In [2]:

```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
sns.set_theme(color_codes=True)
```

In [3]:

```
df = pd.read_csv('Credit Score Classification Dataset.csv')
df.head()
```

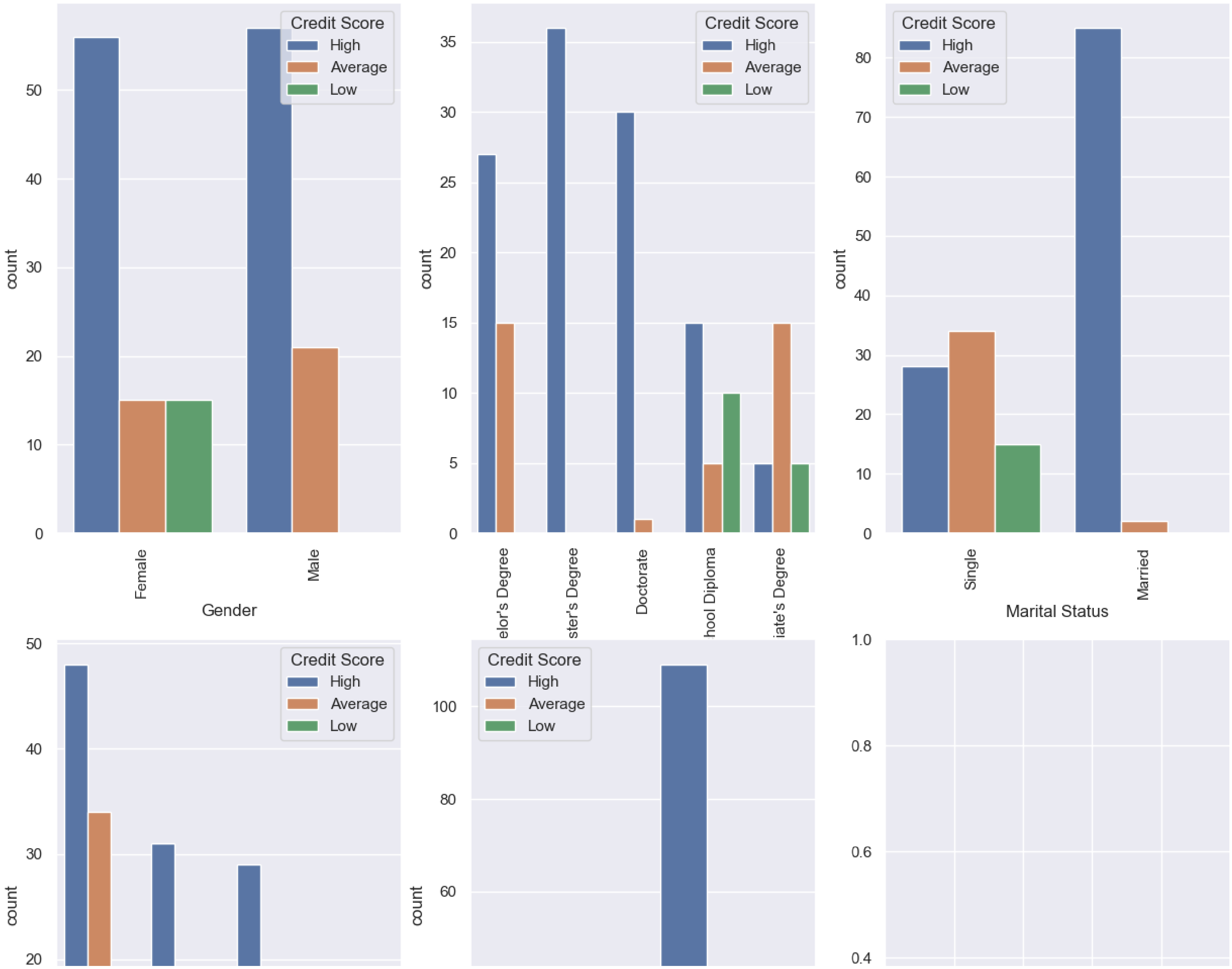
Out[3]:

	Age	Gender	Income	Education	Marital Status	Number of Children	Home Ownership	Credit Score
0	25	Female	50000	Bachelor's Degree	Single	0	Rented	High
1	30	Male	100000	Master's Degree	Married	2	Owned	High
2	35	Female	75000	Doctorate	Married	1	Owned	High
3	40	Male	125000	High School Diploma	Single	0	Owned	High
4	45	Female	100000	Bachelor's Degree	Married	3	Owned	High

Exploratory Data Analysis

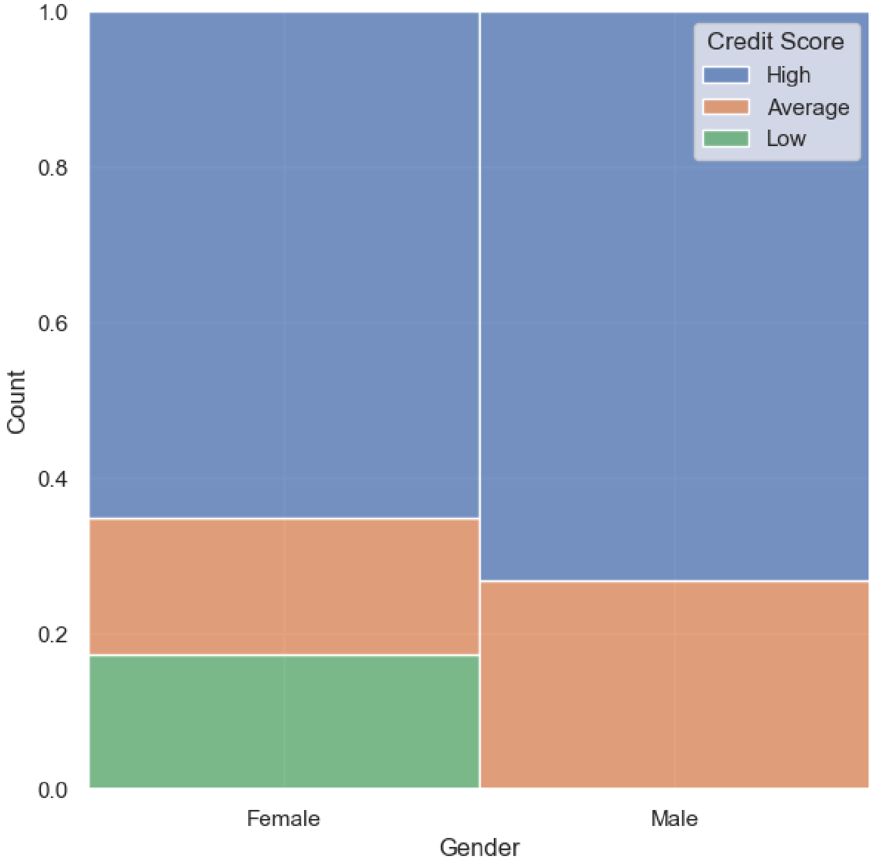
In [4]:

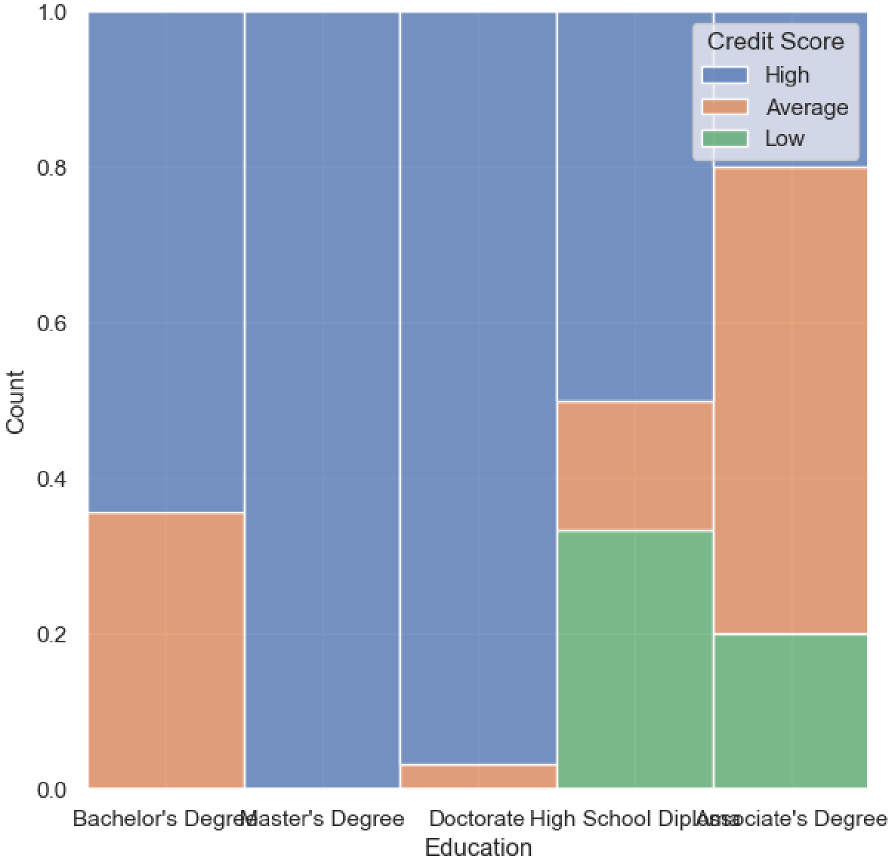
```
cat_vars = ['Gender', 'Education', 'Marital Status', 'Number of Children', 'Home Ownership']
fig, axs = plt.subplots(nrows=2, ncols=3, figsize=(15, 15))
axs = axs.flatten()
for i, var in enumerate(cat_vars):
    sns.countplot(x=var, hue='Credit Score', data=df, ax=axs[i])
    axs[i].set_xticklabels(axs[i].get_xticklabels(), rotation=90)
```

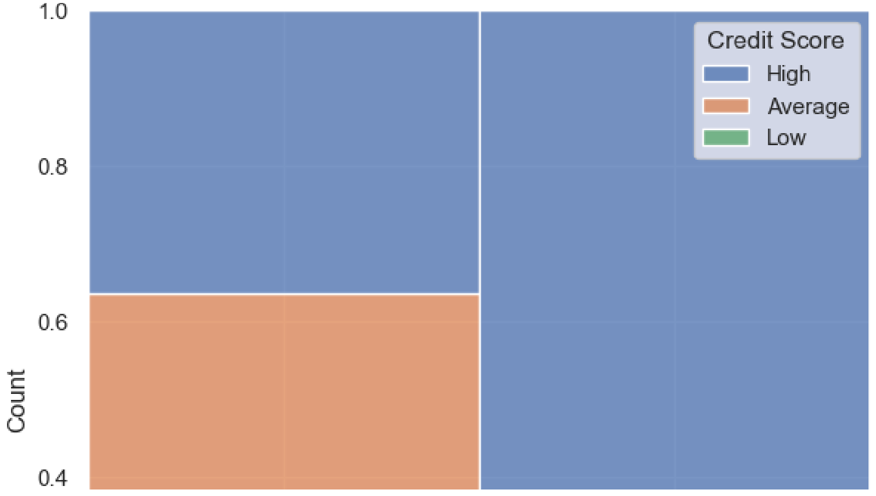

Credit Score
High
Average
Low
count
0
10
20
30
40
50
Female
Male
Gender
0
5
10
15
20
25
30
35
elor's Degree
ster's Degree
Doctorate
hool Diploma
iate's Degree
0
10
20
30
40
50
60
70
80
Single
Married
Marital Status
20
30
40
50
60
80
100
0.4
0.6
0.8
1.0

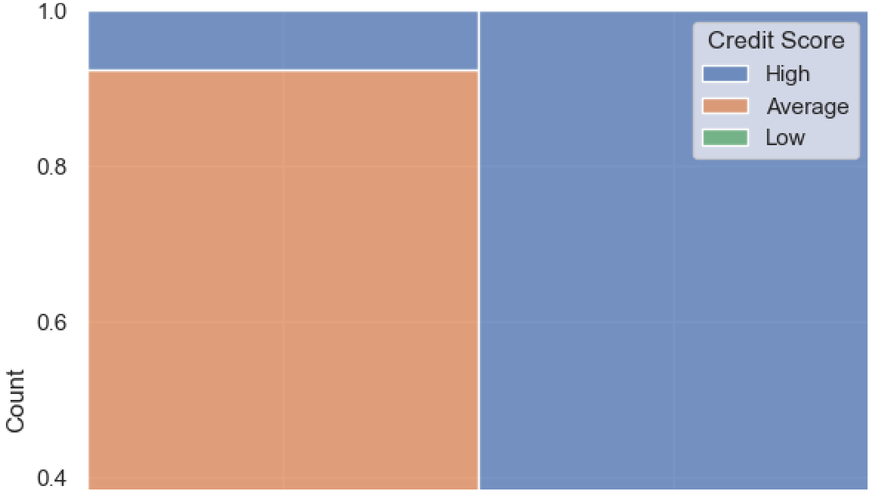
In [5]:

```
cat_vars = ['Gender', 'Education', 'Marital Status', 'Home Ownership']
fig, axs = plt.subplots(nrows=2, ncols=2, figsize=(15, 15))
axs = axs.flatten()
for i, var in enumerate(cat_vars):
    sns.histplot(x=var, hue='Credit Score', data=df, ax=axs[i], multiple="fill", kde=False, element="bars", fill=True)
```


1.0
0.8
0.6
0.4
0.2
0.0
Count
Female
Male
Gender
Credit Score
High
Average
Low

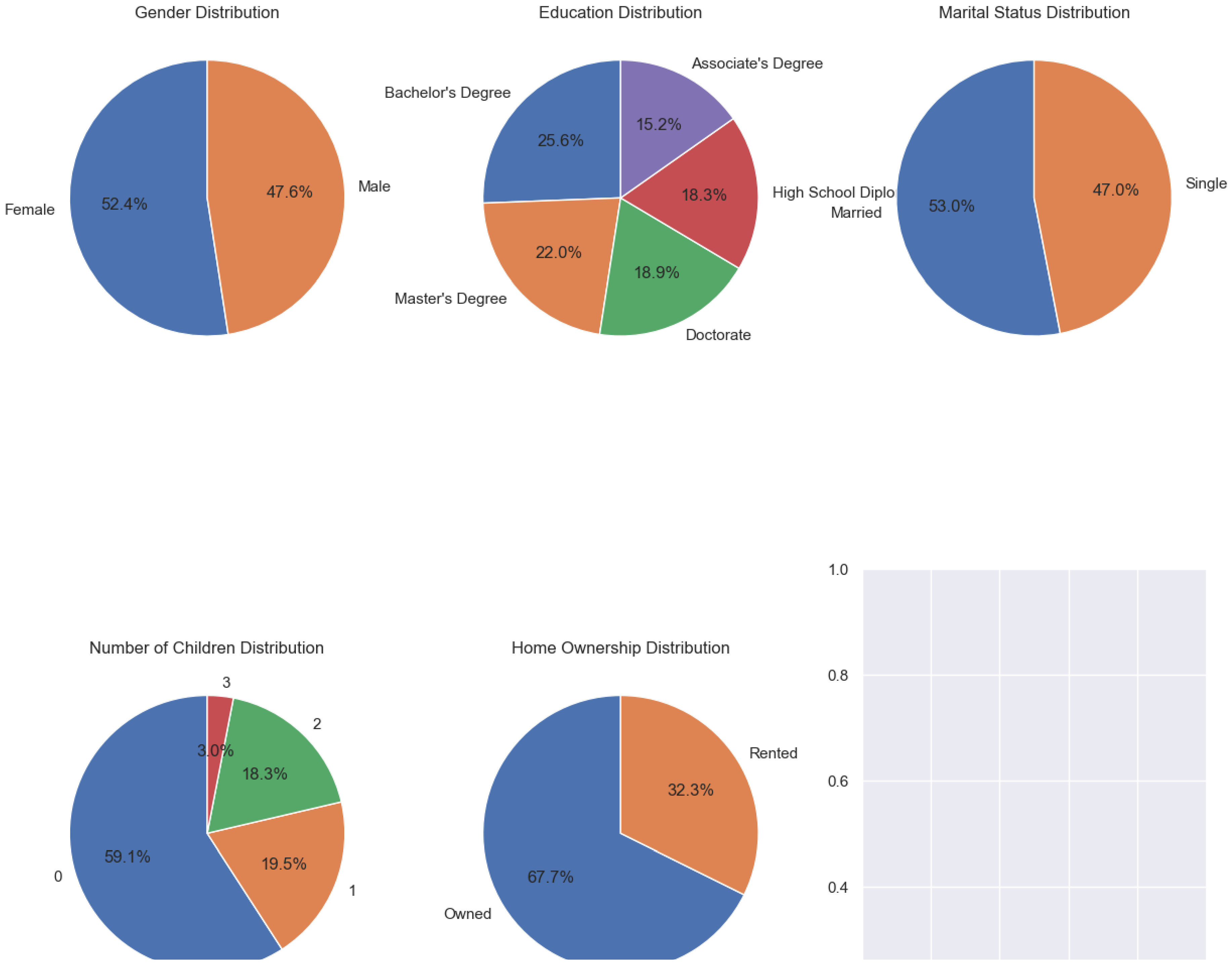

1.0
0.8
0.6
0.4
0.2
0.0
Count
Bachelor's Degree
Master's Degree
Doctorate
High School Diploma
Associate's Degree
Education
Credit Score
High
Average
Low


1.0
0.8
0.6
0.4
Count
Credit Score
High
Average
Low


1.0
0.8
0.6
0.4
Count
Credit Score
High
Average
Low

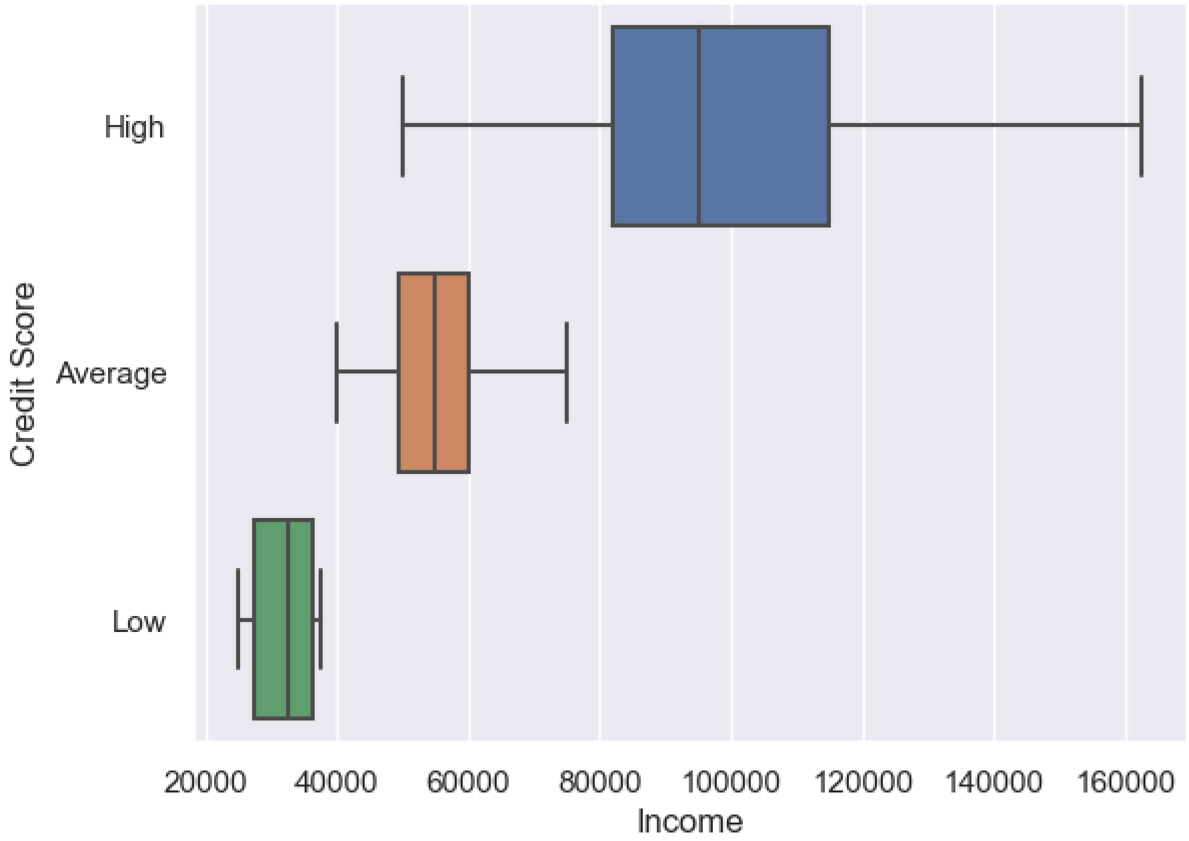
In [6]:

```
cat_vars = ['Gender', 'Education', 'Marital Status', 'Number of Children', 'Home Ownership']

# create a figure and axes
fig, axs = plt.subplots(nrows=2, ncols=3, figsize=(15, 15))

# create a pie chart for each categorical variable
for i, var in enumerate(cat_vars):
    if i < len(axs.flat):
        # count the number of occurrences for each category
        cat_counts = df[var].value_counts()

        # create a pie chart
        axs.flat[i].pie(cat_counts, labels=cat_counts.index, autopct='%1.1f%%', startangle=90)

        # set a title for each subplot
        axs.flat[i].set_title(f'{var} Distribution')
```


Gender Distribution
Female
52.4%
47.6%
Male
Education Distribution
Bachelor's Degree
25.6%
Associate's Degree
15.2%
18.3%
High School Diplo
22.0%
18.9%
Master's Degree
Doctorate
Marital Status Distribution
Married
53.0%
47.0%
Single
Number of Children Distribution
3
3.0%
2
18.3%
0
59.1%
19.5%
1
Home Ownership Distribution
Rented
32.3%
67.7%
Owned
1.0
0.8
0.6
0.4

```
In [7]: num_vars = ['Age', 'Income']
        sns.boxplot(x='Income', data=df, y='Credit Score')
```

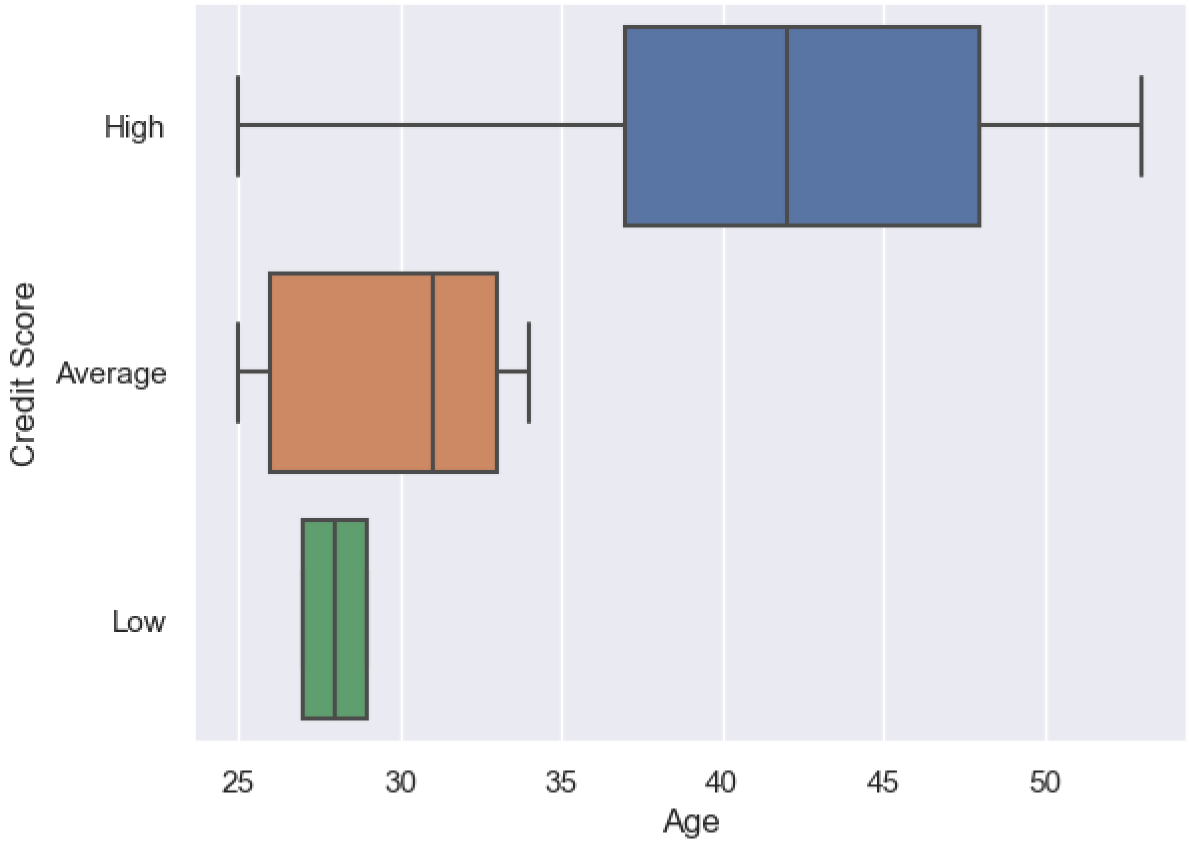
```
Out[7]: <AxesSubplot: xlabel='Income', ylabel='Credit Score'>
```



```
In [8]: num_vars = ['Age', 'Income']
        sns.boxplot(x='Age', data=df, y='Credit Score')
```

Out[8]:

```
<AxesSubplot: xlabel='Age', ylabel='Credit Score'>
```



Preprocessing

Since we have covered only binary classification models we shall stick to that.
Dropping rows with average credit score

In [9]:

```
df.drop(df[(df['Credit Score']=='Average')].index,inplace=True)
```

In [23]:

```
df = pd.get_dummies(df)
```

In [54]:
```
df
```

Out[54]:

	Age	Income	Number of Children	Gender_Female	Gender_Male	Education_Associate's Degree	Education_Bachelor's Degree	Education_Doctorate	Education_High School Diploma	Education_
2	35	75000	1	1	0	0	0	1	0	
3	40	125000	0	0	1	0	0	0	1	
4	45	100000	3	1	0	0	1	0	0	
5	50	150000	0	0	1	0	0	0	0	
8	36	80000	2	1	0	0	0	0	0	
...	...	...	...	...	...	...	...	...	...	
158	53	122500	0	0	1	1	0	0	0	
159	29	27500	0	1	0	0	0	0	1	
161	39	62500	2	1	0	0	1	0	0	
162	44	87500	0	0	1	0	0	0	0	
163	49	77500	1	1	0	0	0	1	0	

126 rows × 16 columns

In [68]:
```
from sklearn.preprocessing import StandardScaler
df.drop(['Home Ownership_Rented','Credit Score_Low'], axis=1, inplace=True)
```

In [69]:
```
df
```

Out[69]:

	Age	Income	Number of Children	Gender_Male	Education_Associate's Degree	Education_Bachelor's Degree	Education_Doctorate	Education_High School Diploma	Education_Master's Degree	Status_
2	35	75000	1	0	0	0	1	0	0	
4	45	100000	3	0	0	1	0	0	0	
5	50	150000	0	1	0	0	0	0	1	
8	36	80000	2	0	0	0	0	0	1	
9	41	105000	0	1	0	0	1	0	0	
...	...	...	...	...	...	...	...	...	...	
158	53	122500	0	1	1	0	0	0	0	
159	29	27500	0	0	0	0	0	1	0	
161	39	62500	2	0	0	1	0	0	0	
162	44	87500	0	1	0	0	0	0	1	
163	49	77500	1	0	0	0	1	0	0	

125 rows × 12 columns

In [75]:

```
X = df.iloc[0:,0:11]
```

In [76]:

```
X
```

Out[76]:

	Age	Income	Number of Children	Gender_Male	Education_Associate's Degree	Education_Bachelor's Degree	Education_Doctorate	Education_High School Diploma	Education_Master's Degree	Status_
2	35	75000	1	0	0	0	1	0	0	
4	45	100000	3	0	0	1	0	0	0	
5	50	150000	0	1	0	0	0	0	1	
8	36	80000	2	0	0	0	0	0	1	
9	41	105000	0	1	0	0	1	0	0	
...	...	...	...	...	...	...	...	...	...	
158	53	122500	0	1	1	0	0	0	0	
159	29	27500	0	0	0	0	0	1	0	
161	39	62500	2	0	0	1	0	0	0	
162	44	87500	0	1	0	0	0	0	1	
163	49	77500	1	0	0	0	1	0	0	

125 rows × 11 columns

In [77]:

```
Y= df.iloc[0:,11]
```

In [78]:

```
Y
```

Out[78]:

```
2      1
4      1
5      1
8      1
9      1
      ..
158    1
159    0
161    1
162    1
163    1
Name: Credit Score_High, Length: 125, dtype: uint8
```

In [80]:

```
X = X.to_numpy()
```

In [81]:

```
Y = Y.to_numpy()
```

In [82]:

```
X
```

Out[82]:

```
array([[    35,  75000,      1, ...,      0,      1,      1],
       [    45, 100000,      3, ...,      0,      1,      1],
       [    50, 150000,      0, ...,      1,      1,      1],
       ...,
       [    39,  62500,      2, ...,      0,      1,      1],
       [    44,  87500,      0, ...,      1,      0,      1],
       [    49,  77500,      1, ...,      0,      1,      1]], dtype=int64)
```

In [86]:

```
X=StandardScaler().fit_transform(X)
```

In [100…

```
len(X)
```

Out[100]:

```
125
```

In [88]:

```
from sklearn.model_selection import train_test_split
```

In [147…

```
Xtrain,Xtest,Ytrain,Ytest = train_test_split(X,Y,test_size=0.6,random_state=8)
```

Logistic Regression

In [148…

```
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import confusion_matrix
from sklearn.metrics import accuracy_score
logr = LogisticRegression()
logr.fit(Xtrain,Ytrain)
Ypred = logr.predict(Xtest)
cmat = confusion_matrix(Ytest,Ypred)
acc_score = accuracy_score(Ytest,Ypred)
```

In [149…

```
cmat
```

Out[149]:

```
array([[11,  0],
       [ 0, 64]], dtype=int64)
```

In [150…

```
acc_score
```

Out[150]:

```
1.0
```

In [151…

```
from sklearn.neighbors import KNeighborsClassifier
```

In [152…

```
knn = KNeighborsClassifier()
knn.fit(Xtrain,Ytrain)
Ypred = knn.predict(Xtest)
cmat = confusion_matrix(Ytest,Ypred)
acc_score = accuracy_score(Ytest,Ypred)
```

```
C:\Users\dp\anaconda3\lib\site-packages\sklearn\neighbors\_classification.py:228: FutureWarning: Unlike other reduction function
s (e.g. `skew`, `kurtosis`), the default behavior of `mode` typically preserves the axis it acts along. In SciPy 1.11.0, this be
havior will change: the default value of `keepdims` will become False, the `axis` over which the statistic is taken will be elim
inated, and the value None will no longer be accepted. Set `keepdims` to True or False to avoid this warning.
  mode, _ = stats.mode(_y[neigh_ind, k], axis=1)
```

In [153…

```
cmat
```

Out[153]:

```
array([[11,  0],
       [ 0, 64]], dtype=int64)
```

In [154…

```
acc_score
```

Out[154]:

```
1.0
```

In [155…

```
from sklearn import svm
```

In [156…

```
clf = svm.SVC(kernel='linear',C=0.1)
clf.fit(X,Y)
```

Out[156]:

```
SVC(C=0.1, kernel='linear')
```

In [157…

```
Ypred = clf.predict(Xtest)
cmat = confusion_matrix(Ytest,Ypred)
acc_score = accuracy_score(Ytest,Ypred)
```

In [158…

```
cmat
```

Out[158]:

```
array([[11,  0],
       [ 0, 64]], dtype=int64)
```

In [159…

```
acc_score
```

Out[159]:

```
1.0
```

In [ ]:

```
```