```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
df= pd.read csv("Telco-Customer-Churn.csv")
df
                            SeniorCitizen Partner Dependents tenure \
      customerID
                   gender
0
      7590 - VHVEG
                   Female
                                               Yes
                                                            No
                                                                      1
1
      5575 - GNVDE
                     Male
                                         0
                                                            No
                                                                     34
                                                No
2
                                         0
                                                                      2
      3668-QPYBK
                     Male
                                                No
                                                            No
3
      7795 - CFOCW
                     Male
                                         0
                                                            No
                                                                     45
                                                No
4
      9237-HQITU
                                         0
                                                                      2
                  Female
                                                No
                                                            No
                                               . . .
                                                           . . .
      6840-RESVB
7038
                                         0
                                                                     24
                     Male
                                               Yes
                                                           Yes
7039
      2234-XADUH
                                                                     72
                  Female
                                         0
                                               Yes
                                                           Yes
7040
      4801-JZAZL
                   Female
                                         0
                                                           Yes
                                                                     11
                                               Yes
7041
      8361-LTMKD
                                         1
                                                                     4
                     Male
                                               Yes
                                                            No
7042 3186-AJIEK
                     Male
                                         0
                                                No
                                                            No
                                                                     66
                       MultipleLines InternetService
     PhoneService
OnlineSecurity
0
                No
                    No phone service
                                                   DSL
No
                                                   DSL
1
               Yes
                                   No
Yes
2
               Yes
                                   No
                                                   DSL
Yes
                    No phone service
3
                No
                                                   DSL
Yes
                                           Fiber optic
4
               Yes
                                   No
No
. . .
7038
               Yes
                                                   DSL
                                  Yes
Yes
                                           Fiber optic
7039
               Yes
                                  Yes
No
   . . .
                                                   DSL
7040
                No
                    No phone service
Yes
                                           Fiber optic
7041
               Yes
                                  Yes
No ...
7042
               Yes
                                           Fiber optic
                                   No
Yes ...
     DeviceProtection TechSupport StreamingTV StreamingMovies
Contract \
                    No
                                 No
                                              No
                                                               No
                                                                   Month-
to-month
```

1 0no voor	Yes	No	No	No
One year 2	No	No	No	No Month-
to-month	140	140	140	NO HOHEH
3	Yes	Yes	No	No
One year				
4	No	No	No	No Month-
to-month				
7038	Yes	Yes	Yes	Yes
One year	165	165	162	162
7039	Yes	No	Yes	Yes
One year				
7040	No	No	No	No Month-
to-month				
7041	No	No	No	No Month-
to-month	.,		.,	V
7042	Yes	Yes	Yes	Yes
Two year				
Paperles	sBillina	Pavr	nentMethod Mon	thlvCharges
TotalCharges				g
0	Yes	Electro	onic check	29.85
29.85				
1	No	Mai	iled check	56.95
1889.5	V	M = 3	the decade	F2 0F
2 108.15	Yes	Mai	iled check	53.85
3	No E	Bank transfer (a	automatic)	42.30
1840.75	110 1	din cransici (c	ad coma cic,	72130
4	Yes	Electro	onic check	70.70
151.65				
7038	Yes	Mai	iled check	84.80
1990.5 7039	Yes	Credit card (a	outomatic)	103.20
7362.9	162	Clear Cala (a	du comacic,	103.20
7040	Yes	Flectro	onic check	29.60
346.45	. 05	21001.1	med direct	25.00
7041	Yes	Mai	iled check	74.40
306.6				
7042	Yes E	Bank transfer (a	automatic)	105.65
6844.5				
Churn				
0 No				
1 No				

```
2
       Yes
3
        No
4
       Yes
       . . .
7038
        No
7039
        No
7040
        No
7041
       Yes
7042
        No
[7043 rows x 21 columns]
df.head()
   customerID gender SeniorCitizen Partner Dependents tenure
PhoneService \
  7590-VHVEG Female
                                          Yes
                                                       No
                                                                1
No
1 5575-GNVDE
                 Male
                                    0
                                           No
                                                       No
                                                               34
Yes
2 3668-QPYBK
                                                                2
                 Male
                                           No
                                                       No
Yes
3 7795-CF0CW
                 Male
                                           No
                                                       No
                                                               45
No
4 9237-HQITU Female
                                           No
                                                       No
                                                                2
Yes
      MultipleLines InternetService OnlineSecurity ...
DeviceProtection \
0 No phone service
                                 DSL
                                                  No
No
                                 DSL
1
                 No
                                                 Yes ...
Yes
2
                 No
                                 DSL
                                                 Yes
No
3 No phone service
                                 DSL
                                                 Yes ...
Yes
                         Fiber optic
4
                 No
                                                  No ...
No
  TechSupport StreamingTV StreamingMovies
                                                   Contract
PaperlessBilling \
                                            Month-to-month
           No
                        No
                                        No
Yes
1
           No
                        No
                                        No
                                                   One year
No
                                            Month-to-month
2
           No
                        No
                                        No
Yes
3
          Yes
                        No
                                        No
                                                   One year
No
```

```
4
           No
                        No
                                             Month-to-month
                                         No
Yes
               PaymentMethod MonthlyCharges
                                               TotalCharges Churn
0
            Electronic check
                                        29.85
                                                      29.85
                                                                No
1
                Mailed check
                                        56.95
                                                     1889.5
                                                                No
2
                                        53.85
                                                     108.15
                Mailed check
                                                               Yes
3
   Bank transfer (automatic)
                                       42.30
                                                    1840.75
                                                                No
                                       70.70
                                                     151.65
            Electronic check
                                                               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
                        7043 non-null
                                         object
     aender
 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
                        7043 non-null
     PhoneService
                                         object
 7
                                         object
     MultipleLines
                        7043 non-null
 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
                        7043 non-null
    StreamingTV
                                         object
 14
    StreamingMovies
                        7043 non-null
                                         object
 15
                        7043 non-null
                                         object
    Contract
 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
                        7043 non-null
     Churn
                                         object
dtypes: float64(1), int64(2), object(18)
memory usage: 1.1+ MB
#Replace Blank spaces with NAN(Zero) in Total Charges as Tenure(of
recently joined people) is Zero
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
                        7043 non-null
                                         object
     customerID
 1
                                         object
     gender
                        7043 non-null
 2
     SeniorCitizen
                        7043 non-null
                                         int64
 3
                        7043 non-null
     Partner
                                         object
 4
     Dependents
                        7043 non-null
                                         object
 5
                        7043 non-null
                                         int64
     tenure
 6
     PhoneService
                        7043 non-null
                                         object
 7
                        7043 non-null
     MultipleLines
                                         object
 8
     InternetService
                        7043 non-null
                                         object
 9
     OnlineSecurity
                        7043 non-null
                                         object
 10
                        7043 non-null
     OnlineBackup
                                         object
 11
     DeviceProtection
                        7043 non-null
                                         object
                        7043 non-null
 12
    TechSupport
                                         object
 13
    StreamingTV
                        7043 non-null
                                         object
 14 StreamingMovies
                        7043 non-null
                                         obiect
 15
    Contract
                        7043 non-null
                                         object
 16 PaperlessBilling
                        7043 non-null
                                         object
                        7043 non-null
 17
     PaymentMethod
                                         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()
                     0
customerID
                     0
gender
SeniorCitizen
                     0
Partner
                     0
                     0
Dependents
                     0
tenure
                     0
PhoneService
MultipleLines
                     0
                     0
InternetService
OnlineSecurity
                     0
OnlineBackup
                     0
DeviceProtection
                     0
                     0
TechSupport
StreamingTV
                     0
StreamingMovies
                     0
                     0
Contract
PaperlessBilling
                     0
PaymentMethod
                     0
MonthlyCharges
                     0
```

```
TotalCharges
                     0
                     0
Churn
dtype: int64
df.describe()
       SeniorCitizen
                                    MonthlyCharges
                                                      TotalCharges
                            tenure
         7043.000000
                                        7043.000000
                                                       7043.000000
count
                       7043.000000
mean
            0.162147
                         32.371149
                                          64.761692
                                                       2279.734304
            0.368612
                         24.559481
                                                       2266.794470
std
                                          30.090047
                                                          0.000000
min
            0.000000
                          0.000000
                                          18.250000
            0.000000
                          9.000000
                                          35.500000
                                                        398.550000
25%
50%
                         29.000000
                                          70.350000
                                                       1394.550000
            0.000000
75%
            0.000000
                         55.000000
                                          89.850000
                                                       3786,600000
            1.000000
                         72,000000
                                         118.750000
                                                       8684.800000
max
df.duplicated().sum()
0
#Check for Special Column which not have any duplicate value for sure
df["customerID"].duplicated().sum()
0
#In Senior Citizen column replace 0 with No and 1 with yes
def conv(value):
    if value==0:
        return "No"
    else:
        return "Yes"
df["SeniorCitizen"]=df["SeniorCitizen"].apply(conv)
df.head(21)
    customerID
                gender SeniorCitizen Partner Dependents tenure
PhoneService \
    7590 - VHVEG
                Female
                                    No
                                           Yes
                                                        No
                                                                 1
No
1
    5575 - GNVDE
                  Male
                                    No
                                            No
                                                        No
                                                                34
Yes
2
    3668-QPYBK
                  Male
                                            No
                                                        No
                                                                 2
                                    No
Yes
3
    7795 - CFOCW
                  Male
                                            No
                                                        No
                                                                45
                                    No
No
    9237-HQITU
                Female
                                            No
                                                        No
                                                                 2
4
                                    No
Yes
5
    9305 - CDSKC
                Female
                                    No
                                            No
                                                        No
                                                                 8
Yes
    1452-KI0VK
                                            No
                                                                22
6
                  Male
                                    No
                                                       Yes
Yes
```

7 No	6713-0K0MC	Female	No	No	No	10
8	7892-P00KP	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-W0FKT	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						
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	Multiple No phone se No phone se	rvice No No rvice No Yes Yes rvice Yes No No No Yes Yes No No Yes No	rernetService DSL DSL DSL Fiber optic Fiber optic Fiber optic DSL Fiber optic DSL No Fiber optic	No internet	No No Yes Yes t service	
17 18		Yes No	Fiber optic DSL		Yes No	

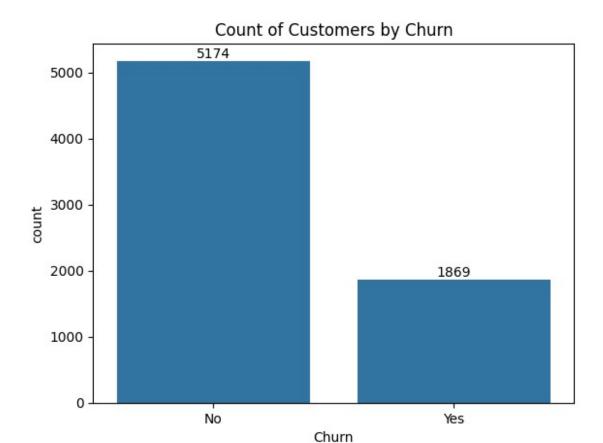
19			No	Fiber optic	No	
20	No	phone ser	rvice	DSL	No	
		DevicePro	otoction	TachSupport	C+roomingTV	\
0		Devicerio	No	TechSupport No	StreamingTV No	\
1			Yes	No	No	
2			No	No	No	
			Yes	Yes	No	
3 4			No	No	No	
			Yes	No	Yes	
5 6			No	No	Yes	
7			No	No	No	
8			Yes	Yes	Yes	
9			No	No	No	
10			No	No	No	
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		No internet service	No internet service	
17			Yes	No	Yes	
18			Yes	Yes	No	
19			Yes	No	No	
20			Yes	No	No	
		Streamin	naMovies	Contract Paper	rlessBillina \	
Θ		Streamin	ngMovies No	Contract Paper Month-to-month	rlessBilling \ Yes	
0 1		Streamin		Month-to-month		
1 2		Streamin	No		Yes	
1 2 3		Streamin	No No	Month-to-month One year	Yes No	
1 2 3 4		Streamin	No No No	Month-to-month One year Month-to-month	Yes No Yes	
1 2 3 4 5		Streamin	No No No No No Yes	Month-to-month One year Month-to-month One year Month-to-month Month-to-month	Yes No Yes No Yes Yes	
1 2 3 4 5 6		Streamin	No No No No No Yes No	Month-to-month One year Month-to-month One year Month-to-month Month-to-month Month-to-month	Yes No Yes No Yes Yes Yes	
1 2 3 4 5 6 7		Streamin	No No No No Yes No	Month-to-month One year Month-to-month One year Month-to-month Month-to-month Month-to-month Month-to-month	Yes No Yes No Yes Yes Yes No	
1 2 3 4 5 6 7 8		Streamin	No No No No Yes No No Yes	Month-to-month One year Month-to-month One year Month-to-month Month-to-month Month-to-month Month-to-month Month-to-month	Yes No Yes No Yes Yes Yes No Yes	
1 2 3 4 5 6 7 8		Streamin	No No No No Yes No No Yes	Month-to-month One year Month-to-month One year Month-to-month Month-to-month Month-to-month Month-to-month Month-to-month One year	Yes No Yes No Yes Yes No Yes No	
1 2 3 4 5 6 7 8 9 10	Ma		No No No No Yes No No Yes No	Month-to-month One year Month-to-month One year Month-to-month Month-to-month Month-to-month Month-to-month One year Month-to-month	Yes No Yes No Yes Yes No Yes No Yes	
1 2 3 4 5 6 7 8 9 10 11	No	Streamin	No No No No Yes No Yes No Service	Month-to-month One year Month-to-month One year Month-to-month Month-to-month Month-to-month Month-to-month One year Month-to-month Two year	Yes No Yes No Yes Yes Yes Yes No Yes No Yes No Yes No	
1 2 3 4 5 6 7 8 9 10 11 12	No		No No No No Yes No No Yes No No service Yes	Month-to-month One year Month-to-month One year Month-to-month Month-to-month Month-to-month Month-to-month One year Month-to-month Two year One year	Yes No Yes No Yes Yes Yes Yes No Yes No Yes No Yes No Yes No Yos	
1 2 3 4 5 6 7 8 9 10 11 12 13	No		No No No No Yes No No Yes No Service Yes Yes	Month-to-month One year Month-to-month One year Month-to-month Month-to-month Month-to-month Month-to-month One year Month-to-month Two year One year Month-to-month	Yes No Yes No Yes Yes Yes Yes Yes No Yes No Yes No Yes No Yes No Yes	
1 2 3 4 5 6 7 8 9 10 11 12 13 14	No		No No No No Yes No No Yes No service Yes Yes	Month-to-month One year Month-to-month One year Month-to-month Month-to-month Month-to-month Month-to-month One year Month-to-month Two year One year Month-to-month Month-to-month	Yes No Yes No Yes Yes Yes Yes No Yes No Yes No Yes No Yes No Yes No Yes	
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15		internet	No No No No Yes No No Service Yes Yes Yes	Month-to-month One year Month-to-month One year Month-to-month Month-to-month Month-to-month Month-to-month One year Month-to-month Two year One year Month-to-month Month-to-month Two year Month-to-month Month-to-month Two year	Yes No Yes No Yes Yes Yes Yes No Yes No Yes No Yes No Yes No Yes No No Yes	
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16			No No No No Yes No No Yes No service Yes Yes Yes service	Month-to-month One year Month-to-month One year Month-to-month Month-to-month Month-to-month Month-to-month One year Month-to-month Two year One year Month-to-month Month-to-month Two year One year One year One year One year	Yes No Yes No Yes Yes Yes Yes No Yes No Yes No Yes No Yes No No Yes No No No Yes	
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17		internet	No No No No No Yes No No Yes No Service Yes Yes Yes Yes Service Yes	Month-to-month One year Month-to-month One year Month-to-month Month-to-month Month-to-month Month-to-month One year Month-to-month Two year One year Month-to-month Month-to-month Two year One year Month-to-month Two year One year Two year	Yes No Yes No Yes Yes Yes Yes No Yes No Yes No Yes No No Yes No No No Yes No No No No No No	
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18		internet	No No No No Yes No No Yes No service Yes Yes Yes service	Month-to-month One year Month-to-month One year Month-to-month Month-to-month Month-to-month Month-to-month One year Month-to-month Two year One year Month-to-month Month-to-month Two year One year One year One year One year	Yes No Yes No Yes Yes Yes Yes No Yes No Yes No Yes No No No No Yes No No No No No No No No	
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17		internet	No No No No No Yes No No Service Yes Yes Yes Yes Service Yes No No	Month-to-month One year Month-to-month One year Month-to-month Month-to-month Month-to-month Month-to-month One year Month-to-month Two year One year Month-to-month Month-to-month Two year One year Month-to-month Two year One year Month-to-month Two year One year Month-to-month	Yes No Yes No Yes Yes Yes Yes No Yes No Yes No Yes No No Yes No No No Yes No No No No No No	
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19		internet	No No No No No Yes No No Service Yes Yes Yes Service Yes No Yes Yes	Month-to-month One year Month-to-month One year Month-to-month Month-to-month Month-to-month Month-to-month One year Month-to-month Two year One year Month-to-month Month-to-month Two year One year Two year Two year Month-to-month Month-to-month Month-to-month Month-to-month Month-to-month	Yes No Yes No Yes Yes Yes Yes No Yes No Yes No No No Yes Yes No No Yes Yes No	
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19		internet	No No No No No Yes No No Service Yes Yes Yes Service Yes No Yes Yes	Month-to-month One year Month-to-month One year Month-to-month Month-to-month Month-to-month Month-to-month One year Month-to-month Two year One year Month-to-month Month-to-month Two year One year Two year One year Month-to-month Two year One year	Yes No Yes No Yes Yes Yes Yes No Yes No Yes No Yes No No No No Yes No No Yes No No Yes	

```
0
              Electronic check
                                          29.85
                                                         29.85
                                                                    No
1
                  Mailed check
                                          56.95
                                                       1889.50
                                                                    No
2
                                          53.85
                  Mailed check
                                                        108.15
                                                                   Yes
3
                                          42.30
                                                       1840.75
    Bank transfer (automatic)
                                                                    No
4
              Electronic check
                                          70.70
                                                        151.65
                                                                   Yes
5
                                          99.65
                                                        820,50
              Electronic check
                                                                   Yes
6
                                          89.10
                                                       1949.40
      Credit card (automatic)
                                                                    No
7
                  Mailed check
                                          29.75
                                                        301.90
                                                                    No
8
              Electronic check
                                         104.80
                                                       3046.05
                                                                   Yes
9
    Bank transfer (automatic)
                                          56.15
                                                       3487.95
                                                                    No
10
                                          49.95
                                                        587.45
                  Mailed check
                                                                    No
                                          18.95
                                                        326.80
11
      Credit card (automatic)
                                                                    No
12
      Credit card (automatic)
                                         100.35
                                                       5681.10
                                                                    No
13
    Bank transfer (automatic)
                                         103.70
                                                       5036.30
                                                                   Yes
14
              Electronic check
                                         105.50
                                                       2686.05
                                                                    No
15
      Credit card (automatic)
                                         113.25
                                                       7895.15
                                                                    No
                                          20.65
                                                       1022.95
16
                  Mailed check
                                                                    No
17
    Bank transfer (automatic)
                                         106.70
                                                       7382.25
                                                                    No
18
      Credit card (automatic)
                                          55.20
                                                        528.35
                                                                   Yes
19
              Electronic check
                                          90.05
                                                       1862.90
                                                                    No
20
              Electronic check
                                          39.65
                                                         39.65
                                                                   Yes
```

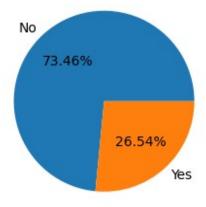
[21 rows x 21 columns]

```
#count of Churn People
```

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



Percentage of Churned Customers

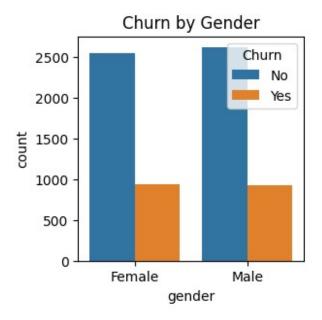


#In this way we have 26.54% of Customers who were Churn out. Now let's Find out the reason behind it!

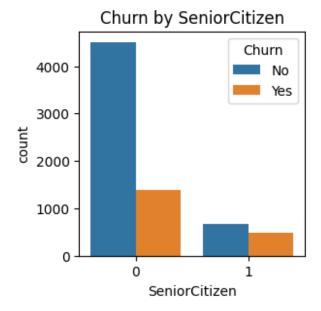
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
df= pd.read csv("Telco-Customer-Churn.csv")
df
                           SeniorCitizen Partner Dependents
      customerID
                   gender
                                                                tenure \
0
      7590 - VHVEG
                  Female
                                        0
                                               Yes
                                                            No
                                                                     1
1
                     Male
                                        0
      5575 - GNVDE
                                                No
                                                            No
                                                                     34
2
                                        0
                                                                     2
      3668-0PYBK
                     Male
                                                No
                                                            No
3
      7795-CF0CW
                     Male
                                        0
                                                No
                                                            No
                                                                     45
4
      9237-HQITU
                                        0
                                                                     2
                  Female
                                                No
                                                            No
                                               . . .
                                                           . . .
                                                                    . . .
7038
      6840-RESVB
                     Male
                                        0
                                               Yes
                                                           Yes
                                                                     24
                                                                     72
7039
      2234-XADUH
                  Female
                                        0
                                               Yes
                                                           Yes
7040 4801-JZAZL
                                        0
                                                                     11
                   Female
                                               Yes
                                                           Yes
7041
      8361-LTMKD
                     Male
                                         1
                                                                     4
                                               Yes
                                                            No
7042 3186-AJIEK
                     Male
                                                No
                                                            No
                                                                     66
                       MultipleLines InternetService
     PhoneService
OnlineSecurity
0
                    No phone service
                                                   DSL
                No
No
1
               Yes
                                   No
                                                   DSL
Yes
     . . .
2
               Yes
                                   No
                                                   DSL
Yes
     . . .
3
                No
                    No phone service
                                                   DSL
Yes
```

4 No	Yes	No	Fiber	optic	
NO					
7038	Yes	Yes		DSL	
Yes	ies	ies		νsL	
7039	Yes	Yes	Fiber	optic	
No 7040	No No	phone service		DSL	
Yes					
7041 No	Yes	Yes	Fiber	optic	
NO 7042	Yes	No	Fiber	optic	
Yes					
		TechSupport St	treamingTV	StreamingMovies	
Contract \	No	No	No	No	Month-
to-month					
1 One year	Yes	No	No	No	
2	No	No	No	No	Month-
to-month 3	Yes	Yes	No	No	
One year	163	163	NO	NO	
4	No	No	No	No	Month-
to-month					
			.,		
7038 One year	Yes	Yes	Yes	Yes	
7039	Yes	No	Yes	Yes	
One year 7040	No	No	No	No	Month-
to-month	NO	NO	INO	NO	MOTICIT-
7041	No	No	No	No	Month-
to-month 7042	Yes	Yes	Yes	Yes	
Two year					
•	essBilling.	ſ	PaymentMeth	nod MonthlyCharge	S
TotalCharge 0	es \ Yes	Elo	ctronic che	eck 29.8	5
29.85	162	Ltet	CTIONITE CHE	Z9.0	5
1	No		Mailed che	eck 56.9	5
1889.5 2	Yes		Mailed che	eck 53.8	5
108.15		D 1 1 5			
3	No	Bank transfe	r (automati	.c) 42.3	0

```
1840.75
                                  Electronic check
                                                             70.70
4
                   Yes
151.65
                                                                . . .
. . .
. . .
7038
                                      Mailed check
                   Yes
                                                             84.80
1990.5
7039
                   Yes
                          Credit card (automatic)
                                                            103.20
7362.9
7040
                   Yes
                                  Electronic check
                                                             29.60
346.45
7041
                   Yes
                                      Mailed check
                                                             74.40
306.6
7042
                   Yes Bank transfer (automatic)
                                                            105.65
6844.5
     Churn
0
        No
1
        No
2
       Yes
3
        No
4
       Yes
       . . .
. . .
7038
        No
7039
        No
7040
        No
7041
       Yes
7042
        No
[7043 rows x 21 columns]
plt.figure(figsize=(3,3))
sns.countplot(x="gender",data=df,hue='Churn')
plt.title("Churn by Gender")
plt.show()
```

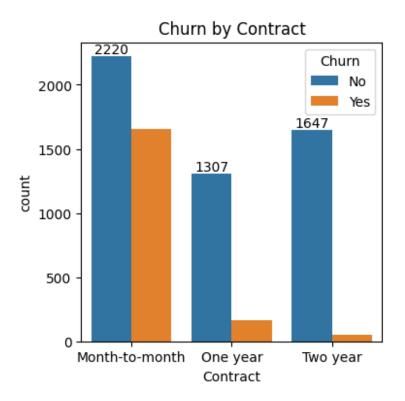


```
plt.figure(figsize=(3,3))
sns.countplot(x="SeniorCitizen",data=df,hue='Churn')
plt.title("Churn by SeniorCitizen")
plt.show()
```



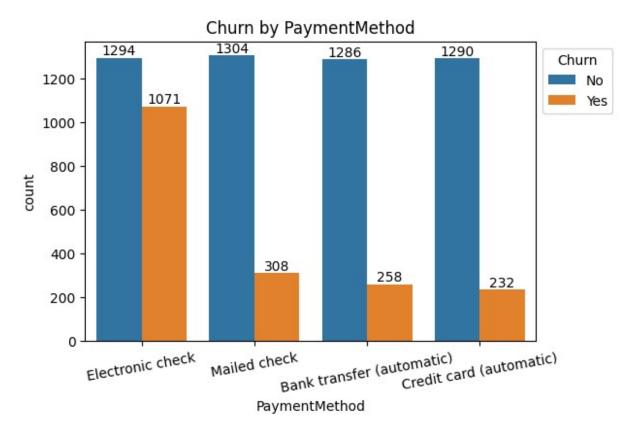
#Here we see the percentage of Churn out of SeniorCitizen is More.

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



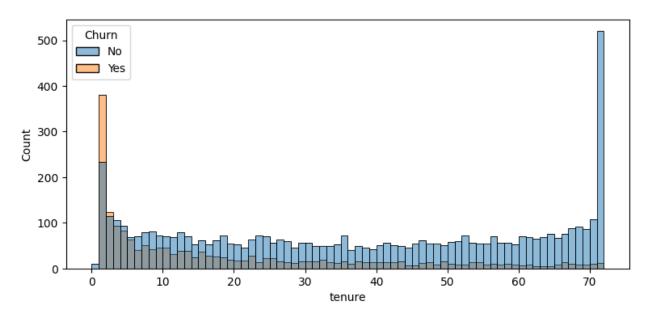
#People who have month-to-month contract have likely to churn than the people who have two or three years of contract.

```
plt.figure(figsize=(6,4))
ax=sns.countplot(x="PaymentMethod",data=df,hue='Churn')
ax.bar_label(ax.containers[0])
ax.bar_label(ax.containers[1])
plt.title("Churn by PaymentMethod")
plt.legend(title="Churn",bbox_to_anchor=(1,1))
plt.xticks(rotation=10)
plt.show()
```



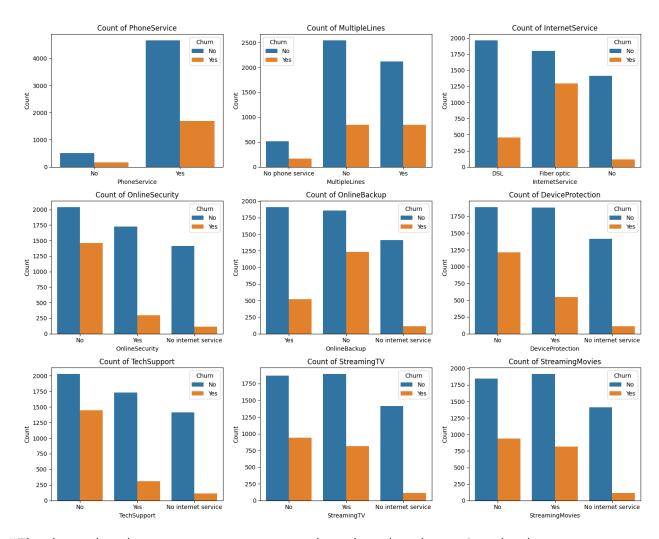
#Hence we said the customer is likely to be Churn when they are using the payment method of Electronic Check

```
plt.figure(figsize=(9,4))
sns.histplot(x="tenure",data=df,bins=72,hue="Churn")
plt.show()
```



#From this we can say the people who were use our sevices more than one month be stayed with us or other people were churned out within a Month.

```
df.columns.values
array(['customerID', 'gender', 'SeniorCitizen', 'Partner',
'Dependents',
       'tenure', 'PhoneService', 'MultipleLines', 'InternetService',
       'OnlineSecurity', 'OnlineBackup', 'DeviceProtection',
       'TechSupport', 'StreamingTV', 'StreamingMovies', 'Contract',
       'PaperlessBilling', 'PaymentMethod', 'MonthlyCharges',
       'TotalCharges', 'Churn'], dtype=object)
columns = [
    'PhoneService', 'MultipleLines', 'InternetService', 'OnlineSecurity', 'OnlineBackup', 'DeviceProtection',
    'TechSupport', 'StreamingTV', 'StreamingMovies'
n cols = 3
n rows = (len(columns) + n cols - 1) // n cols
fig, axes = plt.subplots(n rows, n cols, figsize=(15, n rows * 4))
axes = axes.flatten()
for i, column in enumerate(columns):
    sns.countplot(x=column, data=df, ax=axes[i] , hue=df["Churn"])
    axes[i].set title(f"Count of {column}")
    axes[i].set xlabel(column)
    axes[i].set ylabel('Count')
plt.tight layout()
plt.show()
```



#The charts show how many customers stay or leave based on the services they have. Customers without services like OnlineSecurity, TechSupport, and DeviceProtection tend to leave more often. Services like StreamingTV and StreamingMovies show similar patterns, with fewer services often leading to more customers leaving.