Banking Customer Churn Analysis

Importing the data from url

```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns

from google.colab import userdata
import os
os.environ["KAGGLE_KEY"] = userdata.get('Kaggle_Key')
os.environ["KAGGLE_USERNAME"] = userdata.get('Kaggle_Username')

#!kaggle datasets list

#Download dataset
!kaggle datasets download -d dyutimazumder/banking-customer-churn-analysis
```

```
Dataset URL: https://www.kaggle.com/datasets/dyutimazumder/banking-customer-churn-analysis
License(s): unknown
```

```
!unzip -o /content/banking-customer-churn-analysis.zip
```

```
Archive:  /content/banking-customer-churn-analysis.zip
  inflating: Banking Customer Churn Analysis.pbix
  inflating: Churn Modelling Dataset.csv
```

```
bank = pd.read_csv('/content/Churn Modelling Dataset.csv')
bank.head()
```

	RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember
0	1	15634602	Hargrave	619	France	Female	42	2	0.00	1	1	1
1	2	15647311	Hill	608	Spain	Female	41	1	83807.86	1	0	1
2	3	15619304	Onio	502	France	Female	42	8	159660.80	3	1	0
3	4	15701354	Boni	699	France	Female	39	1	0.00	2	0	0
4	5	15737888	Mitchell	850	Spain	Female	43	2	125510.82	1	1	1

```
#changing the exited column values to Yes or No
bank['Exited'] = bank['Exited'].apply(lambda x: 'Yes' if x == 1 else 'No')
bank.head()
```

	RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember
0	1	15634602	Hargrave	619	France	Female	42	2	0.00	1	1	1
1	2	15647311	Hill	608	Spain	Female	41	1	83807.86	1	0	1
2	3	15619304	Onio	502	France	Female	42	8	159660.80	3	1	0
3	4	15701354	Boni	699	France	Female	39	1	0.00	2	0	0
4	5	15737888	Mitchell	850	Spain	Female	43	2	125510.82	1	1	1

```
bank.describe()
```

	RowNumber	CustomerId	CreditScore	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember
count	10000.00000	1.000000e+04	10000.000000	10000.000000	10000.000000	10000.000000	10000.000000	10000.00000	10000.000000
mean	5000.50000	1.569094e+07	650.528800	38.921800	5.012800	76485.889288	1.530200	0.70550	0.515100
std	2886.89568	7.193619e+04	96.653299	10.487806	2.892174	62397.405202	0.581654	0.45584	0.499797
min	1.00000	1.556570e+07	350.000000	18.000000	0.000000	0.000000	1.000000	0.00000	0.000000
25%	2500.75000	1.562853e+07	584.000000	32.000000	3.000000	0.000000	1.000000	0.00000	0.000000
50%	5000.50000	1.569074e+07	652.000000	37.000000	5.000000	97198.540000	1.000000	1.00000	1.000000
75%	7500.25000	1.575323e+07	718.000000	44.000000	7.000000	127644.240000	2.000000	1.00000	1.000000
max	10000.00000	1.581569e+07	850.000000	92.000000	10.000000	250898.090000	4.000000	1.00000	1.000000

```
bank.isnull().sum()
```

	0
RowNumber	0
CustomerId	0
Surname	0
CreditScore	0
Geography	0
Gender	0
Age	0
Tenure	0
Balance	0
NumOfProducts	0
HasCrCard	0
IsActiveMember	0
EstimatedSalary	0
Exited	0

dtype: int64

```
bank.columns
```

```
Index(['RowNumber', 'CustomerId', 'Surname', 'CreditScore', 'Geography',
       'Gender', 'Age', 'Tenure', 'Balance', 'NumOfProducts', 'HasCrCard',
       'IsActiveMember', 'EstimatedSalary', 'Exited'],
      dtype='object')
```

```
bank.describe()
```

	RowNumber	CustomerId	CreditScore	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember
count	10000.00000	1.000000e+04	10000.000000	10000.000000	10000.000000	10000.000000	10000.000000	10000.00000	10000.000000
mean	5000.50000	1.569094e+07	650.528800	38.921800	5.012800	76485.889288	1.530200	0.70550	0.515100
std	2886.89568	7.193619e+04	96.653299	10.487806	2.892174	62397.405202	0.581654	0.45584	0.499797
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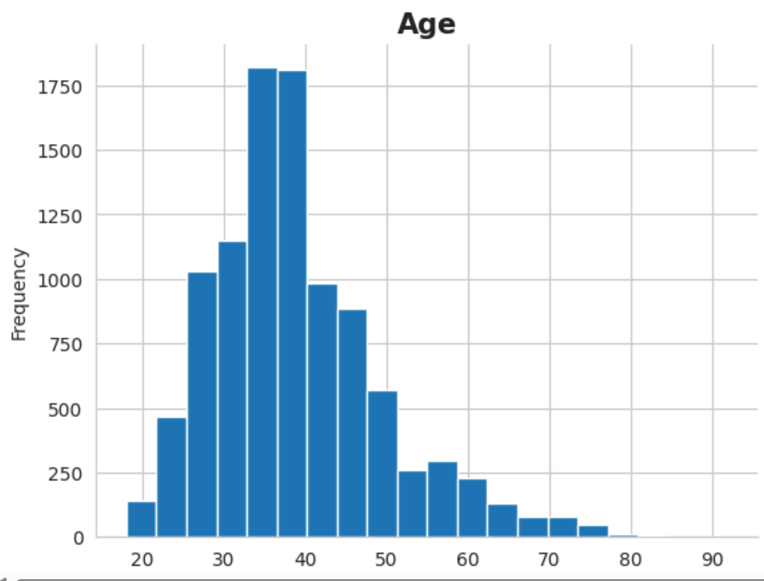
25%	2500.75000	1.562853e+07	584.000000	32.000000	3.000000	0.000000	1.000000	0.00000	0.000000
50%	5000.50000	1.569074e+07	652.000000	37.000000	5.000000	97198.540000	1.000000	1.00000	1.000000
75%	7500.25000	1.575323e+07	718.000000	44.000000	7.000000	127644.240000	2.000000	1.00000	1.000000
max	10000.00000	1.581569e+07	850.000000	92.000000	10.000000	250898.090000	4.000000	1.00000	1.000000

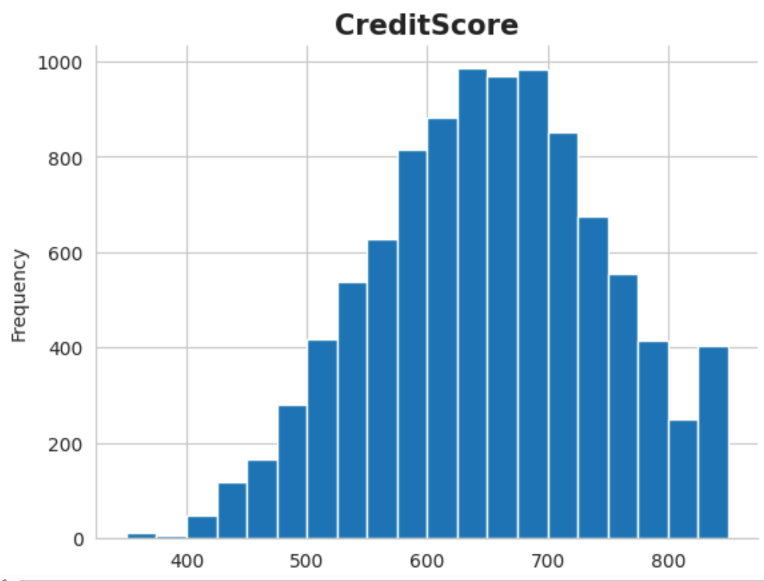
```
#total customers
total_customers = bank['CustomerId'].count()
print(total_customers)
```

```
10000
```

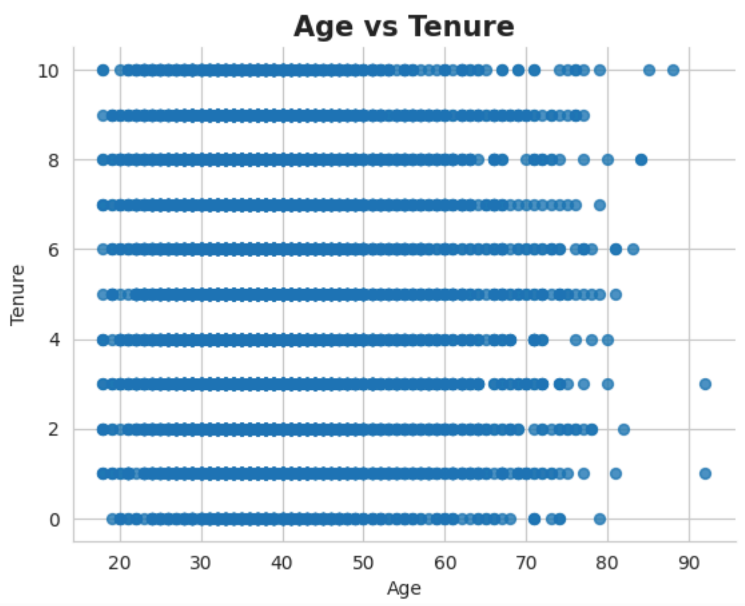
```
bank['Age'].plot(kind='hist', bins=20)
plt.title('Age',  fontsize = 15, fontweight = 'bold')
plt.gca().spines[['top', 'right',]].set_visible(False)
```



```
bank['CreditScore'].plot(kind='hist', bins=20)
plt.title('CreditScore',  fontsize = 15, fontweight = 'bold')
plt.gca().spines[['top', 'right',]].set_visible(False)
```

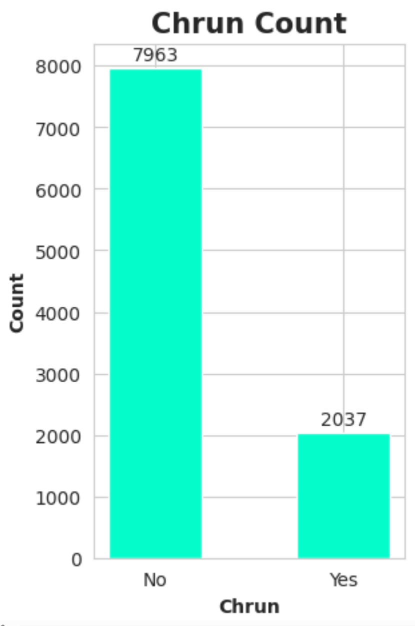


```
bank.plot(kind='scatter', x='Age', y='Tenure', s=32, alpha=0.8)
plt.title('Age vs Tenure',  fontsize = 15, fontweight = 'bold')
plt.gca().spines[['top', 'right',]].set_visible(False)
```



```
chrun_count = bank.Exited.value_counts()
datalabels = chrun_count.values
plt.figure(figsize=(3, 5))
bars = plt.bar(chrun_count.index, chrun_count.values, color = '#03fcca', width = 0.5)
plt.title('Chrun Count', fontsize = 15, fontweight = 'bold')
plt.xlabel('Chrun', fontsize = 10, fontweight = 'bold')
plt.ylabel('Count', fontsize = 10, fontweight = 'bold')

#data labels
for bar in bars:
  height = bar.get_height()
  plt.text(bar.get_x() + bar.get_width()/2, height + 50,
           height, ha = 'center', va = 'bottom')
plt.show()
```



```
bank.head()
```

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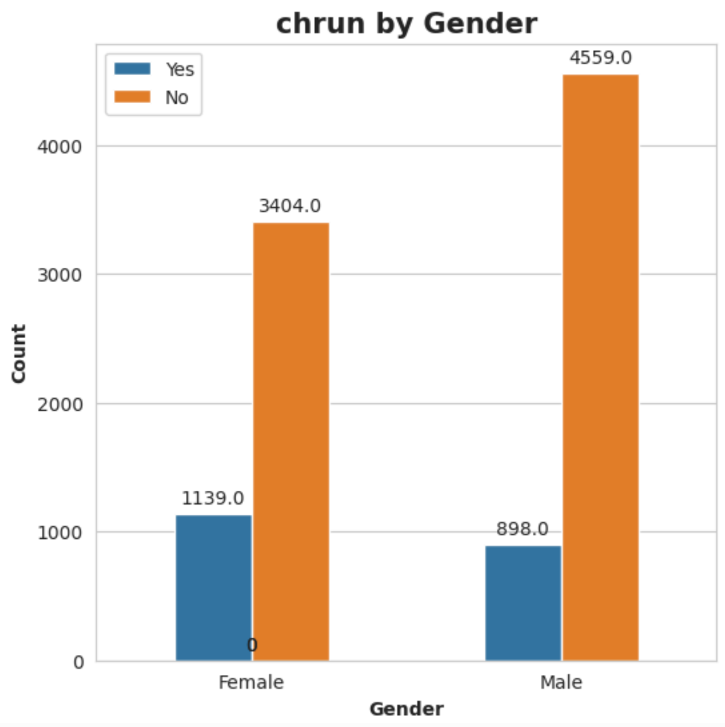
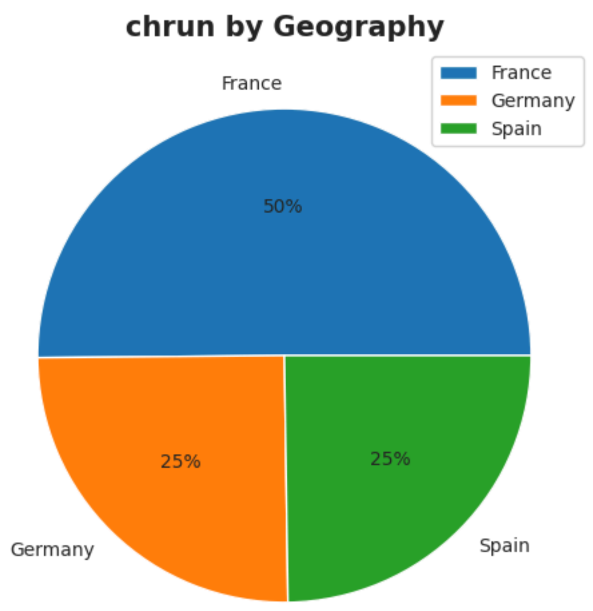
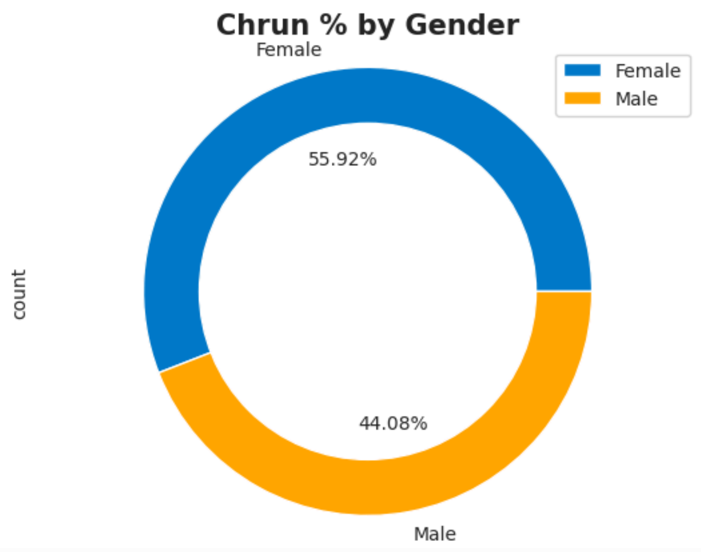
```
chrun_gender = bank.groupby('Gender')['Exited'].value_counts()
plt.figure(figsize=(6, 6))
plt.title('chrun by Gender', fontsize = 15, fontweight = 'bold')
ax = sns.countplot(x = 'Gender', hue = 'Exited', data = bank, width = 0.5)
plt.xlabel('Gender', fontsize = 10, fontweight = 'bold')
plt.ylabel('Count', fontsize = 10, fontweight = 'bold')
plt.legend()
for p in ax.patches:
  height = p.get_height()
  plt.text(p.get_x() + p.get_width()/2, height + 50,
           height, ha = 'center', va = 'bottom')
plt.show()
```



```
#Plotting by Geography
chrun_geo = bank.groupby('Geography')['Exited'].count()
sns.set_style('whitegrid')
plt.figure(figsize=(6, 6))
plt.pie(chrun_geo, labels=chrun_geo.index, autopct='%.0f%%')
plt.title('chrun by Geography', fontsize = 15, fontweight = 'bold')
plt.legend()
plt.show()
```

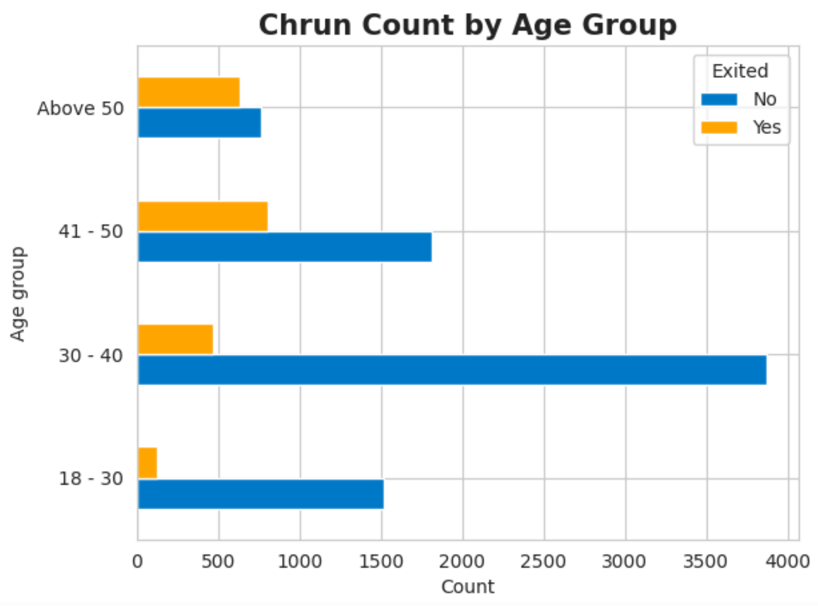


```
#chrun count by gender
import matplotlib.patches as patches
chrun_percentage = bank[bank['Exited'] == 'Yes']['Gender'].value_counts()
chrun_percentage.plot(kind = 'pie', autopct = '%.2f%%', colors=['#007acc', '#FFA500'])
center_circle = patches.Circle((0, 0), 0.75, fc = 'white')
fig = plt.gcf()
fig.gca().add_artist(center_circle)
plt.axis('equal')
plt.title('Chrun % by Gender', fontsize = 15, fontweight = 'bold')
plt.legend()
plt.show()
```

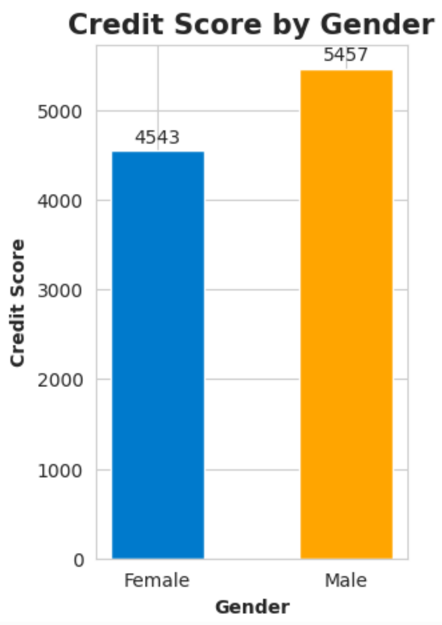


```
def age_group(age):
  if age >= 18 and age < 30:
    return '18 - 30'
  elif age >= 30 and age < 40:
    return '30 - 40'
  elif age >= 40 and age < 50:
    return '41 - 50'
  else:
    return 'Above 50'

chrun_percentage = bank[bank['Exited'] == 'Yes'].count()
```

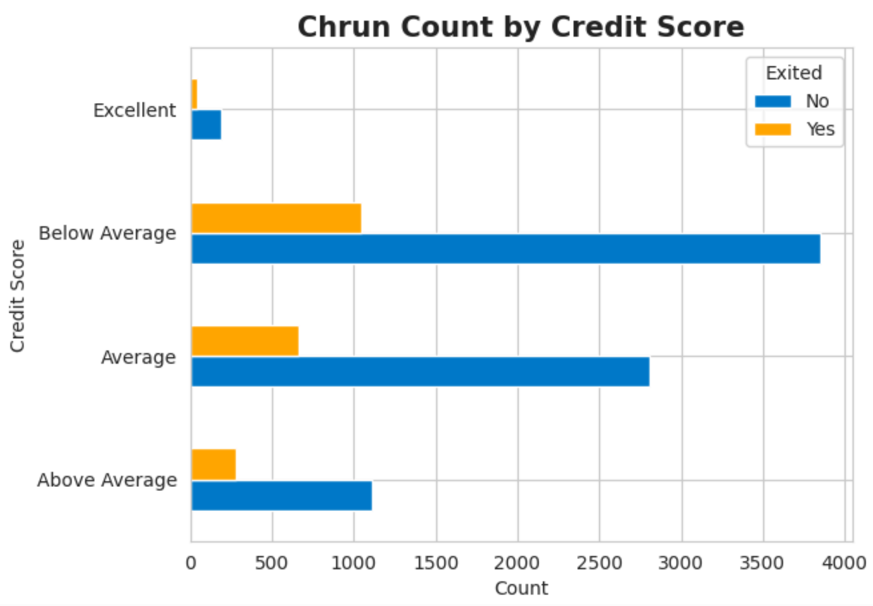
```
bank['Age_Group'] = bank['Age'].apply(age_group)
age_group = bank.groupby('Age_Group')['Exited'].value_counts().unstack()
age_group.plot(kind = 'barh', color = ['#007acc', '#FFA500'])
plt.title('Chrun Count by Age Group', fontsize = 15, fontweight = 'bold')
plt.xlabel('Count')
plt.ylabel('Age group')
plt.show()
```



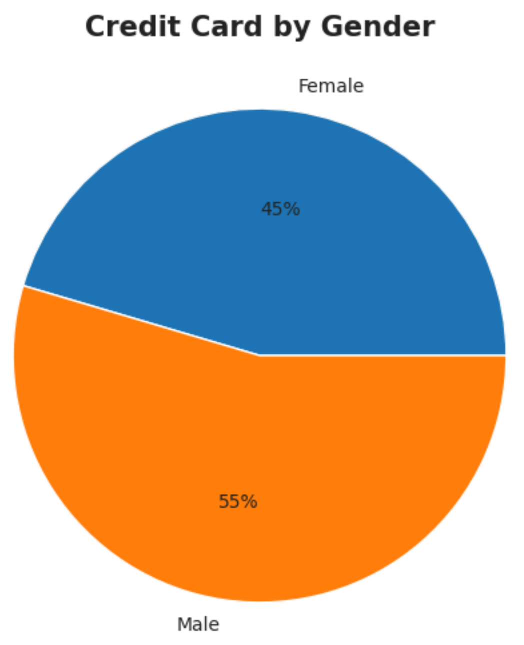
```
#credit score as per gender
credit_score = bank.groupby('Gender')['CreditScore'].count()

plt.figure(figsize=(3, 5))
bars = plt.bar(credit_score.index, credit_score.values, color = ['#007acc', '#FFA500'], width =
plt.xlabel('Gender', fontsize = 10, fontweight = 'bold')
plt.ylabel('Credit Score', fontsize = 10, fontweight = 'bold')
plt.title('Credit Score by Gender', fontsize = 15, fontweight = 'bold')
for bar in bars:
  height = bar.get_height()
  plt.text(bar.get_x() + bar.get_width()/2, height + 50,
           height, ha = 'center', va = 'bottom')
plt.show()
```



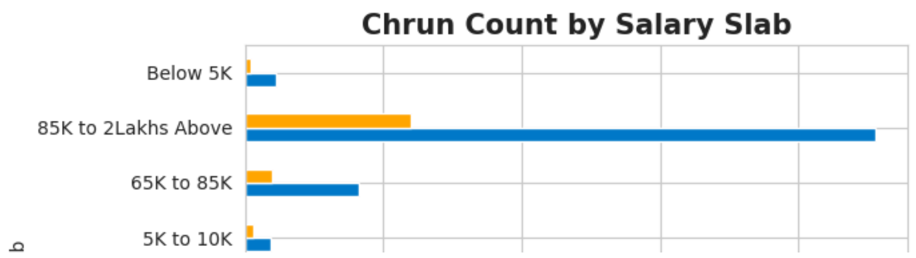
```
def credit_score(score):
  if score < 650:
    return 'Below Average'
  elif score >= 650 and score < 750:
    return 'Average'
  elif score >= 750 and score < 850:
    return 'Above Average'
  else:
    return 'Excellent'
bank['Credit_Score'] = bank['CreditScore'].apply(credit_score)
credit_score_count = bank.groupby('Credit_Score')['Exited'].value_counts().unstack()
credit_score_count.plot(kind = 'barh', color = ['#007acc', '#FFA500'])
plt.title('Chrun Count by Credit Score', fontsize = 15, fontweight = 'bold')
plt.xlabel('Count')
plt.ylabel('Credit Score')
plt.show()
```



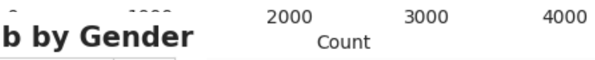
```
#credit card avaliable as per gender
credit_card = bank.groupby('Gender')['HasCrCard'].count()
plt.figure(figsize=(6, 6))
plt.pie(credit_card, labels=credit_card.index, autopct='%.0f%%')
plt.title('Credit Card by Gender', fontsize = 15, fontweight = 'bold')
plt.show()
```

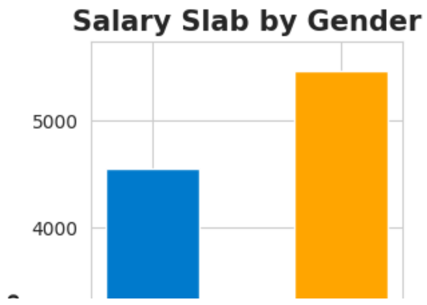


```
def salary_slab(salary):
  if salary <= 5000:
    return 'Below 5K'
  elif 5000 <= salary <= 9999:
    return '5K to 10K'
  elif 10000 <= salary <= 15000:
    return '10K to 15K'
  elif 15000 <= salary <= 25000:
    return '15K to 25K'
  elif 25000 <= salary <= 30000:
    return '25K to 30K'
  elif 30000 <= salary <= 50000:
    return '30K to 50K'
  elif 50000 <= salary <= 65000:
    return '50K to 65K'
  elif 65000 <= salary <= 85000:
    return '65K to 85K'
  else:
    return '85K to 2Lakhs Above'

#chruned count
chrun_salary = bank[bank['Exited'] == 'Yes'].count()
bank['Salary_Slab'] = bank['EstimatedSalary'].apply(salary_slab)
salary_slab = bank.groupby('Salary_Slab')['Exited'].value_counts().unstack()
salary_slab.plot(kind = 'barh', color = ['#007acc', '#FFA500'])
plt.title('Chrun Count by Salary Slab', fontsize = 15, fontweight = 'bold')
plt.xlabel('Count')
plt.ylabel('Salary Slab')
plt.show()
```



```
#salary slab according to gender
salary_slab = bank.groupby('Gender')['Salary_Slab'].count()
plt.figure(figsize=(3, 6))
plt.bar(salary_slab.index, salary_slab.values, color = ['#007acc', '#FFA500'], width = 0.5)
plt.xlabel('Gender', fontsize = 10, fontweight = 'bold')
plt.ylabel('Salary Slab', fontsize = 10, fontweight = 'bold')
plt.title('Salary Slab by Gender', fontsize = 15, fontweight = 'bold')
plt.show()
```




Salary Slab by Gender