customer-churn-project

October 15, 2024

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

```
[260]: df=pd.read_csv("Customer Churn.csv")
```

```
[262]: df.head()
```

```
[262]:    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]
```

[264]:
```
# replacing blanks in total charges with 0 as tenure is 0 so no total charges␣
↪are recorded
```

[266]:
```
df["TotalCharges"] = df["TotalCharges"].replace(" ", "0")
```

[268]:
```
df["TotalCharges"] = df["TotalCharges"].astype("float")
```

[270]:
```
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   float64
 20  Churn             7043 non-null   object
dtypes: float64(2), int64(2), object(17)
memory usage: 1.1+ MB
```

[272]:
```
# isnull is used for checking any null value in dataset if yes it will-> True␣
↪and if not-> False
```

[274]:
```
df.isnull().sum()
```

[274]:
```
customerID          0
gender              0
```

```
SeniorCitizen       0
Partner             0
Dependents          0
tenure              0
PhoneService        0
MultipleLines       0
InternetService     0
OnlineSecurity      0
OnlineBackup        0
DeviceProtection    0
TechSupport         0
StreamingTV         0
StreamingMovies     0
Contract            0
PaperlessBilling    0
PaymentMethod       0
MonthlyCharges      0
TotalCharges        0
Churn               0
dtype: int64
```

[276]:
```
df.isnull().sum().sum()
```

[276]:
```
0
```

[278]:
```
df.describe()
```

[278]:
```
       SeniorCitizen       tenure  MonthlyCharges  TotalCharges
count    7043.000000  7043.000000     7043.000000   7043.000000
mean        0.162147    32.371149       64.761692   2279.734304
std         0.368612    24.559481       30.090047   2266.794470
min         0.000000     0.000000       18.250000      0.000000
25%         0.000000     9.000000       35.500000    398.550000
50%         0.000000    29.000000       70.350000   1394.550000
75%         0.000000    55.000000       89.850000   3786.600000
max         1.000000    72.000000      118.750000   8684.800000
```

[280]:
```
df.duplicated().sum()
```

[280]:
```
0
```

[282]:
```
df["customerID"].duplicated().sum()
```

[282]:
```
0
```

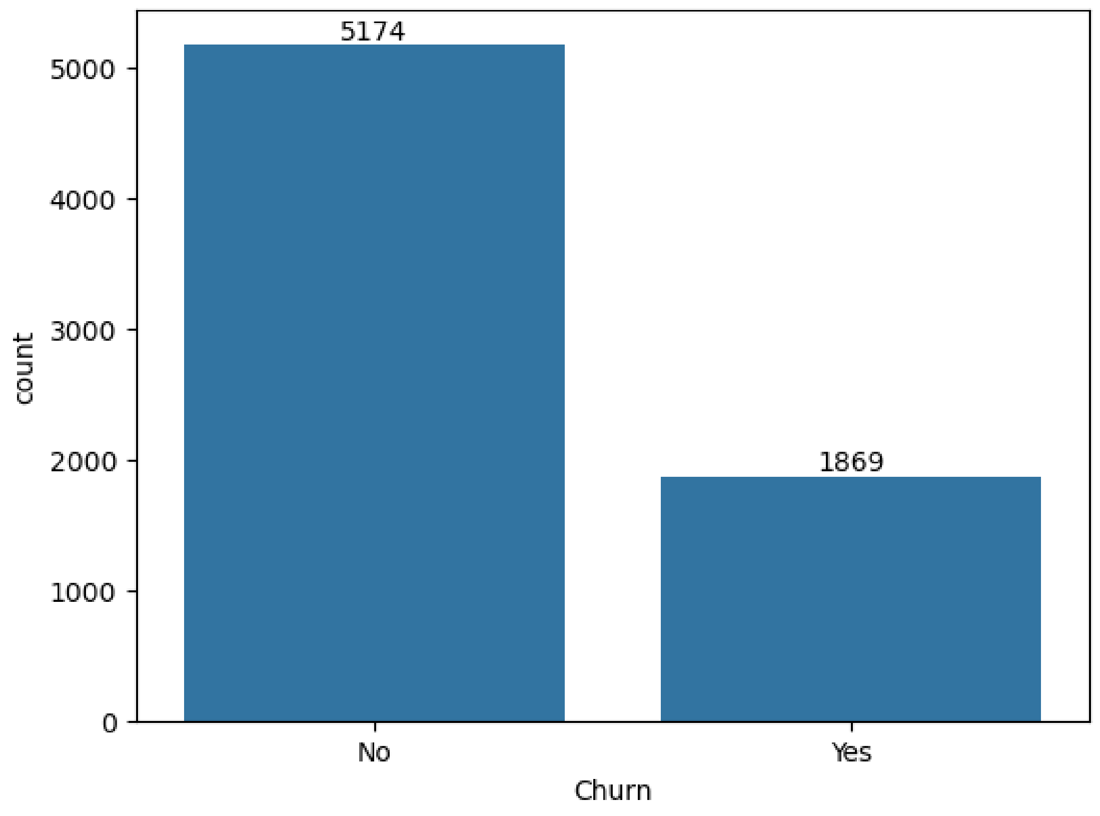
[284]:
```
def conv(value):
    if(value == 1):
        return"yes"
    else:
        return("No")

df["SeniorCitizen"] = df["SeniorCitizen"].apply(conv)
```

[286]:
```
#converted 0 and 1 values of senior citizen to yes/no to make it easier to␣
 ↪understand
```

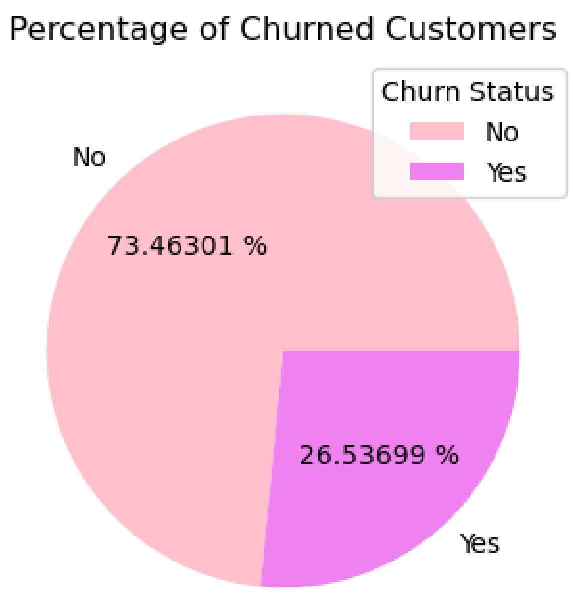
[288]:
```
df.head(5)
```

[288]:
```
   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

      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       1889.50     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]
```

[290]:
```
ax = sns.countplot(x = 'Churn',data = df) #ax.bar use kra yh cotainer ke top pr␣
 ↪result btata
ax.bar_label(ax.containers[0]) # This labels the bars in the first container
plt.show()
```

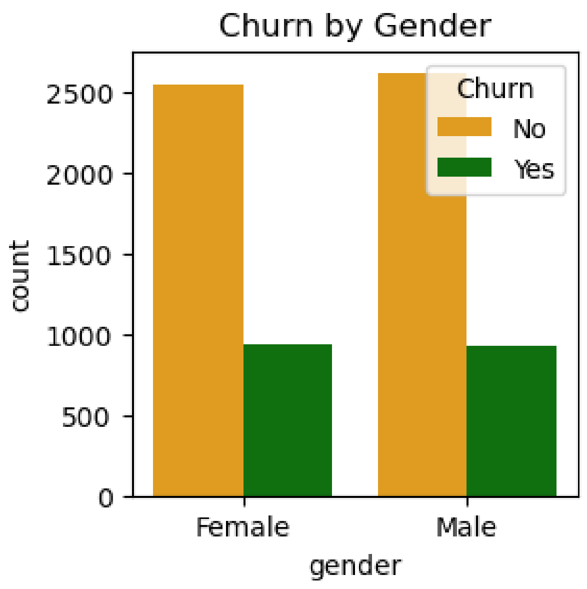


[292]:
```
plt.figure(figsize =(4,4))
gb = df.groupby('Churn').agg({'Churn' : 'count'})
plt.pie(gb['Churn'],labels = gb.index, autopct = "%1.5f %%",colors=['pink',␣
  ↪'violet'])
plt.title("Percentage of Churned Customers", fontsize =12)
plt.legend(gb.index, title="Churn Status", loc="upper right")
plt.show()
```

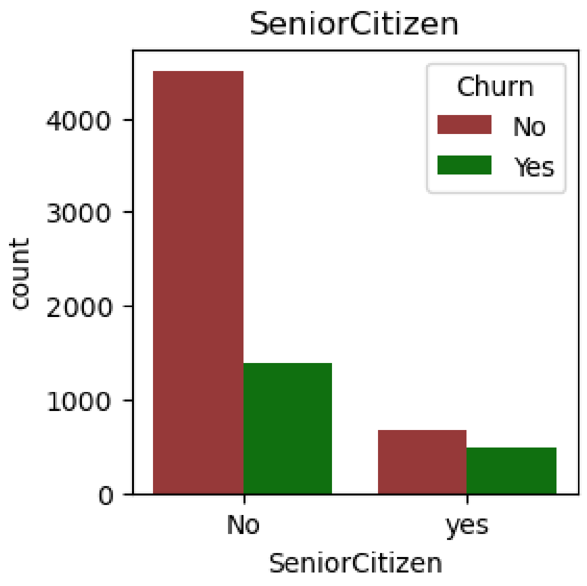


```
[294]: # from the given pie chart we can conclude that 26.53% of our customers have␣
         ↪churned out
```

```
[296]: plt.figure(figsize = (3,3))
       sns.countplot(x ='gender', data=df, hue='Churn',palette=['orange', 'green'])
       plt.title("Churn by Gender")
       plt.show()
```

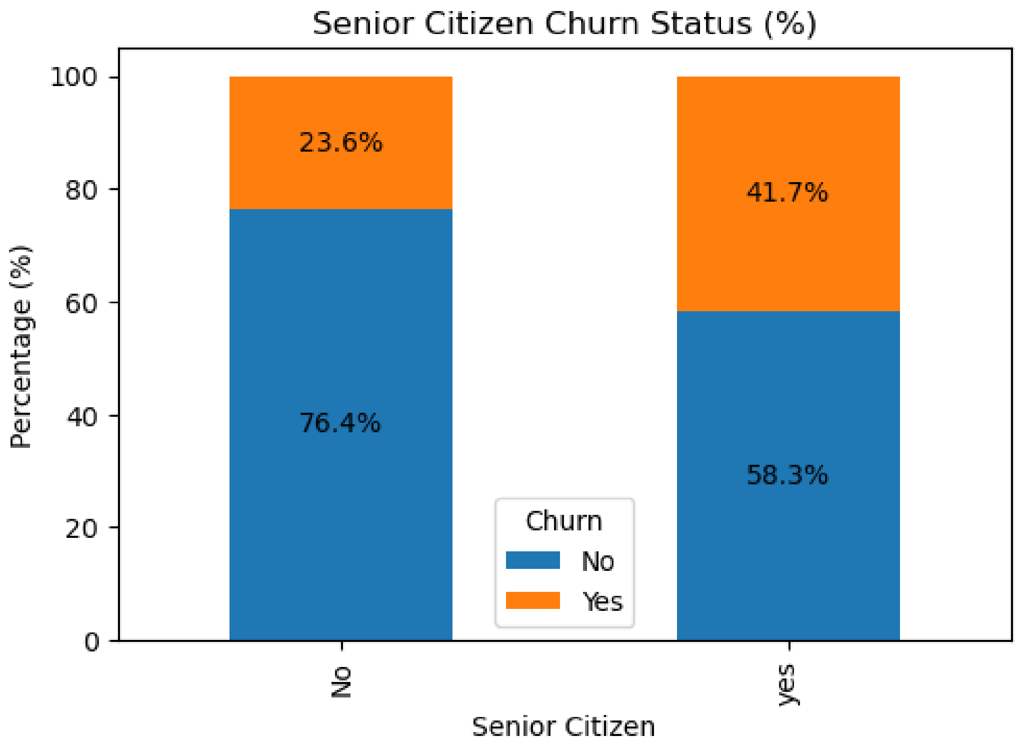


[308]:
```
plt.figure(figsize = (3,3))
sns.countplot(x = "SeniorCitizen", data = df, hue = "Churn" , palette =␣
↪["brown","green"])
plt.title("SeniorCitizen")
plt.show()
```



[332]:
```
# Group by 'SeniorCitizen' and 'Churn' to get counts
counts = df.groupby(['SeniorCitizen', 'Churn']).size().unstack(fill_value=0)

# Calculate total counts for normalization
total_counts = counts.sum(axis=1)

# Calculate percentages
percentages = counts.div(total_counts, axis=0) * 100

# Plotting
ax = percentages.plot(kind='bar', stacked=True, figsize=(6, 4))

# Add title and labels
plt.title("Senior Citizen Churn Status (%)")
plt.xlabel("Senior Citizen")
plt.ylabel("Percentage (%)")

# Add percentage labels on top of each segment
for i in ax.containers:
    ax.bar_label(i, label_type='center', fmt='%.1f%%')
```

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



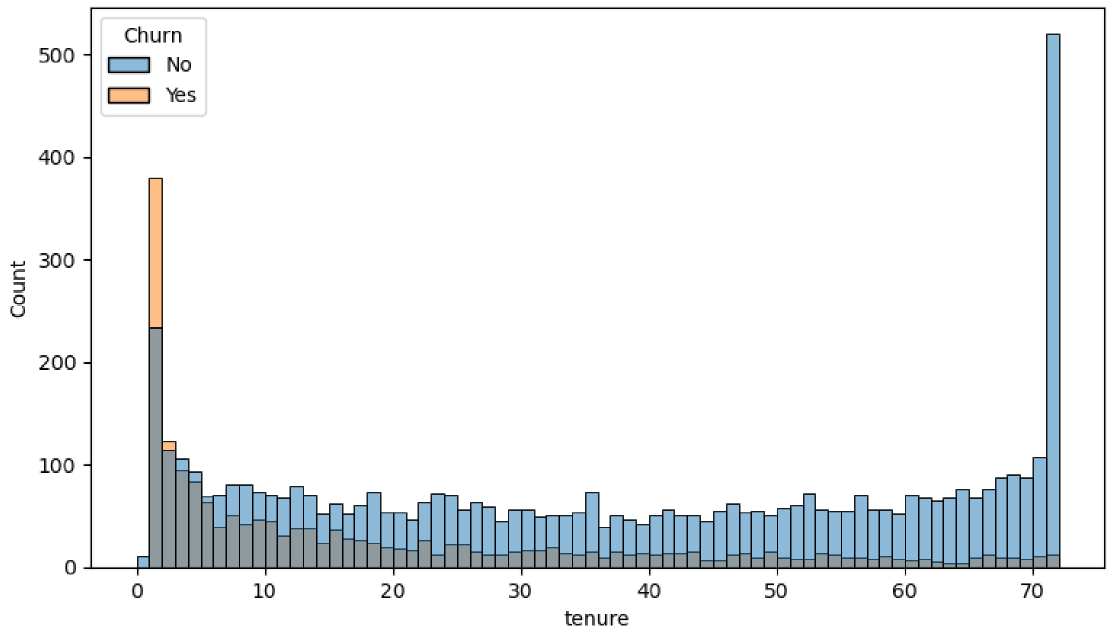
fmt='%.1f%%' %.1f:

The % indicates that we are formatting a value. .1 specifies that we want one digit after the decimal point. f means that we are formatting a floating-point number. So, for example, a value of 75.123 would be displayed as 75.1. %%:

The double %% is used to include a literal percent sign (%) in the output. Since % is a special character in formatting strings (it denotes the start of a format specifier), you use %% to display a single %.

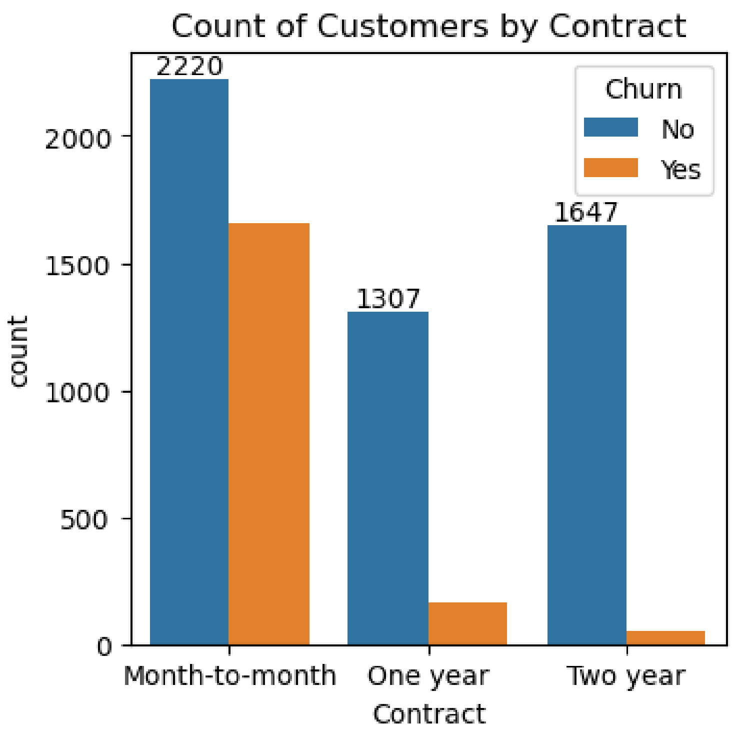
#comparatively a greater percentage of people in senior citizen category have churned

[374]:
```
plt.figure(figsize =(9,5))
sns.histplot(x = "tenure", data = df , bins = 72,hue ="Churn")
plt.show()
```



0.1 people who have used our services for a long time have stayed and people who have used our sevices

[391]:
```
plt.figure(figsize = (4,4))
ax = sns.countplot(x = 'Contract',data = df,hue = "Churn") #ax.bar use kra yh␣
  ↪cotainer ke top pr result btata
ax.bar_label(ax.containers[0])# This labels the bars in the first container
plt.title("Count of Customers by Contract")
plt.show()
```



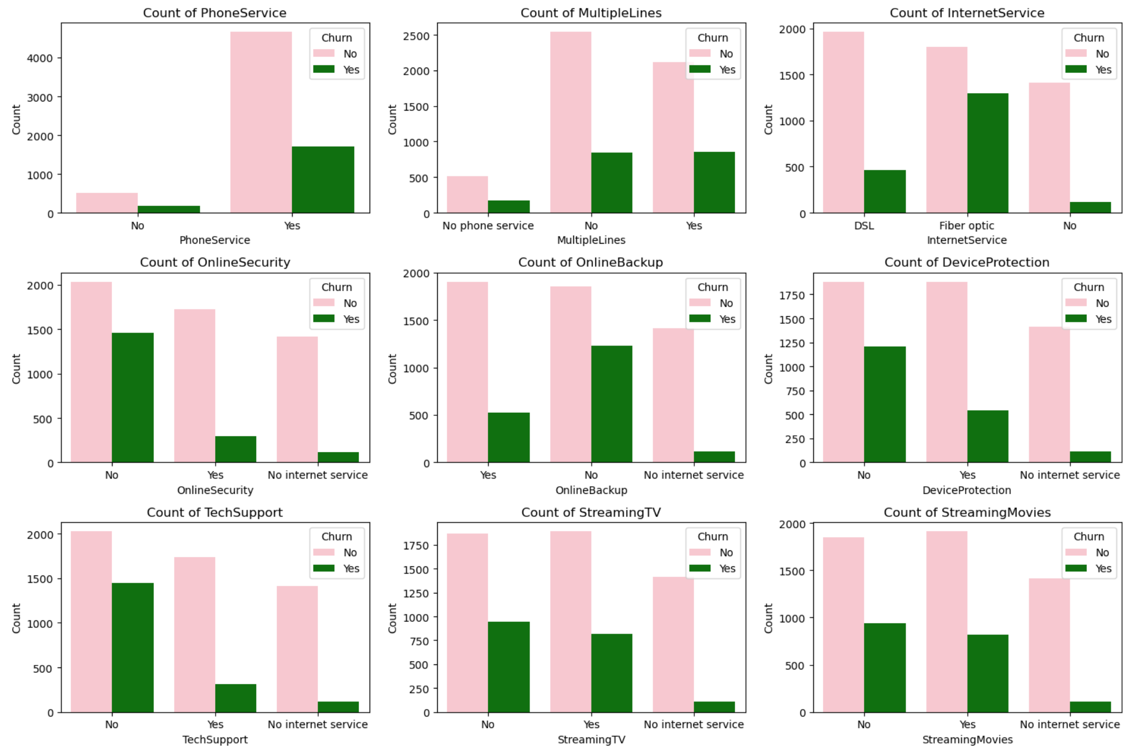
[ ]:
```
#people who have month to month contract are likely to churn then from those␣
↪who have 1 or 2 years or contract.
```

[403]:
```
df.columns.values
```

[403]:
```
array(['customerID', 'gender', 'SeniorCitizen', 'Partner', 'Dependents',
       'tenure', 'PhoneService', 'MultipleLines', 'InternetService',
       'OnlineSecurity', 'OnlineBackup', 'DeviceProtection',
       'TechSupport', 'StreamingTV', 'StreamingMovies', 'Contract',
       'PaperlessBilling', 'PaymentMethod', 'MonthlyCharges',
       'TotalCharges', 'Churn'], dtype=object)
```

[409]:
```
# List of features to plot
features = [
    'PhoneService', 'MultipleLines', 'InternetService',
    'OnlineSecurity', 'OnlineBackup', 'DeviceProtection',
    'TechSupport', 'StreamingTV', 'StreamingMovies'
]

# Set the number of rows and columns for the subplots
n_rows = 3  # Adjust based on the number of features
n_cols = 3
```

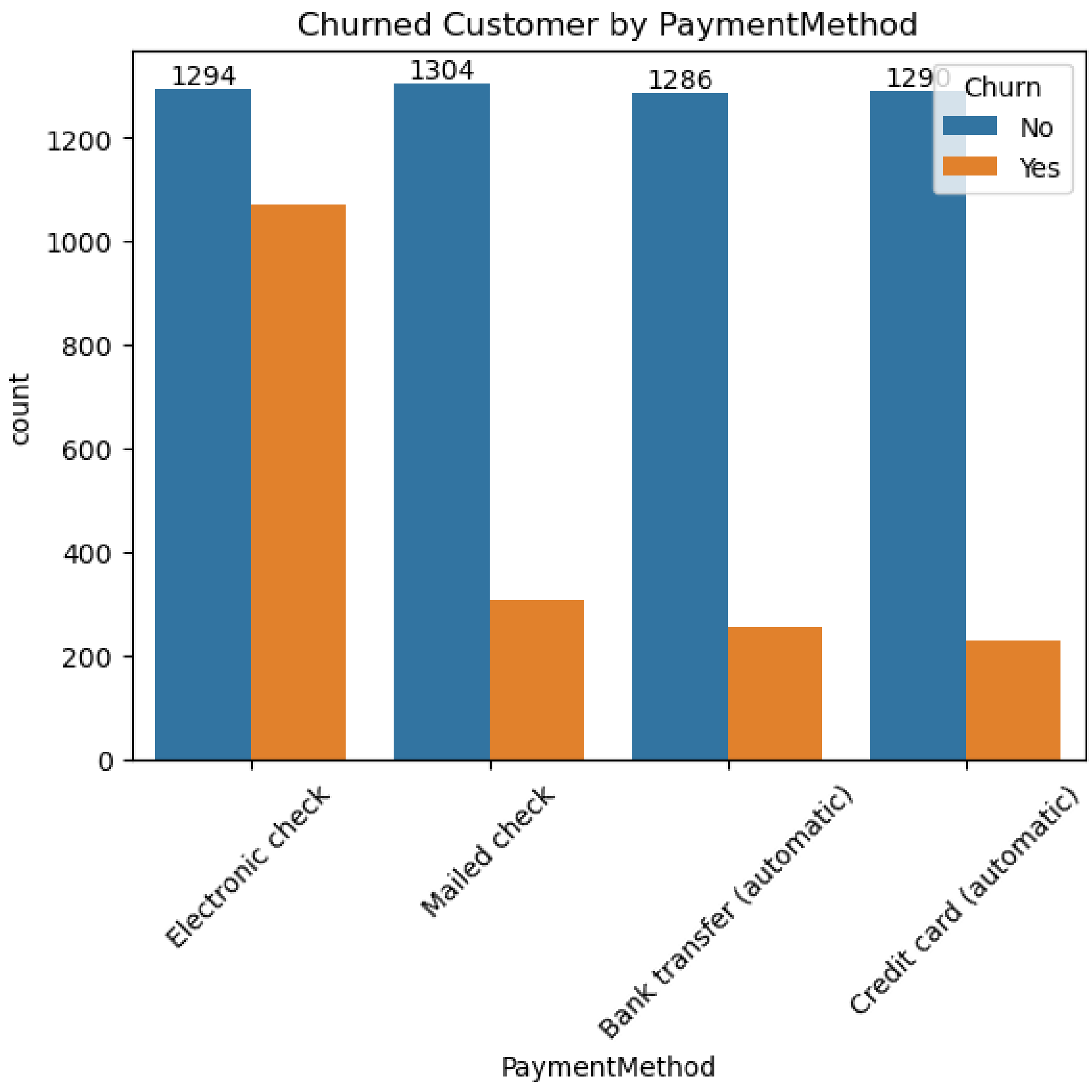
```
plt.figure(figsize=(15, 10))  # Adjust figure size for clarity

for i, feature in enumerate(features):
    plt.subplot(n_rows, n_cols, i + 1)
    sns.countplot(x=feature, data=df, hue='Churn', palette=["pink", "green"])
    plt.title(f"Count of {feature}")  # Updated title
    plt.xlabel(feature)
    plt.ylabel("Count")
    plt.legend(title='Churn', loc='upper right')

plt.tight_layout()  # Adjusts subplot parameters to give specified padding
plt.show()
```



#The charts display counts of customer churn (yes/no) across various services such as PhoneService, MultipleLines, InternetService, OnlineSecurity, and others. In general, customers with no additional services like OnlineSecurity, OnlineBackup, and TechSupport have higher churn rates, while those with these services tend to churn less. Fiber optic InternetService has a notably higher churn rate compared to DSL or no internet service.

[437]:
```
ax = sns.countplot(x = 'PaymentMethod',data = df , hue = "Churn") #ax.bar use␣
 ↪kra yh cotainer ke top pr result btata
ax.bar_label(ax.containers[0]) # This labels the bars in the first container
#ax.bar_label(ax.containers[1])
```

```
plt.title("Churned Customer by PaymentMethod")
plt.xticks(rotation=45)
plt.show()
```



1 customer is likely to churn when he is using electronic check as a payment method.

[ ]:

```

```