```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
df = pd.read csv('Customer Churn.csv')
df.head()
   customerID gender SeniorCitizen Partner Dependents tenure
PhoneService \
  7590-VHVEG Female
                                         Yes
                                                               1
                                                      No
No
1 5575-GNVDE
                 Male
                                           No
                                                      No
                                                              34
Yes
2
  3668-QPYBK
                                                               2
                 Male
                                           No
                                                      No
Yes
                                          No
                                                              45
3 7795-CF0CW
                 Male
                                                      No
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
                                DSL
                                                Yes ...
3 No phone service
Yes
4
                        Fiber optic
                 No
                                                 No ...
No
  TechSupport StreamingTV StreamingMovies
                                                  Contract
PaperlessBilling \
           No
                       No
                                       No
                                           Month-to-month
Yes
1
           No
                       No
                                       No
                                                  One year
No
2
           No
                       No
                                           Month-to-month
                                       No
Yes
3
          Yes
                       No
                                       No
                                                  One year
No
                                           Month-to-month
4
           No
                       No
                                       No
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
                        7043 non-null
     Partner
                                        object
4
                        7043 non-null
                                        object
     Dependents
 5
     tenure
                        7043 non-null
                                        int64
 6
                        7043 non-null
     PhoneService
                                        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
                                        object
                        7043 non-null
 14 StreamingMovies
                        7043 non-null
                                        object
 15 Contract
                        7043 non-null
                                        object
                        7043 non-null
 16 PaperlessBilling
                                        object
 17
     PaymentMethod
                        7043 non-null
                                        object
 18 MonthlyCharges
                        7043 non-null
                                        float64
 19
    TotalCharges
                        7043 non-null
                                        object
                        7043 non-null
20 Churn
                                        object
dtypes: float64(1), int64(2), object(18)
memory usage: 1.1+ MB
#replacing blanks with 0 as a tenure and no total charges 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
- - -
     - - - - - -
                        7043 non-null
 0
     customerID
                                        object
 1
     gender
                        7043 non-null
                                        object
```

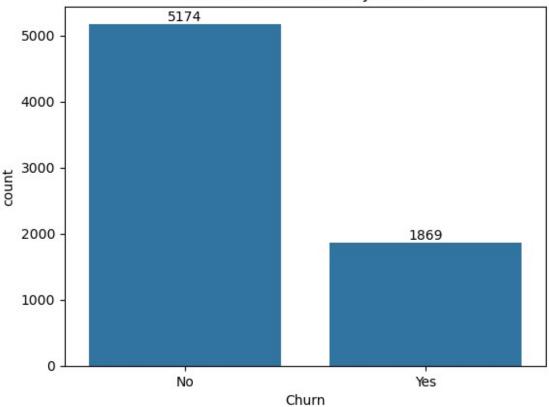
```
2
                        7043 non-null
                                        int64
     SeniorCitizen
 3
     Partner
                        7043 non-null
                                        object
 4
     Dependents
                        7043 non-null
                                        object
 5
     tenure
                        7043 non-null
                                        int64
 6
     PhoneService
                        7043 non-null
                                        object
 7
     MultipleLines
                        7043 non-null
                                        object
                                        object
 8
     InternetService
                        7043 non-null
 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
    Contract
 15
                        7043 non-null
                                        object
 16 PaperlessBilling
                        7043 non-null
                                        object
     PaymentMethod
                        7043 non-null
 17
                                        object
 18 MonthlyCharges
                        7043 non-null
                                        float64
    TotalCharges
 19
                        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
                      7043.000000
                                       7043.000000
                                                      7043.000000
count
         7043.000000
            0.162147
                         32.371149
                                         64.761692
                                                      2279.734304
mean
            0.368612
                         24.559481
                                         30.090047
                                                      2266.794470
std
            0.000000
                          0.000000
                                         18.250000
                                                         0.000000
min
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
            1.000000
                         72,000000
                                        118.750000
                                                      8684.800000
max
df["customerID"].duplicated().sum()
0
#converted 0 and 1 values of senior citizens 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)
```

PhoneService \ 0 7590-VHVEG Female \ no Yes No \ No \ No \ 1 5575-GNVDE Male \ no No No No 36 Yes \ 2 3668-QPYBK Male \ no No No No No Yes 3 7795-CFOCW Male \ no No No No No Yes 3 7795-CFOCW Male \ no No No No No Yes 5 9305-CDSKC Female \ no No No No No Yes 5 9305-CDSKC Female \ no No No No Yes 6 1452-KIOVK Male \ no No No Yes 22 Yes 6 1452-KIOVK Male \ no No No No No 16 No							
PhoneService 0 7590-VHVEG Female no Yes No	df.h	nead( <mark>20</mark> )					
0         7590-VHVEG         Female         no         Yes         No           No         1         5575-GNVDE         Male         no         No         No         30           Yes         2         3668-QPYBK         Male         no         No         No         A           Yes         3         7795-CFOCW         Male         no         No         No         A           No         4         9237-HQITU         Female         no         No         No         No         Xe           Yes         5         9305-CDSKC         Female         no         No         No         No         Xe         Xe <td>Phor</td> <td></td> <td>gender</td> <td>SeniorCitizen</td> <td>Partner</td> <td>Dependents</td> <td>tenure</td>	Phor		gender	SeniorCitizen	Partner	Dependents	tenure
1 5575-GNVDE Male no No No No 36 Yes 3 3668-QPYBK Male no No No No 36 Yes 3 7795-CFOCW Male no No No No 45 No No	0		Female	no	Yes	No	1
2 3668-QPYBK Male no No No No Yes 7795-CFOCW Male no No No No A4 No	1	5575-GNVDE	Male	no	No	No	34
3 7795-CFOCW Male no No No A4 No 4 9237-HQITU Female no No No No A5 Yes 5 9305-CDSKC Female no No No No A5 Yes 6 1452-KIOVK Male no No No No A5 Yes 7 6713-OKOMC Female no No No No A6 No 8 7892-POOKP Female no Yes No A6 Yes 9 6388-TABGU Male no No Yes 66 Yes 10 9763-GRSKD Male no Yes Yes 11 7469-LKBCI Male no No No No A6 Yes 12 8091-TTVAX Male no Yes No 56 Yes 13 0280-XJGEX Male no No No No A6 Yes 14 5129-JLPIS Male no No No No A6 Yes 16 8191-XWSZG Female no No No No 56 Yes 17 9959-WOFKT Male no No No No 56 Yes 18 4190-MFLUW Female no Yes Yes 16 Yes 19 4183-MYFRB Female no No No No 22 Yes MultipleLines InternetService OnlineSecurity	2	3668-QPYBK	Male	no	No	No	2
4       9237-HQITU       Female       no       No <td>3</td> <td>7795-CF0CW</td> <td>Male</td> <td>no</td> <td>No</td> <td>No</td> <td>45</td>	3	7795-CF0CW	Male	no	No	No	45
5       9305-CDSKC       Female       no       No       No       8         6       1452-KIOVK       Male       no       No       Yes       22         7 es       6713-0KOMC       Female       no       No       No       16         No       8       7892-PO0KP       Female       no       Yes       No       26         Yes       9       6388-TABGU       Male       no       No       Yes       66         Yes       10       9763-GRSKD       Male       no       Yes       Yes       12         10       9763-GRSKD       Male       no       No       No       No       16         Yes       11       7469-LKBCI       Male       no       No       No       10         Yes       12       8091-TTVAX       Male       no       Yes       No       56         12       8091-TTVAX       Male       no       No       No       No       49         Yes       14       5129-JLPIS       Male       no       No       No       No       29         Yes       15       3655-SNQYZ       Female       no       No       No	4	9237-HQITU	Female	no	No	No	2
6 1452-KIOVK Male no No Yes 25 Yes 7 6713-OKOMC Female no No No 16 No 8 7892-POOKP Female no Yes No 26 Yes 9 6388-TABGU Male no No Yes 66 Yes 10 9763-GRSKD Male no Yes Yes 15 Yes 11 7469-LKBCI Male no No No No 16 Yes 12 8091-TTVAX Male no Yes No 56 Yes 13 0280-XJGEX Male no No No No 46 Yes 14 5129-JLPIS Male no No No No 25 Yes 15 3655-SNQYZ Female no Yes Yes 66 Yes 17 9959-WOFKT Male no No No Yes 75 Yes 18 4190-MFLUW Female no Yes Yes 16 Yes 19 4183-MYFRB Female no No No 25 MultipleLines InternetService OnlineSecurity	5	9305-CDSKC	Female	no	No	No	8
7 6713-0KOMC Female no No No No 10 No 8 7892-POOKP Female no Yes No 26 Yes 9 6388-TABGU Male no No Yes 66 Yes 10 9763-GRSKD Male no Yes Yes 1. 7469-LKBCI Male no No No No 16 Yes 12 8091-TTVAX Male no Yes No 56 Yes 13 0280-XJGEX Male no No No No 45 Yes 14 5129-JLPIS Male no No No No 25 Yes 15 3655-SNQYZ Female no Yes Yes 66 Yes 16 8191-XWSZG Female no No No Yes 75 Yes 17 9959-WOFKT Male no No No Yes 75 Yes 18 4190-MFLUW Female no Yes Yes 19 4183-MYFRB Female no No No No 25 Yes 19 4183-MYFRB Female no No No No 25 Yes 19 4183-MYFRB Female no No No No 25 Yes 19 4183-MYFRB Female no No No No 25 Yes 19 4183-MYFRB Female no No No No 25 Yes 19 4183-MYFRB Female no No No No 25 Yes 19 4183-MYFRB Female no No No No 25 Yes 19 4183-MYFRB Female no No No No 25 Yes 19 4183-MYFRB Female no No No No 25 Yes 19 4183-MYFRB Female no No No No 25 Yes 19 4183-MYFRB Female no No No No 25 Yes 19 4183-MYFRB Female no No No No 25 Yes 19 4183-MYFRB Female no No No No 25 Yes 19 4183-MYFRB Female no No No No 25 Yes 19 4183-MYFRB Female no No No No 25 Yes 19 4183-MYFRB Female no No No No 25 Yes 19 4183-MYFRB Female no No No No 25 Yes 19 4183-MYFRB Female no No No No 25 Yes 19 4183-MYFRB Female no No No No 25 Yes 19 4183-MYFRB Female no No No No 25 Yes 19 4183-MYFRB Female no No No No No 25 Yes 19 4183-MYFRB Female no No No No No No No No Yes Yes 19 4183-MYFRB Female no No No No No No No Yes Yes 19 4183-MYFRB Female no No No No No No No Yes Yes 19 4183-MYFRB Female no No No No No No No Yes Yes 19 4183-MYFRB Female no No No No No No No No Yes Yes 19 4183-MYFRB Female no No No No No No No Yes Yes 19 4183-MYFRB Female no	6	1452-KI0VK	Male	no	No	Yes	22
8 7892-POOKP Female no Yes No 26 Yes 9 6388-TABGU Male no No Yes 66 Yes 10 9763-GRSKD Male no Yes Yes 12 Yes 11 7469-LKBCI Male no No No No 16 Yes 12 8091-TTVAX Male no Yes No 56 Yes 13 0280-XJGEX Male no No No No 49 Yes 14 5129-JLPIS Male no No No No 22 Yes 15 3655-SNQYZ Female no Yes Yes 66 Yes 16 8191-XWSZG Female no No No No 55 Yes 17 9959-WOFKT Male no No Yes Yes 18 4190-MFLUW Female no Yes Yes 16 Yes 19 4183-MYFRB Female no No No No 22 Yes  MultipleLines InternetService OnlineSecurity	7	6713-0K0MC	Female	no	No	No	10
9 6388-TABGU Male no No Yes 63 Yes 10 9763-GRSKD Male no Yes Yes 13 Yes 11 7469-LKBCI Male no No No No 16 Yes 12 8091-TTVAX Male no Yes No 56 Yes 13 0280-XJGEX Male no No No No 49 Yes 14 5129-JLPIS Male no No No No 29 Yes 15 3655-SNQYZ Female no Yes Yes 69 Yes 16 8191-XWSZG Female no No No No 56 Yes 17 9959-W0FKT Male no No Yes 76 Yes 18 4190-MFLUW Female no Yes Yes 16 Yes 19 4183-MYFRB Female no No No No 29 Yes  MultipleLines InternetService OnlineSecurity	8	7892-P00KP	Female	no	Yes	No	28
10 9763-GRSKD Male no Yes Yes 13 Yes 11 7469-LKBCI Male no No No 10 Yes 12 8091-TTVAX Male no Yes No 56 Yes 13 0280-XJGEX Male no No No No 49 Yes 14 5129-JLPIS Male no No No No 29 Yes 15 3655-SNQYZ Female no Yes Yes 69 Yes 16 8191-XWSZG Female no No No No 56 Yes 17 9959-W0FKT Male no No Yes 76 Yes 18 4190-MFLUW Female no Yes Yes 10 Yes 19 4183-MYFRB Female no No No No 29 Yes	9	6388-TABGU	Male	no	No	Yes	62
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 No 49 Yes 14 5129-JLPIS Male no No No No 29 Yes 15 3655-SNQYZ Female no Yes Yes 69 Yes 16 8191-XWSZG Female no No No Yes 75 Yes 17 9959-WOFKT Male no No Yes 75 Yes 18 4190-MFLUW Female no Yes Yes 16 Yes 19 4183-MYFRB Female no No No No 22 MultipleLines InternetService OnlineSecurity	10	9763-GRSKD	Male	no	Yes	Yes	13
12 8091-TTVAX Male no Yes No 58 Yes 13 0280-XJGEX Male no No No No 49 Yes 14 5129-JLPIS Male no No No No 29 Yes 15 3655-SNQYZ Female no Yes Yes 69 Yes 16 8191-XWSZG Female no No No No 56 Yes 17 9959-W0FKT Male no No Yes 76 Yes 18 4190-MFLUW Female no Yes Yes 10 Yes 19 4183-MYFRB Female no No No No 20 Yes  MultipleLines InternetService OnlineSecurity	11	7469-LKBCI	Male	no	No	No	16
13 0280-XJGEX Male no No No 49 Yes 14 5129-JLPIS Male no No No No 29 Yes 15 3655-SNQYZ Female no Yes Yes 69 Yes 16 8191-XWSZG Female no No No No 52 Yes 17 9959-WOFKT Male no No Yes 72 Yes 18 4190-MFLUW Female no Yes Yes 19 4183-MYFRB Female no No No No 22 Yes  MultipleLines InternetService OnlineSecurity	12	8091-TTVAX	Male	no	Yes	No	58
14 5129-JLPIS Male no No No 25 Yes 15 3655-SNQYZ Female no Yes Yes 65 Yes 16 8191-XWSZG Female no No No No 55 Yes 17 9959-WOFKT Male no No Yes 75 Yes 18 4190-MFLUW Female no Yes Yes 16 Yes 19 4183-MYFRB Female no No No No 25 Yes  MultipleLines InternetService OnlineSecurity	13	0280-XJGEX	Male	no	No	No	49
15 3655-SNQYZ Female no Yes Yes 69 Yes 16 8191-XWSZG Female no No No Si Yes 17 9959-W0FKT Male no No Yes 7: Yes 18 4190-MFLUW Female no Yes Yes 19 4183-MYFRB Female no No No No 2: Yes  MultipleLines InternetService OnlineSecurity	14	5129-JLPIS	Male	no	No	No	25
16 8191-XWSZG Female no No No 52 Yes 17 9959-WOFKT Male no No Yes 72 Yes 18 4190-MFLUW Female no Yes Yes 10 Yes 19 4183-MYFRB Female no No No 22 Yes  MultipleLines InternetService OnlineSecurity	15	3655-SNQYZ	Female	no	Yes	Yes	69
17 9959-WOFKT Male no No Yes 7: Yes 18 4190-MFLUW Female no Yes Yes 10 Yes 19 4183-MYFRB Female no No No 2: Yes  MultipleLines InternetService OnlineSecurity	16	8191-XWSZG	Female	no	No	No	52
18 4190-MFLUW Female no Yes Yes 10 Yes 19 4183-MYFRB Female no No No 22 Yes  MultipleLines InternetService OnlineSecurity	17	9959-W0FKT	Male	no	No	Yes	71
19 4183-MYFRB Female no No No 22 Yes  MultipleLines InternetService OnlineSecurity	18	4190-MFLUW	Female	no	Yes	Yes	10
·	19	4183-MYFRB	Female	no	No	No	21
1NoDSLYes2NoDSLYes3No phone serviceDSLYes	0 1 2 3	No phone ser	rvice No No	DSL DSL DSL	Or	N Ye Ye	0 S S

```
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
                            Fiber optic
14
                    No
                                                             Yes
15
                   Yes
                            Fiber optic
                                                             Yes
16
                    No
                                      No
                                           No internet service
17
                            Fiber optic
                   Yes
                                                             Yes
18
                    No
                                     DSL
                                                              No
19
                    No
                            Fiber optic
                                                              No
        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
                                                                      Yes
                                               No
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
         StreamingMovies
                                   Contract PaperlessBilling
0
                       No
                            Month-to-month
                                                            Yes
1
                                   One year
                       No
                                                             No
2
                       No
                            Month-to-month
                                                            Yes
3
                       No
                                   One year
                                                             No
4
                            Month-to-month
                       No
                                                            Yes
5
                      Yes
                            Month-to-month
                                                            Yes
6
                            Month-to-month
                       No
                                                            Yes
7
                       No
                            Month-to-month
                                                             No
8
                            Month-to-month
                      Yes
                                                            Yes
```

```
9
                      No
                                                          No
                                 One year
10
                          Month-to-month
                      No
                                                         Yes
11
    No internet service
                                 Two year
                                                          No
12
                                 One year
                                                          No
                     Yes
13
                     Yes
                          Month-to-month
                                                         Yes
14
                     Yes
                          Month-to-month
                                                         Yes
15
                     Yes
                                                          No
                                 Two year
16
    No internet service
                                 One year
                                                          No
17
                     Yes
                                 Two year
                                                          No
18
                      No
                          Month-to-month
                                                          No
19
                     Yes
                          Month-to-month
                                                         Yes
                 PaymentMethod MonthlyCharges
                                                 TotalCharges
                                                                 Churn
0
              Electronic check
                                          29.85
                                                         29.85
                                                                    No
1
                                          56.95
                                                                    No
                  Mailed check
                                                       1889.50
2
                  Mailed check
                                          53.85
                                                        108.15
                                                                   Yes
3
    Bank transfer (automatic)
                                          42.30
                                                       1840.75
                                                                    No
                                                        151.65
4
              Electronic check
                                          70.70
                                                                   Yes
5
              Electronic check
                                          99.65
                                                        820.50
                                                                   Yes
6
                                          89.10
                                                       1949.40
      Credit card (automatic)
                                                                    No
7
                                          29.75
                                                        301.90
                  Mailed check
                                                                    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
                                                        326.80
                                                                    No
12
      Credit card (automatic)
                                         100.35
                                                       5681.10
                                                                    No
                                         103.70
13
    Bank transfer (automatic)
                                                       5036.30
                                                                   Yes
14
              Electronic check
                                         105.50
                                                       2686.05
                                                                    No
15
      Credit card (automatic)
                                                       7895.15
                                         113.25
                                                                    No
                                                       1022.95
16
                  Mailed check
                                          20.65
                                                                    No
17
                                         106.70
    Bank transfer (automatic)
                                                       7382.25
                                                                    No
      Credit card (automatic)
18
                                          55.20
                                                        528.35
                                                                   Yes
19
              Electronic check
                                          90.05
                                                       1862.90
                                                                    No
[20 rows x 21 columns]
ax = sns.countplot(x = 'Churn', data = df)
ax.bar label(ax.containers[0])
plt.title("Count of Customers by Churn")
plt.show()
```

## Count of Customers by Churn

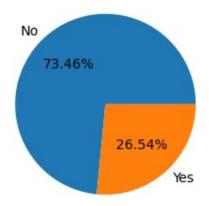


```
gb = df.groupby("Churn").agg({'Churn':"count"})
gb

Churn
Churn
No 5174
Yes 1869

plt.figure(figsize = (3,4))
plt.pie(gb['Churn'], labels = gb.index, autopct = "%1.2f%%")
plt.title("Percentage of Churned Customers", fontsize = 10)
plt.show()
```

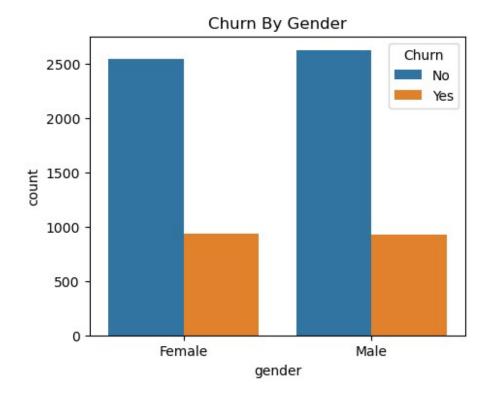
## Percentage of Churned Customers



#from the given pie chart we can conclude that 26.54% of our customers have churned out.

#now lets explore the reason behind it

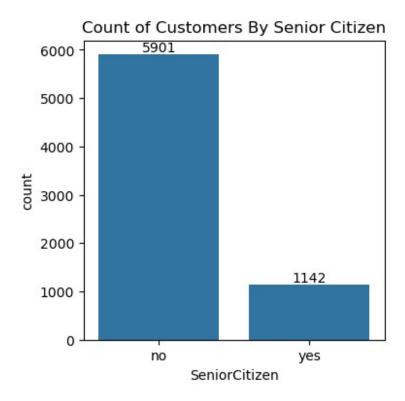
```
plt.figure(figsize = (5,4))
sns.countplot(x = "gender", data=df, hue = "Churn")
plt.title("Churn By Gender")
plt.show()
```



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

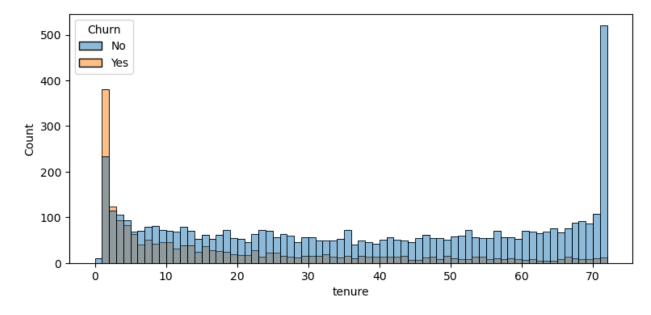
## Churn By SeniorCitizen Churn No Yes No Yes SeniorCitizen

```
plt.figure(figsize = (4,4))
ax = sns.countplot(x = "SeniorCitizen", data=df)
ax.bar_label(ax.containers[0])
plt.title("Count of Customers By Senior Citizen")
plt.show()
```



#comparatively a greater percentage of people in senior citizen category have churnd out.

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



#people who have used our servies for a long time and people who have used our services for 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 hav month to month contract are likey to churn from those who have 1 or 2 yrs of contract

```
# Set up the subplot grid (3 rows, 3 columns for 9 plots)
fig, axes = plt.subplots(nrows=3, ncols=3, figsize=(18, 12))
axes = axes.flatten() # Flatten the 2D array of axes to 1D for easy
looping
# Loop through the columns and create count plots
for i, col in enumerate(cols):
    sns.countplot(data=df, x=col, ax=axes[i], palette="pastel")
    axes[i].set title(f'Count Plot of {col}')
    axes[i].tick params(axis='x', rotation=45)
# Remove any unused subplots (if any)
for j in range(len(cols), len(axes)):
    fig.delaxes(axes[i])
plt.tight layout()
plt.show()
C:\Users\MAINAK\AppData\Local\Temp\ipykernel 4992\1114383419.py:14:
FutureWarning:
Passing `palette` without assigning `hue` is deprecated and will be
removed in v0.14.0. Assign the `x` variable to `hue` and set
`legend=False` for the same effect.
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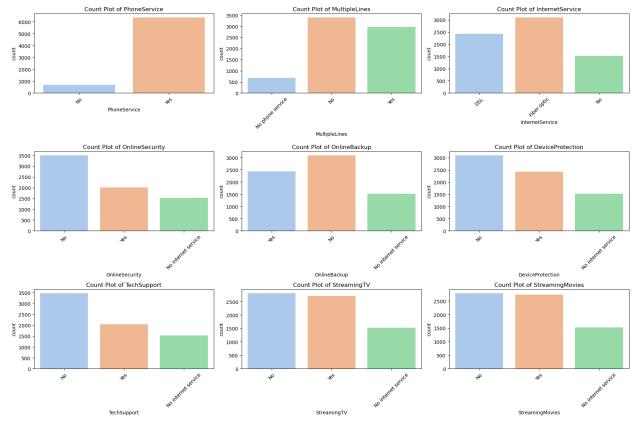
sns.countplot(data=df, x=col, ax=axes[i], palette="pastel")
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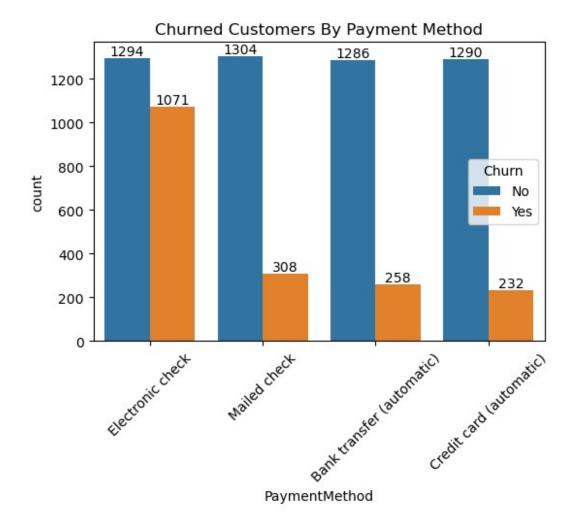
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sns.countplot(data=df, x=col, ax=axes[i], palette="pastel")



```
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("Churned Customers By Payment Method")
plt.xticks(rotation = 45)
plt.show()
```



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