```python
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt

df = pd.read_csv("C:/Users/DELL/Desktop/churn data/WA_Fn-UseC_-Telco-
Customer-Churn.csv")
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]
```

```
# Replace blanks with 0 as tenure is 0 and no total charges are
recorded

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

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
```

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

```
0
```

```
df.describe()
```

```
       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
```

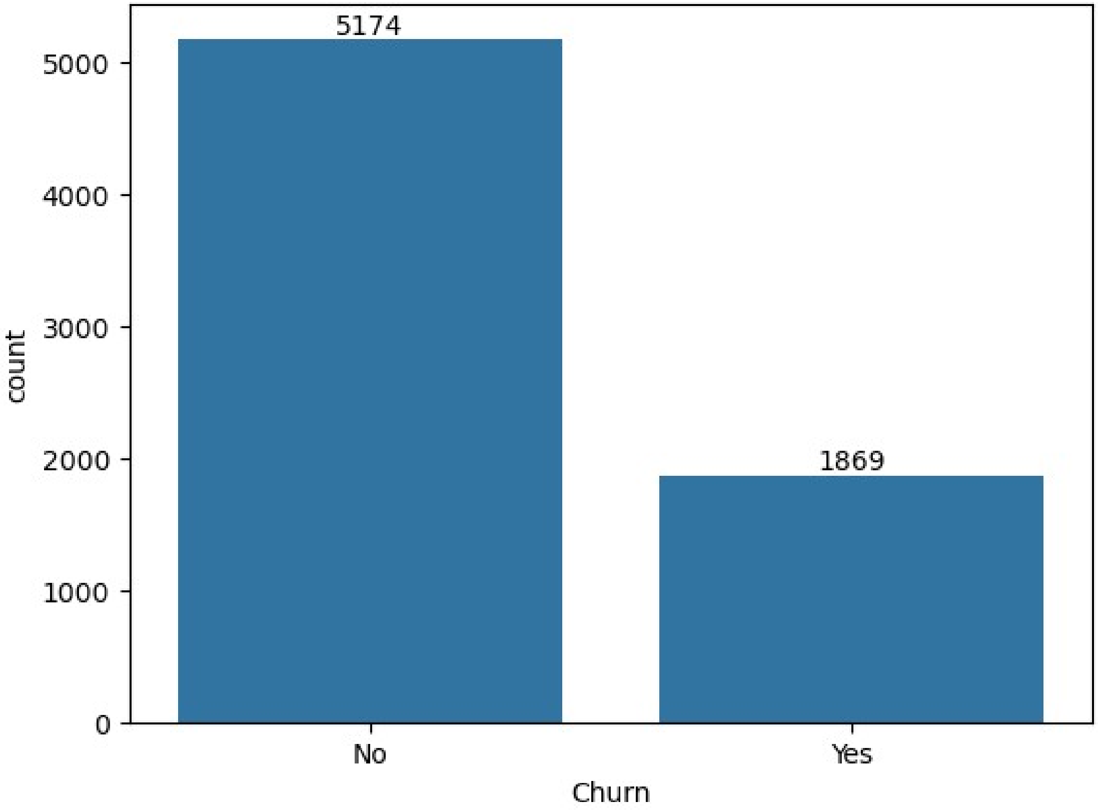
```
df["customerID"].duplicated().sum()
```

```
0
```

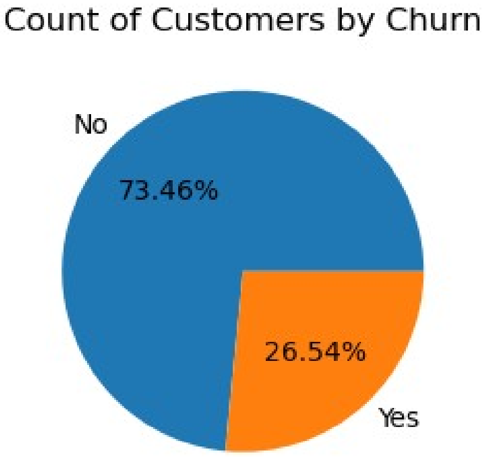
converted 0 and 1 values of senior citizen to yes/no to make it easier to understand

```
def conv(value):
    if value == 1:
        return "yes"
    else:
        return"no"
df['SeniorCitizen'] = df["SeniorCitizen"].apply(conv)
```

```
ax = sns.countplot(x = 'Churn',data = df)
ax.bar_label(ax.containers[0])
plt.show()
```

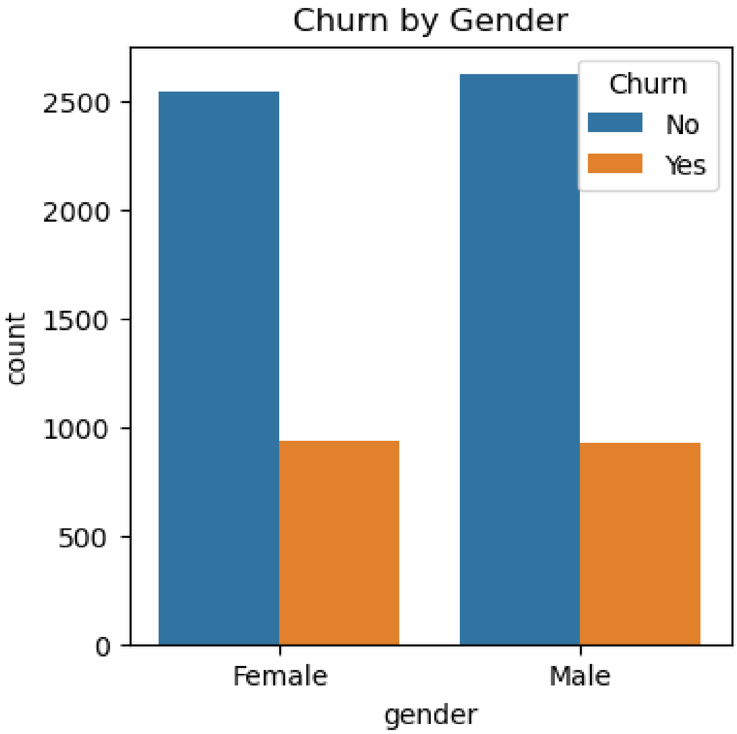


```
plt.figure(figsize = (3,4))
gb = df.groupby('Churn').agg({'Churn':'count'})
plt.pie(gb['Churn'],labels = gb.index,autopct = "%1.2f%%")
plt.title("Count of Customers by Churn")
plt.show()
```

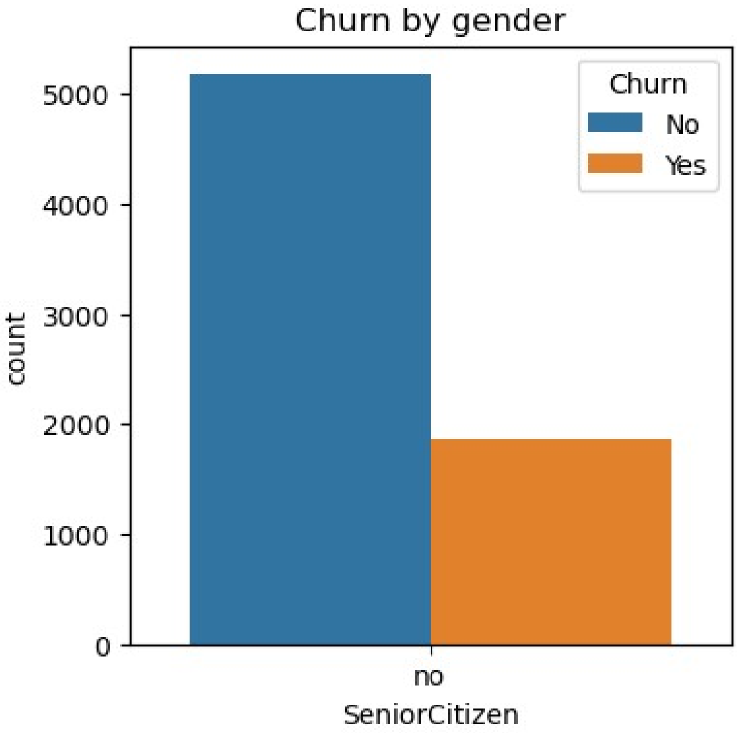


From the given pie chart we can conclude that 26.54% of our customers have churnde out. Now lets explore the reason behind it

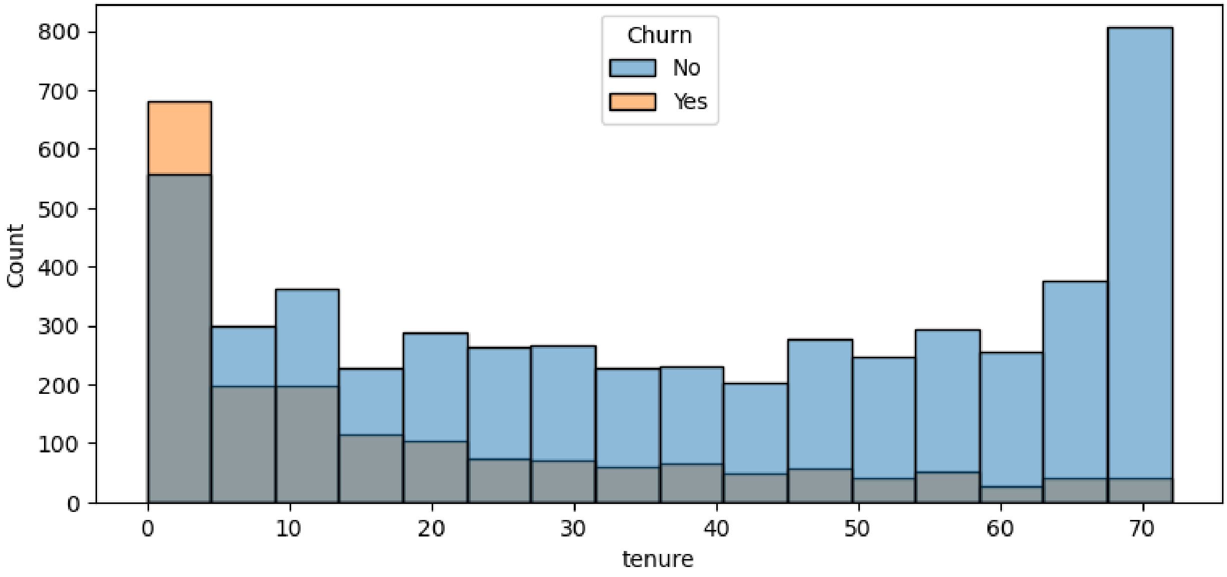
```
plt.figure(figsize = (4,4))
sns.countplot(x = "gender",data = df,hue = "Churn")
plt.title("Churn by Gender")
plt.show()
```



```
plt.figure(figsize = (4,4))
sns.countplot(x = "SeniorCitizen",data = df,hue = "Churn")
plt.title("Churn by gender")
plt.show()
```

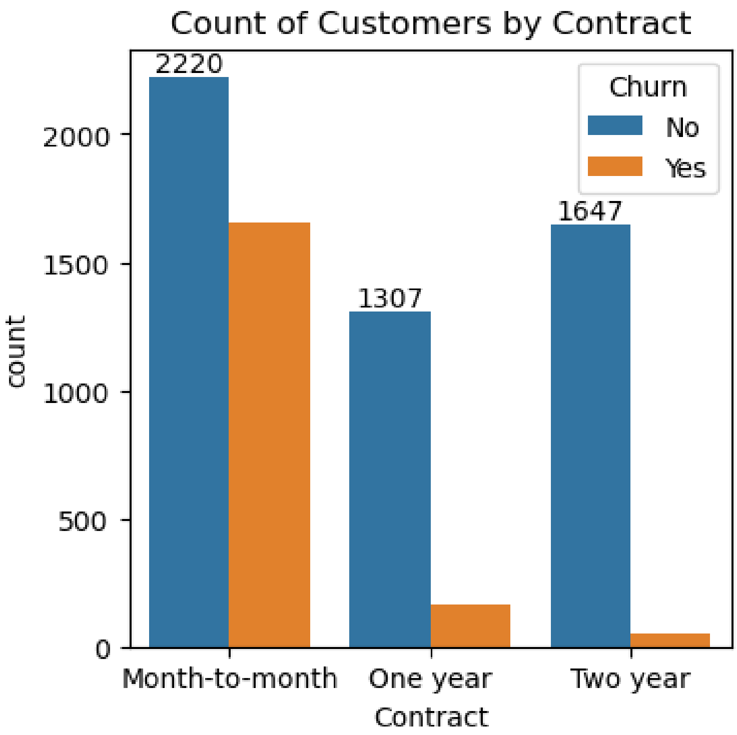


```
plt.figure(figsize = (9,4))
sns.histplot(x= "tenure",data = df,hue = "Churn")
plt.show()
```



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

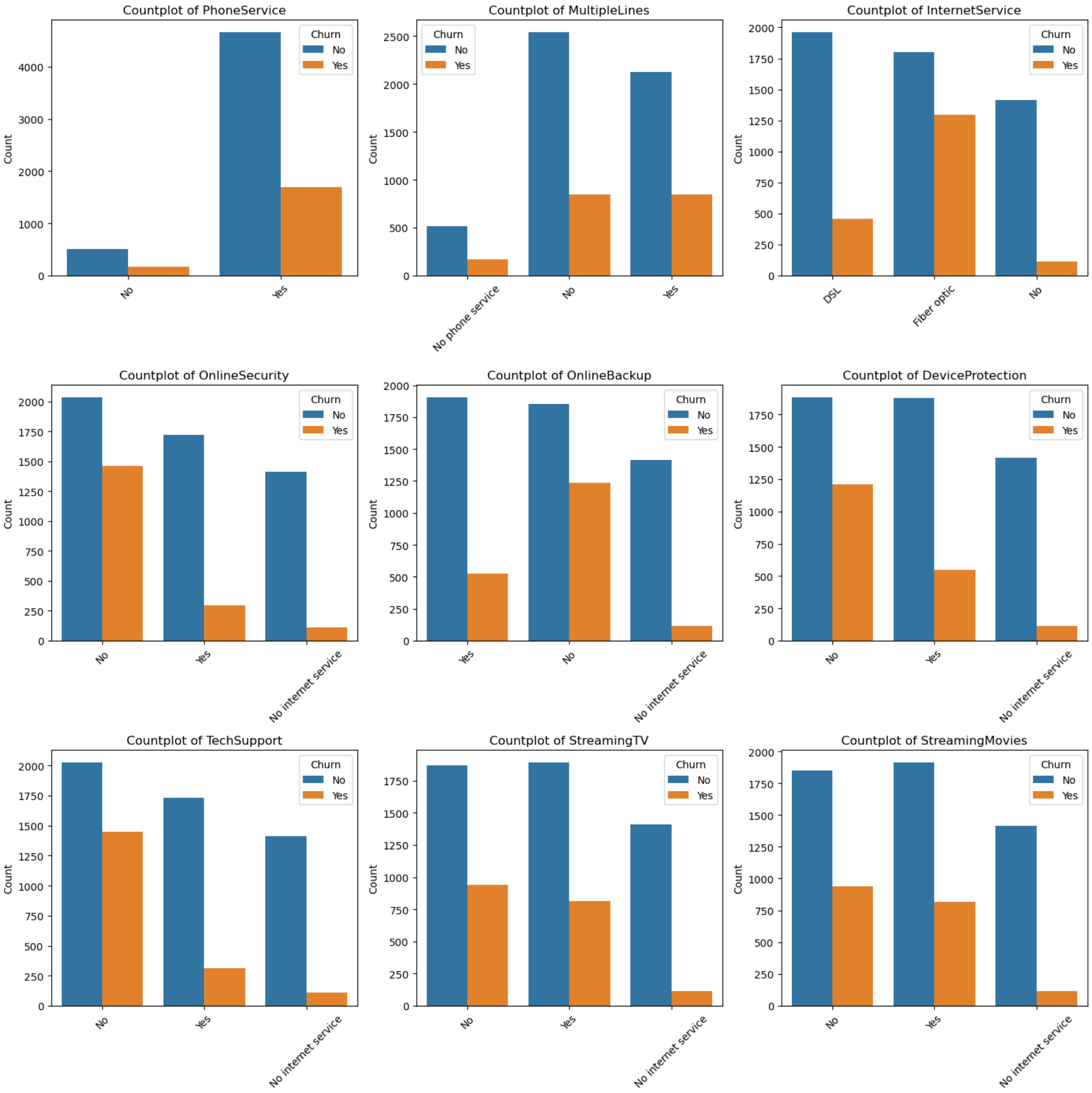
```
plt.figure(figsize = (4,4))
ax = sns.countplot(x = "Contract",data = df,hue = "Churn")
ax.bar_label(ax.containers[0])
plt.title("Count of Customers by Contract")
plt.show()
```



People who have month to month contract are likely to churn than from those who have 1 or 2 years of contract

```
# Columns to visualize
categorical_columns = ['PhoneService', 'MultipleLines',
'InternetService',
                       'OnlineSecurity', 'OnlineBackup',
'DeviceProtection',
                       'TechSupport', 'StreamingTV',
'StreamingMovies']

# Set up subplots
num_cols = 3
num_rows = (len(categorical_columns) + num_cols - 1) // num_cols

fig, axes = plt.subplots(num_rows, num_cols, figsize=(15, 5 *
num_rows))
axes = axes.flatten()

# Define custom colors
```

```python
custom_palette = {"No": "#1f77b4", "Yes": "#ff7f0e"}  # Blue for "No",
Orange for "Yes"

# Plot countplots with hue = 'Churn'
for i, col in enumerate(categorical_columns):
    sns.countplot(data=df, x=col, hue="Churn", ax=axes[i],
palette=custom_palette)
    axes[i].set_title(f"Countplot of {col}")
    axes[i].set_xlabel("")
    axes[i].set_ylabel("Count")
    axes[i].tick_params(axis='x', rotation=45)

# Hide empty subplots
for j in range(i + 1, len(axes)):
    fig.delaxes(axes[j])

plt.tight_layout()
plt.show()
```


Countplot of PhoneService
Churn
🟦 No
🟧 Yes
Count
0
1000
2000
3000
4000
No
Yes
Countplot of MultipleLines
Churn
🟦 No
🟧 Yes
Count
0
500
1000
1500
2000
2500
No phone service
No
Yes
Countplot of InternetService
Churn
🟦 No
🟧 Yes
Count
0
250
500
750
1000
1250
1500
1750
2000
DSL
Fiber optic
No
Countplot of OnlineSecurity
Churn
🟦 No
🟧 Yes
Count
0
250
500
750
1000
1250
1500
1750
2000
No
Yes
No internet service
Countplot of OnlineBackup
Churn
🟦 No
🟧 Yes
Count
0
250
500
750
1000
1250
1500
1750
2000
Yes
No
No internet service
Countplot of DeviceProtection
Churn
🟦 No
🟧 Yes
Count
0
250
500
750
1000
1250
1500
1750
No
Yes
No internet service
Countplot of TechSupport
Churn
🟦 No
🟧 Yes
Count
0
250
500
750
1000
1250
1500
1750
2000
No
Yes
No internet service
Countplot of StreamingTV
Churn
🟦 No
🟧 Yes
Count
0
250
500
750
1000
1250
1500
1750
No
Yes
No internet service
Countplot of StreamingMovies
Churn
🟦 No
🟧 Yes
Count
0
250
500
750
1000
1250
1500
1750
2000
No
Yes
No internet service