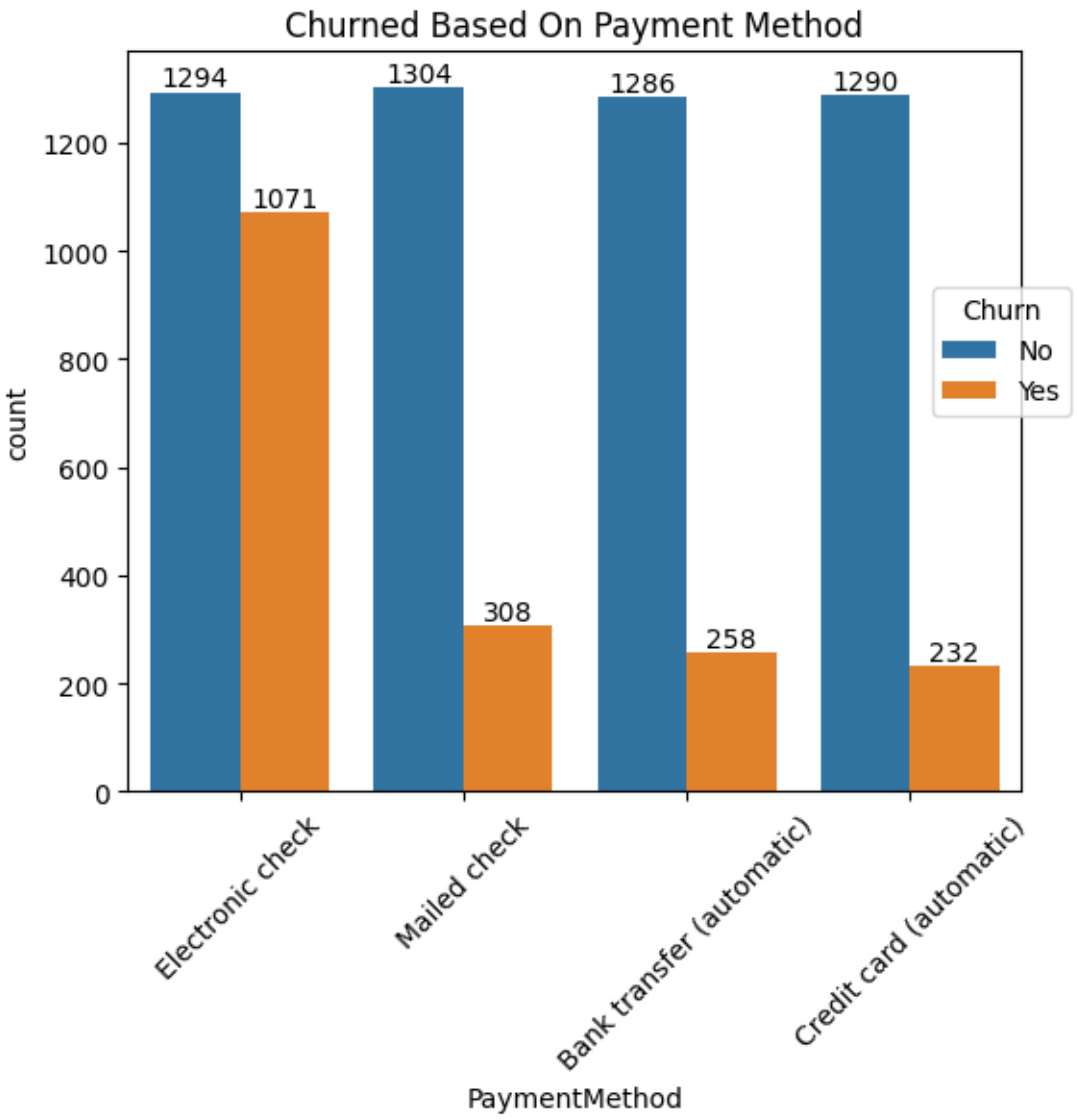
From the above subplot we can conclude that customer are largely churned out who are using Fiber optics Internet services and who have multiple lines . We need to improve these section.

[99]:
```
plt.figure(figsize= (4, 4))
sns.countplot( x = 'Contract' , data = data , hue = 'Churn')
plt.title("Churned Based On Contract")
plt.show()
```



Customers are primarily churned out mainly , who use Month to Month Contract compare to 1 or 2 year contract

[107]:
```
plt.figure(figsize= (6, 5))
ax = sns.countplot( x = 'PaymentMethod' , data = data , hue = 'Churn')
ax.bar_label(ax.containers[0])
ax.bar_label(ax.containers[1])
plt.title("Churned Based On Payment Method")
plt.xticks(rotation = 45)
plt.legend(title='Churn', bbox_to_anchor=(1.07, 0.7) , loc='upper right')
plt.show()
```



Customer is likely to churn who are using Electric check compare to any automatic payment method

[ ]: