```python
import matplotlib.pyplot as plt
import seaborn as sns
import pandas as pd
import numpy as np
df= pd.read_csv("D:/Desktop/python project/Customer Churn.csv")
print(df.head())
# pip install seaborn
```

```
   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]
```

```
df.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
```

```
df.details()
```

```
-----------------------------------------------------------------------
-----
AttributeError                            Traceback (most recent call
last)
Cell In[4], line 1
----> 1 df.details()

File ~\AppData\Local\Programs\Python\Python311\Lib\site-packages\
pandas\core\generic.py:5989, in NDFrame.__getattr__(self, name)
   5982 if (
   5983     name not in self._internal_names_set
   5984     and name not in self._metadata
   5985     and name not in self._accessors
   5986     and
self._info_axis._can_hold_identifiers_and_holds_name(name)
   5987 ):
   5988     return self[name]
-> 5989 return object.__getattribute__(self, name)

AttributeError: 'DataFrame' object has no attribute 'details'
```

convert Data type of TotalCharges from object to float

```
df["TotalCharges"]=df["TotalCharges"].replace(" ", "0")
df["TotalCharges"]=df["TotalCharges"].astype("float")

print(df.head())

   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]
```

```
print(df.info())
print(df.head())
```

```
<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
None
   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]
```

In SeniorCitizen column convert the 0 value with False and 1 with True

```
def cav(val):
    if val == 0:
        return "No"
    else:
        return "Yes"

df["SeniorCitizen"]=df["SeniorCitizen"].apply(cav)
print(df.head(50))

    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
2   3668-QPYBK    Male            No      No         No       2
Yes
3   7795-CFOCW    Male            No      No         No      45
No
4   9237-HQITU  Female            No      No         No       2
Yes
5   9305-CDSKC  Female            No      No         No       8
Yes
6   1452-KIOVK    Male            No      No        Yes      22
Yes
7   6713-OKOMC  Female            No      No         No      10
No
8   7892-POOKP  Female            No     Yes         No      28
Yes
9   6388-TABGU    Male            No      No        Yes      62
Yes
10  9763-GRSKD    Male            No     Yes        Yes      13
Yes
11  7469-LKBCI    Male            No      No         No      16
Yes
12  8091-TTVAX    Male            No     Yes         No      58
Yes
13  0280-XJGEX    Male            No      No         No      49
Yes
14  5129-JLPIS    Male            No      No         No      25
Yes
15  3655-SNQYZ  Female            No     Yes        Yes      69
Yes
16  8191-XWSZG  Female            No      No         No      52
Yes
17  9959-WOFKT    Male            No      No        Yes      71
Yes
18  4190-MFLUW  Female            No     Yes        Yes      10
Yes
19  4183-MYFRB  Female            No      No         No      21
Yes
20  8779-QRDMV    Male           Yes      No         No       1
```

```
No
21  1680-VDCWW    Male            No     Yes         No      12
Yes
22  1066-JKSGK    Male            No      No         No       1
Yes
23  3638-WEABW  Female            No     Yes         No      58
Yes
24  6322-HRPFA    Male            No     Yes        Yes      49
Yes
25  6865-JZNKO  Female            No      No         No      30
Yes
26  6467-CHFZW    Male            No     Yes        Yes      47
Yes
27  8665-UTDHZ    Male            No     Yes        Yes       1
No
28  5248-YGIJN    Male            No     Yes         No      72
Yes
29  8773-HHUOZ  Female            No      No        Yes      17
Yes
30  3841-NFECX  Female           Yes     Yes         No      71
Yes
31  4929-XIHVW    Male           Yes     Yes         No       2
Yes
32  6827-IEAUQ  Female            No     Yes        Yes      27
Yes
33  7310-EGVHZ    Male            No      No         No       1
Yes
34  3413-BMNZE    Male           Yes      No         No       1
Yes
35  6234-RAAPL  Female            No     Yes        Yes      72
Yes
36  6047-YHPVI    Male            No      No         No       5
Yes
37  6572-ADKRS  Female            No      No         No      46
Yes
38  5380-WJKOV    Male            No      No         No      34
Yes
39  8168-UQWWF  Female            No      No         No      11
Yes
40  8865-TNMNX    Male            No     Yes        Yes      10
Yes
41  9489-DEDVP  Female            No     Yes        Yes      70
Yes
42  9867-JCZSP  Female            No     Yes        Yes      17
Yes
43  4671-VJLCL  Female            No      No         No      63
Yes
44  4080-IIARD  Female            No     Yes         No      13
Yes
```

```
45  3714-NTNFO  Female            No      No         No      49
Yes
46  5948-UJZLF    Male            No      No         No       2
Yes
47  7760-OYPDY  Female            No      No         No       2
Yes
48  7639-LIAYI    Male            No      No         No      52
Yes
49  2954-PIBKO  Female            No     Yes        Yes      69
Yes

       MultipleLines InternetService       OnlineSecurity  ...
0   No phone service             DSL                   No  ...   \
1                 No             DSL                  Yes  ...
2                 No             DSL                  Yes  ...
3   No phone service             DSL                  Yes  ...
4                 No     Fiber optic                   No  ...
5                Yes     Fiber optic                   No  ...
6                Yes     Fiber optic                   No  ...
7   No phone service             DSL                  Yes  ...
8                Yes     Fiber optic                   No  ...
9                 No             DSL                  Yes  ...
10                No             DSL                  Yes  ...
11                No              No  No internet service  ...
12               Yes     Fiber optic                   No  ...
13               Yes     Fiber optic                   No  ...
14                No     Fiber optic                  Yes  ...
15               Yes     Fiber optic                  Yes  ...
16                No              No  No internet service  ...
17               Yes     Fiber optic                  Yes  ...
18                No             DSL                   No  ...
19                No     Fiber optic                   No  ...
20  No phone service             DSL                   No  ...
21                No              No  No internet service  ...
22                No              No  No internet service  ...
23               Yes             DSL                   No  ...
24                No             DSL                  Yes  ...
25                No             DSL                  Yes  ...
26               Yes     Fiber optic                   No  ...
27  No phone service             DSL                   No  ...
28               Yes             DSL                  Yes  ...
29                No             DSL                   No  ...
30               Yes     Fiber optic                  Yes  ...
31                No     Fiber optic                   No  ...
32                No             DSL                  Yes  ...
33                No              No  No internet service  ...
34                No             DSL                   No  ...
35               Yes     Fiber optic                  Yes  ...
36                No     Fiber optic                   No  ...
```

```
37                No     Fiber optic                   No  ...
38               Yes     Fiber optic                   No  ...
39               Yes     Fiber optic                   No  ...
40                No             DSL                   No  ...
41               Yes             DSL                  Yes  ...
42                No              No  No internet service  ...
43               Yes             DSL                  Yes  ...
44               Yes             DSL                  Yes  ...
45               Yes     Fiber optic                   No  ...
46                No             DSL                   No  ...
47                No     Fiber optic                   No  ...
48               Yes             DSL                  Yes  ...
49               Yes             DSL                  Yes  ...

       DeviceProtection          TechSupport          StreamingTV  
0                    No                   No                   No  \
1                   Yes                   No                   No   
2                    No                   No                   No   
3                   Yes                  Yes                   No   
4                    No                   No                   No   
5                   Yes                   No                  Yes   
6                    No                   No                  Yes   
7                    No                   No                   No   
8                   Yes                  Yes                  Yes   
9                    No                   No                   No   
10                   No                   No                   No   
11  No internet service  No internet service  No internet service   
12                  Yes                   No                  Yes   
13                  Yes                   No                  Yes   
14                  Yes                  Yes                  Yes   
15                  Yes                  Yes                  Yes   
16  No internet service  No internet service  No internet service   
17                  Yes                   No                  Yes   
18                  Yes                  Yes                   No   
19                  Yes                   No                   No   
20                  Yes                   No                   No   
21  No internet service  No internet service  No internet service   
22  No internet service  No internet service  No internet service   
23                   No                  Yes                   No   
24                   No                  Yes                   No   
25                   No                   No                   No   
26                   No                   No                  Yes   
27                   No                   No                   No   
28                  Yes                  Yes                  Yes   
29                   No                   No                  Yes   
30                  Yes                  Yes                   No   
31                  Yes                   No                  Yes   
32                  Yes                  Yes                   No   
33  No internet service  No internet service  No internet service   
```

```
34                   No                   No                   No
35                   No                  Yes                  Yes
36                   No                   No                   No
37                  Yes                   No                   No
38                  Yes                   No                  Yes
39                  Yes                   No                  Yes
40                   No                   No                   No
41                   No                   No                  Yes
42  No internet service  No internet service  No internet service
43                  Yes                  Yes                  Yes
44                   No                  Yes                  Yes
45                   No                   No                   No
46                   No                   No                   No
47                   No                   No                  Yes
48                   No                  Yes                  Yes
49                  Yes                  Yes                   No

        StreamingMovies        Contract PaperlessBilling  
0                    No  Month-to-month              Yes  \
1                    No        One year               No   
2                    No  Month-to-month              Yes   
3                    No        One year               No   
4                    No  Month-to-month              Yes   
5                   Yes  Month-to-month              Yes   
6                    No  Month-to-month              Yes   
7                    No  Month-to-month               No   
8                   Yes  Month-to-month              Yes   
9                    No        One year               No   
10                   No  Month-to-month              Yes   
11  No internet service        Two year               No   
12                  Yes        One year               No   
13                  Yes  Month-to-month              Yes   
14                  Yes  Month-to-month              Yes   
15                  Yes        Two year               No   
16  No internet service        One year               No   
17                  Yes        Two year               No   
18                   No  Month-to-month               No   
19                  Yes  Month-to-month              Yes   
20                  Yes  Month-to-month              Yes   
21  No internet service        One year               No   
22  No internet service  Month-to-month               No   
23                   No        Two year              Yes   
24                   No  Month-to-month               No   
25                   No  Month-to-month              Yes   
26                  Yes  Month-to-month              Yes   
27                   No  Month-to-month               No   
28                  Yes        Two year              Yes   
29                  Yes  Month-to-month              Yes   
30                   No        Two year              Yes   
```

```
31                  Yes  Month-to-month              Yes
32                   No        One year               No
33  No internet service  Month-to-month               No
34                   No  Month-to-month               No
35                   No        Two year               No
36                   No  Month-to-month              Yes
37                   No  Month-to-month              Yes
38                  Yes  Month-to-month              Yes
39                  Yes  Month-to-month              Yes
40                   No        One year               No
41                   No        Two year              Yes
42  No internet service        One year               No
43                   No        Two year              Yes
44                   No  Month-to-month              Yes
45                  Yes  Month-to-month              Yes
46                   No  Month-to-month               No
47                   No  Month-to-month              Yes
48                  Yes        Two year              Yes
49                   No        Two year              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            Electronic check          99.65         820.5   Yes
6     Credit card (automatic)          89.10        1949.4    No
7                Mailed check          29.75         301.9    No
8            Electronic check         104.80       3046.05   Yes
9   Bank transfer (automatic)          56.15       3487.95    No
10               Mailed check          49.95        587.45    No
11    Credit card (automatic)          18.95         326.8    No
12    Credit card (automatic)         100.35        5681.1    No
13  Bank transfer (automatic)         103.70        5036.3   Yes
14           Electronic check         105.50       2686.05    No
15    Credit card (automatic)         113.25       7895.15    No
16               Mailed check          20.65       1022.95    No
17  Bank transfer (automatic)         106.70       7382.25    No
18    Credit card (automatic)          55.20        528.35   Yes
19           Electronic check          90.05        1862.9    No
20           Electronic check          39.65         39.65   Yes
21  Bank transfer (automatic)          19.80        202.25    No
22               Mailed check          20.15         20.15   Yes
23    Credit card (automatic)          59.90        3505.1    No
24    Credit card (automatic)          59.60        2970.3    No
25  Bank transfer (automatic)          55.30        1530.6    No
26           Electronic check          99.35       4749.15   Yes
27           Electronic check          30.20          30.2   Yes
```

```
28    Credit card (automatic)          90.25       6369.45    No
29               Mailed check          64.70        1093.1   Yes
30    Credit card (automatic)          96.35       6766.95    No
31    Credit card (automatic)          95.50        181.65    No
32               Mailed check          66.15       1874.45    No
33  Bank transfer (automatic)          20.20          20.2    No
34  Bank transfer (automatic)          45.25         45.25    No
35  Bank transfer (automatic)          99.90        7251.7    No
36           Electronic check          69.70         316.9   Yes
37    Credit card (automatic)          74.80        3548.3    No
38           Electronic check         106.35       3549.25   Yes
39  Bank transfer (automatic)          97.85        1105.4   Yes
40               Mailed check          49.55         475.7    No
41    Credit card (automatic)          69.20       4872.35    No
42               Mailed check          20.75        418.25    No
43    Credit card (automatic)          79.85       4861.45    No
44           Electronic check          76.20        981.45    No
45           Electronic check          84.50        3906.7    No
46               Mailed check          49.25            97    No
47           Electronic check          80.65        144.15   Yes
48    Credit card (automatic)          79.75        4217.8    No
49    Credit card (automatic)          64.15        4254.1    No

[50 rows x 21 columns]
```

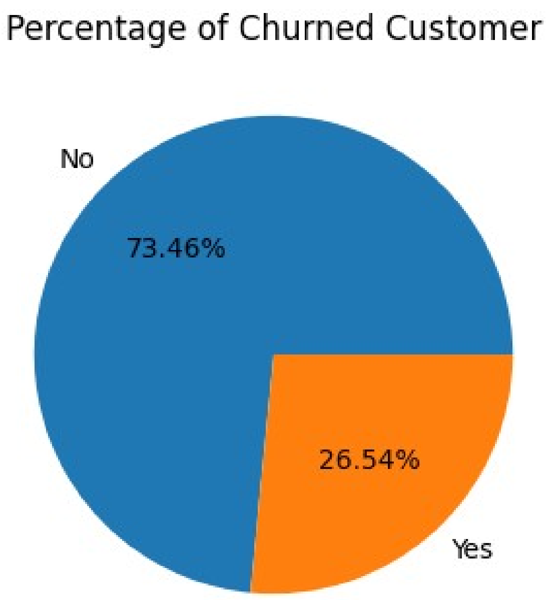
```
df.isnull().sum().sum()
```

```
0
```

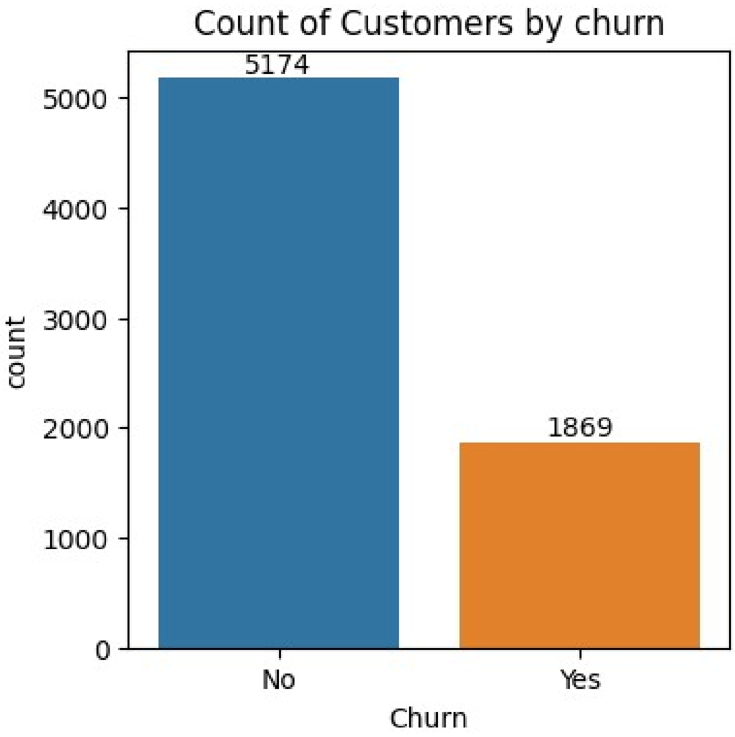
```
df.describe()
```

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

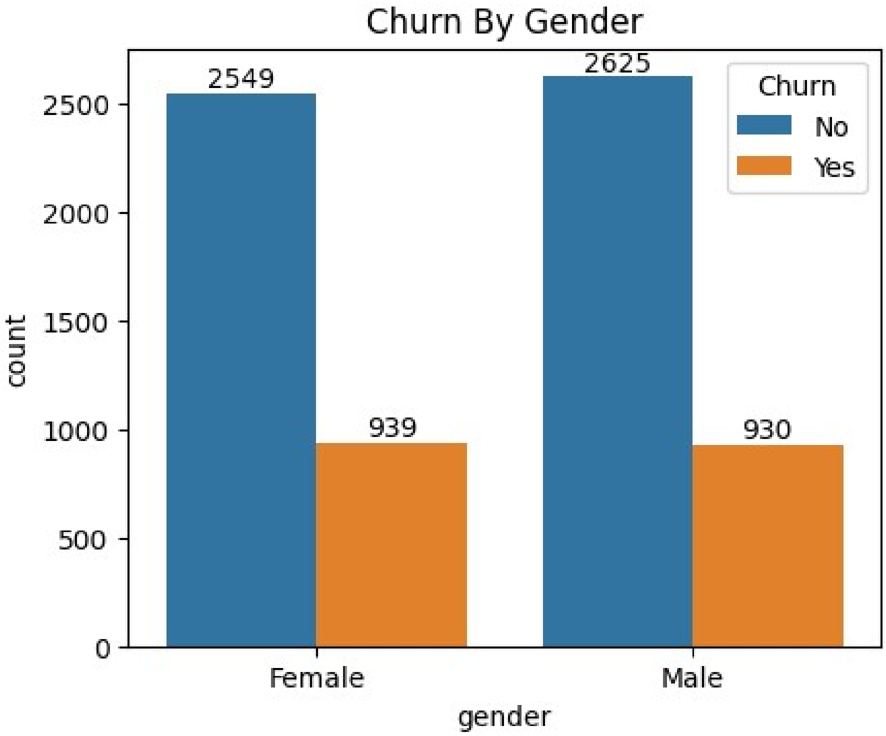
```
plt.figure(figsize=(4,4))
gb=df.groupby("Churn").agg({"Churn":"count"})
plt.pie(gb['Churn'],labels = gb.index, autopct= "%1.2f%%")
plt.title("Percentage of Churned Customer")
plt.show()
```



```
plt.figure(figsize=(4,4))
ax=sns.countplot(x='Churn', data=df)
ax.bar_label(ax.containers[0])
plt.title("Count of Customers by churn")
plt.show()
```

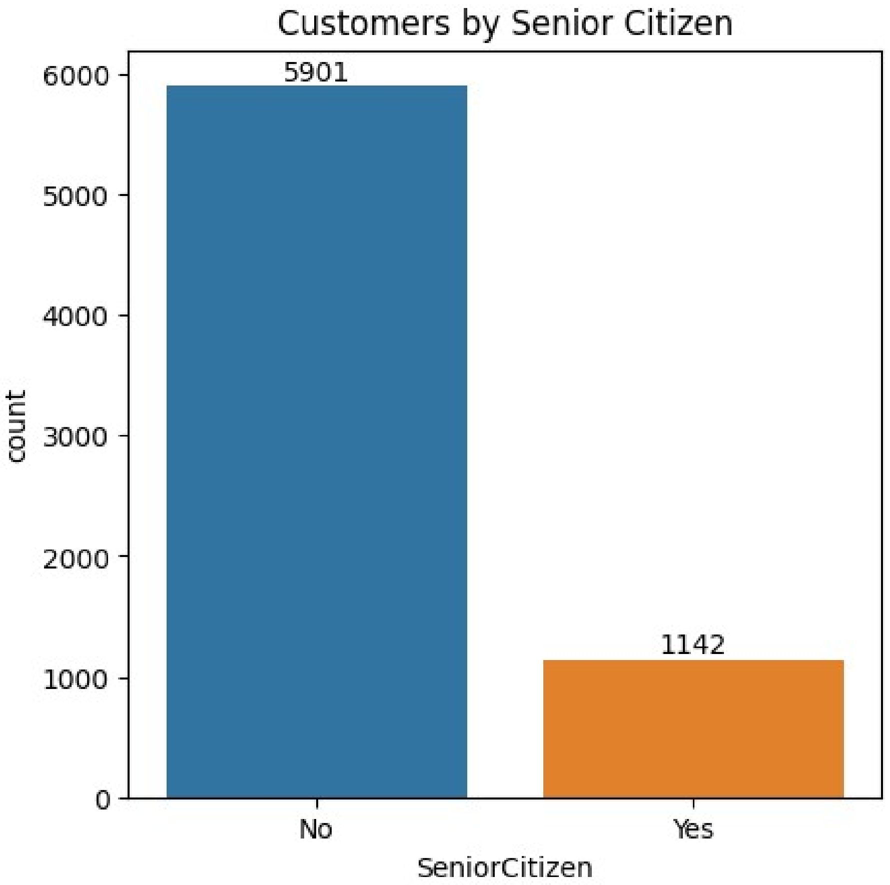


```
plt.figure(figsize=(5,4))
ax=sns.countplot(x="gender",data=df,hue="Churn")
ax.bar_label(ax.containers[0])
ax.bar_label(ax.containers[1])
plt.title("Churn By Gender")
plt.show()
```

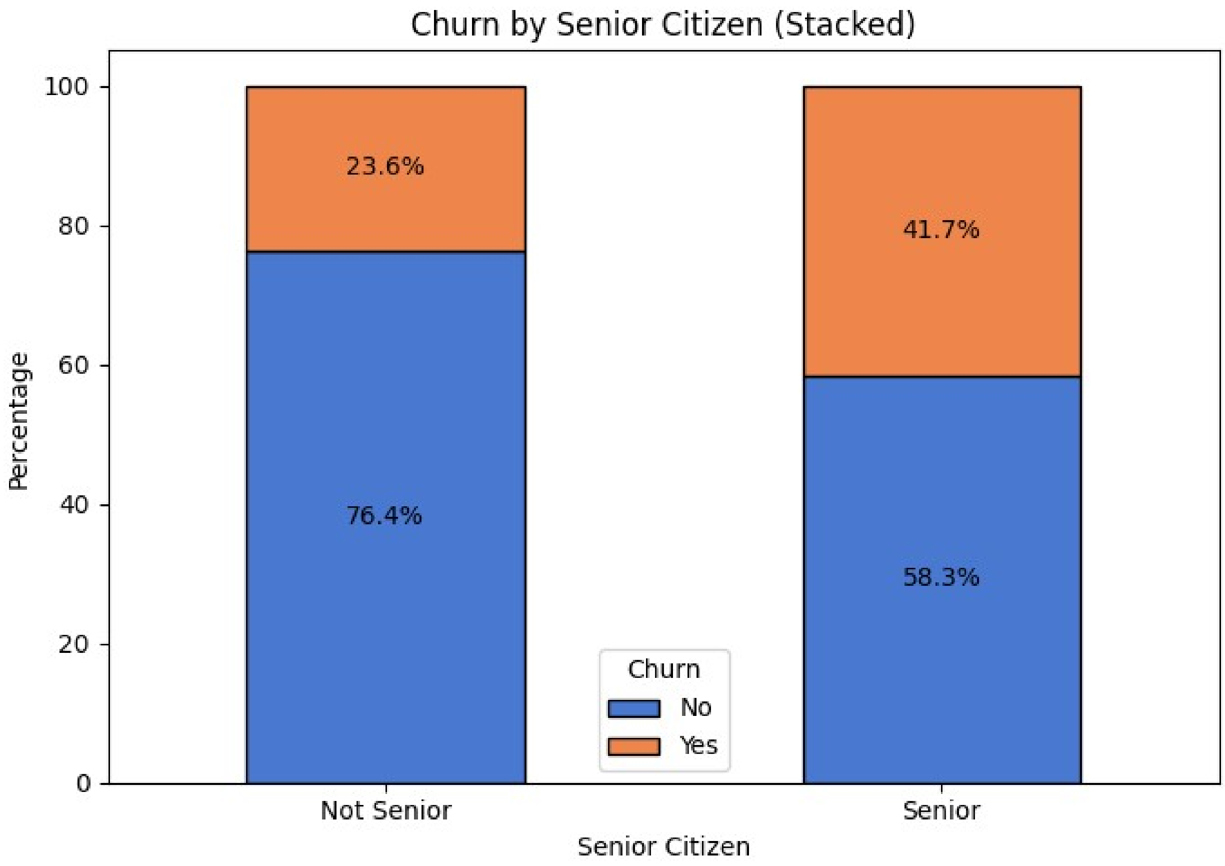


```
plt.figure(figsize=(5,5))
ax=sns.countplot(x="SeniorCitizen",data=df)
plt.bar_label(ax.containers[0])
plt.title("Customers by Senior Citizen")
print(ax)
```

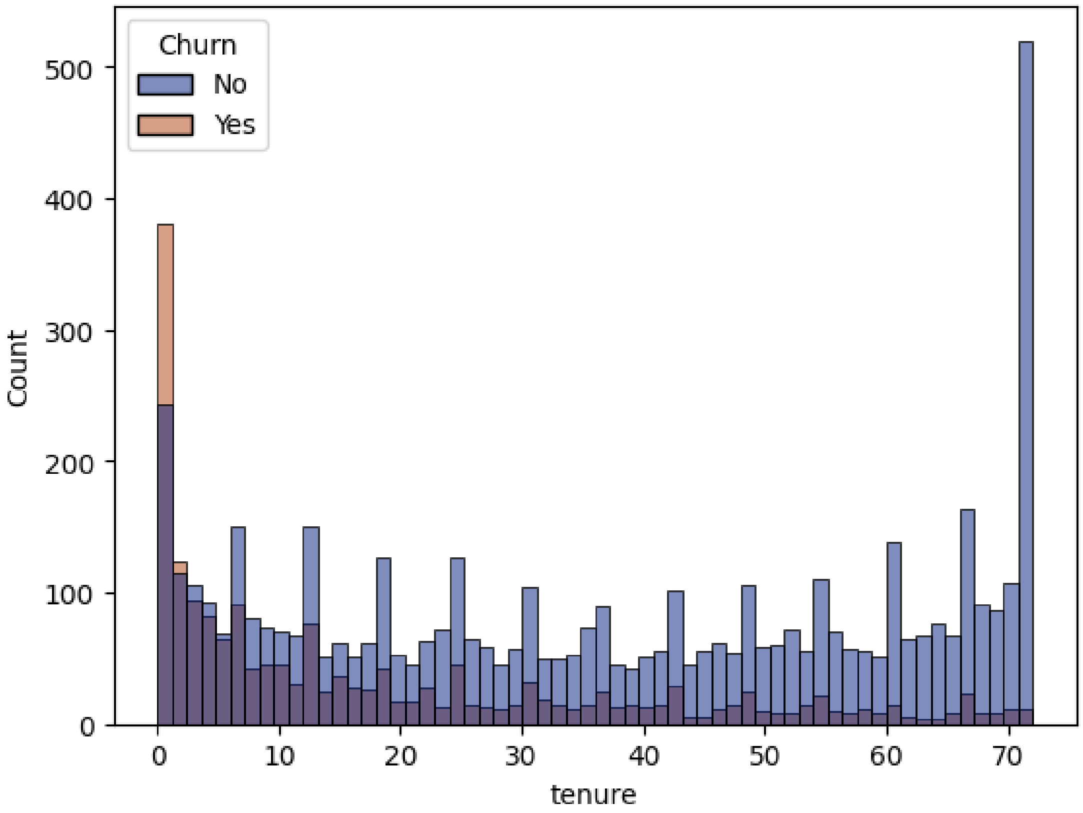
```
Axes(0.125,0.11;0.775x0.77)
```



```
data = df.groupby(['SeniorCitizen',
'Churn']).size().reset_index(name='Count')
total_counts = data.groupby('SeniorCitizen')['Count'].transform('sum')
data['Percentage'] = data['Count'] / total_counts * 100

# Pivot data to get stacking effect
pivot_data = data.pivot(index='SeniorCitizen', columns='Churn',
values='Percentage').fillna(0)

# Plot the stacked bar chart
colors = sns.color_palette("muted")  # Choose a color palette
pivot_data.plot(
    kind='bar',
    stacked=True,
    color=colors[:len(pivot_data.columns)],
    figsize=(7, 5),
    edgecolor='black'
)

# Add percentage labels
for i, senior in enumerate(pivot_data.index):
    bottom = 0
    for churn, percentage in pivot_data.loc[senior].items():
        if percentage > 0:
            plt.text(
                i, bottom + percentage / 2, f"{percentage:.1f}%",
                ha='center', va='center', fontsize=10, color='black'
            )
        bottom += percentage

# Customize the plot
plt.xticks(ticks=range(len(pivot_data.index)), labels=['Not Senior',
'Senior'], rotation=0)
plt.xlabel("Senior Citizen")
plt.ylabel("Percentage")
plt.title("Churn by Senior Citizen (Stacked)")
plt.legend(title="Churn")
plt.tight_layout()
plt.show()
```

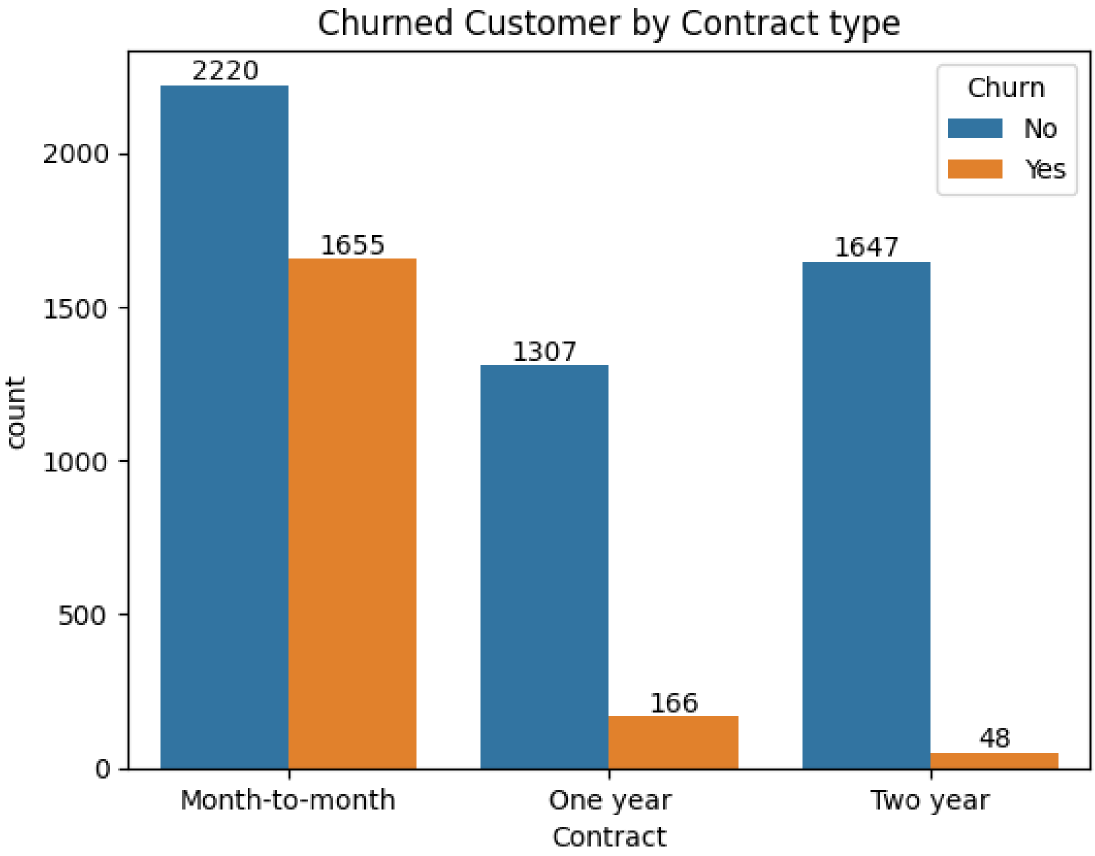


```
ax=sns.histplot(x="tenure",data=df, bins=60,hue="Churn",
palette="dark")
plt.show()
```



People who have used Services for a long time stayed and people who have jused our services 1 or 2 months have churned

```
ax=sns.countplot(x="Contract",data=df,hue="Churn")
plt.bar_label(ax.containers[0])
plt.bar_label(ax.containers[1])
plt.title("Churned Customer by Contract type")
plt.show()
```

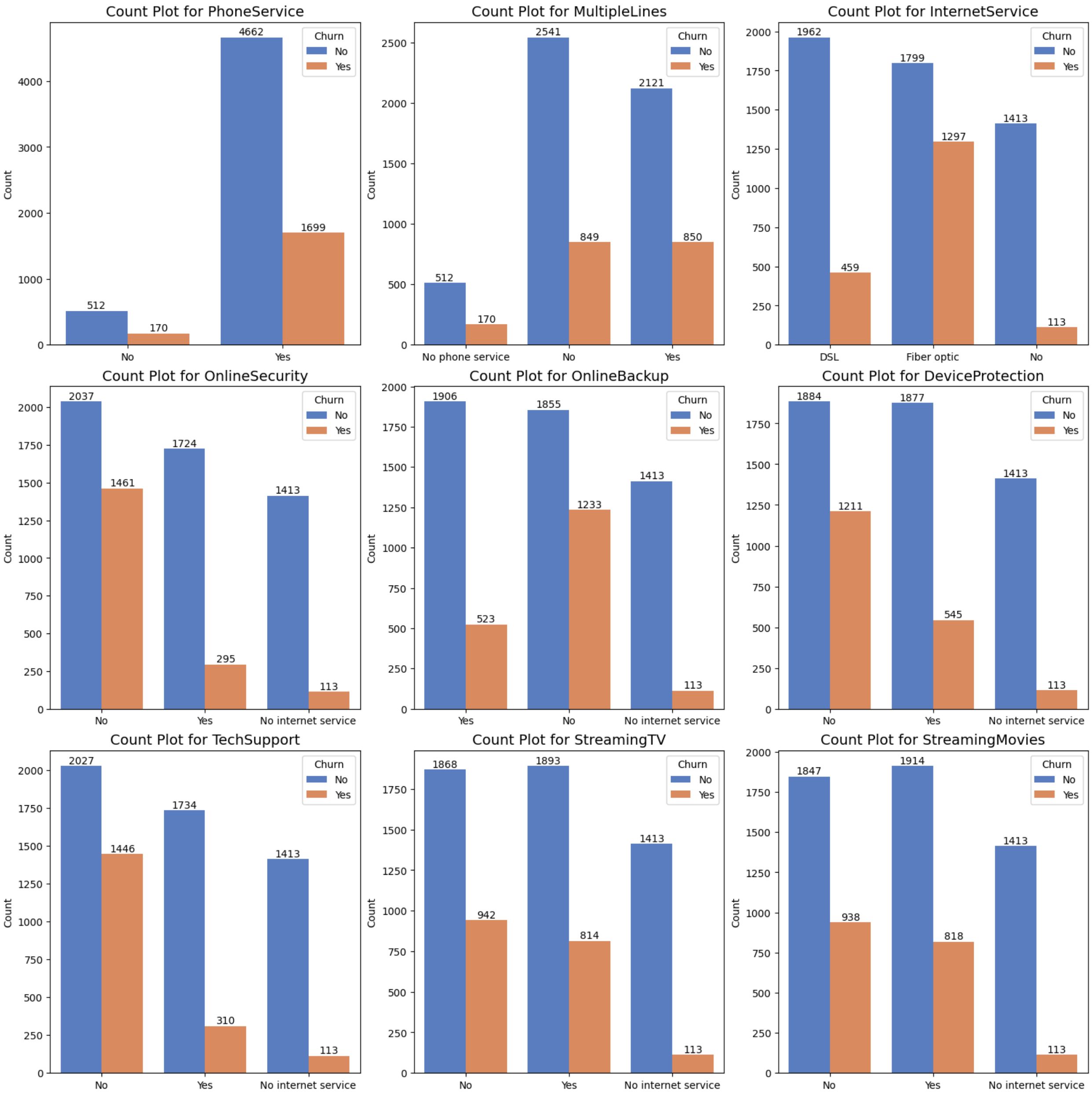


Above chart compares churn rates across different contract types. Customers with month-to-month contracts have the highest churn rate, while those with one-year and two-year contracts exhibit significantly lower churn rates. Long-term contracts seem to promote customer retention effectively.

```python
print(df.columns.values)
```

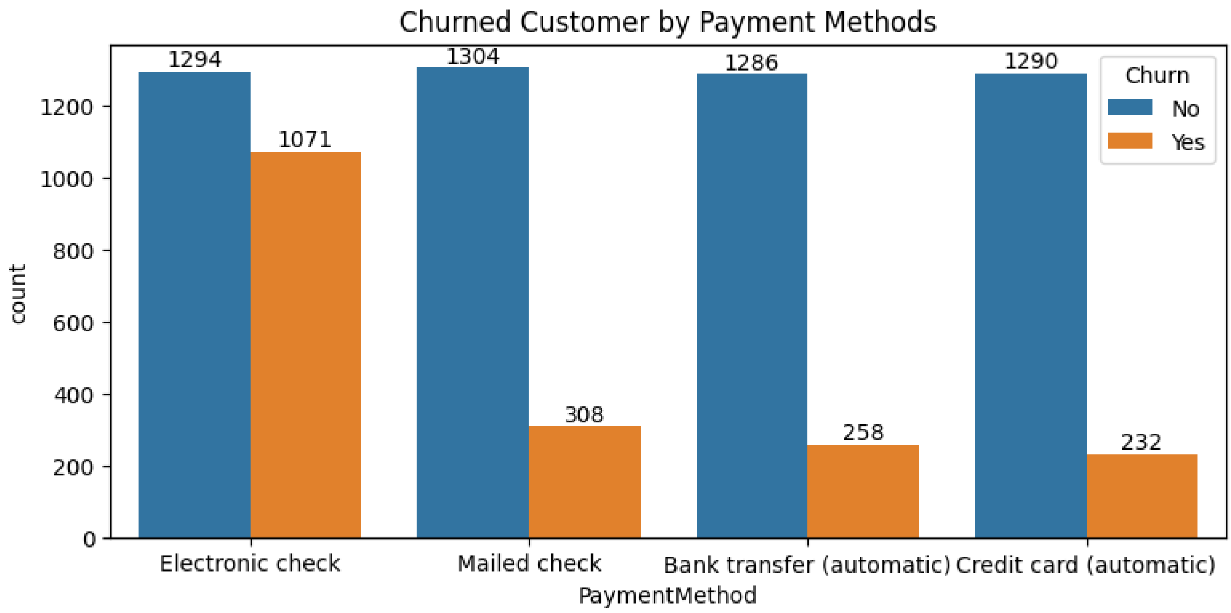
```
['customerID' 'gender' 'SeniorCitizen' 'Partner' 'Dependents' 'tenure'
 'PhoneService' 'MultipleLines' 'InternetService' 'OnlineSecurity'
 'OnlineBackup' 'DeviceProtection' 'TechSupport' 'StreamingTV'
 'StreamingMovies' 'Contract' 'PaperlessBilling' 'PaymentMethod'
 'MonthlyCharges' 'TotalCharges' 'Churn']
```

```python
columns = [
    'PhoneService', 'MultipleLines', 'InternetService',
'OnlineSecurity',
    'OnlineBackup', 'DeviceProtection', 'TechSupport', 'StreamingTV',
'StreamingMovies'
]

n_cols = 3  # Number of columns in the subplot grid
n_rows = -(-len(columns) // n_cols)  # Calculate the number of rows
fig, axes = plt.subplots(n_rows, n_cols, figsize=(15, 5 * n_rows),
constrained_layout=True)

# Create count plots for each column
for i, column in enumerate(columns):
    row, col = divmod(i, n_cols)
    sns.countplot(x=column, data=df, ax=axes[row][col],
palette="muted", hue="Churn")
    axes[row][col].set_title(f'Count Plot for {column}', fontsize=14)
    axes[row][col].set_xlabel('')
    axes[row][col].set_ylabel('Count')
    for container in axes[row][col].containers:
        axes[row][col].bar_label(container, fmt='%d',
label_type='edge', fontsize=10)

# Hide any unused subplots
for j in range(len(columns), n_rows * n_cols):
    row, col = divmod(j, n_cols)
    fig.delaxes(axes[row][col])

plt.show()
```



#The bar charts show customer service usage segmented by churn status. Customers with no internet services (e.g., "No OnlineSecurity" or "No Streaming") have relatively lower churn compared to active service users. Fiber optic internet and services like Tech Support or Device Protection show higher churn proportions among users. The insights highlight the need for targeted retention strategies for specific services.

```
plt.figure(figsize=(9,4))
ax=sns.countplot(x="PaymentMethod",data=df,hue="Churn")
plt.bar_label(ax.containers[0])
plt.bar_label(ax.containers[1])
plt.title("Churned Customer by Payment Methods")
plt.show()
```



The chart compares churn rates across different payment methods. Customers using electronic checks have the highest churn rate, while those using automatic payments like bank transfers or credit cards exhibit significantly lower churn rates. This suggests that convenience in payment methods may reduce customer churn.