TASK-5

Description:

Engineer new features and select relevant features for model training.

Responsibility:

1.Generate meaningful features from existing data. 2.Use techniques like PCA or feature importance to select the most important features. Optimize feature sets for improved model performance.

Suggested code may be subject to a license | Certinax/cst383-data-science

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

+ Code + Text

```
df = pd.read_csv('/heart.csv')
```

```
df.head()
```

	age	sex	cp	trestbps	chol	fbs	restecg	thalach	exang	oldpeak	slope	ca	thal	target
0	52	1	0	125	212	0	1	168	0	1.0	2	2	3	0
1	53	1	0	140	203	1	0	155	1	3.1	0	0	3	0
2	70	1	0	145	174	0	1	125	1	2.6	0	0	3	0
3	61	1	0	148	203	0	1	161	0	0.0	2	1	3	0
4	62	0	0	138	294	1	1	106	0	1.9	1	3	2	0

Next steps: Generate code with df View recommended plots New interactive sheet

```
df.tail()
```

	age	sex	cp	trestbps	chol	fbs	restecg	thalach	exang	oldpeak	slope	ca	thal	target
1020	59	1	1	140	221	0	1	164	1	0.0	2	0	2	1
1021	60	1	0	125	258	0	0	141	1	2.8	1	1	3	0
1022	47	1	0	110	275	0	0	118	1	1.0	1	1	2	0
1023	50	0	0	110	254	0	0	159	0	0.0	2	0	2	1
1024	54	1	0	120	188	0	1	113	0	1.4	1	1	3	0

```
#Checking columns names
print(df.columns.values)
```

```
['age' 'sex' 'cp' 'trestbps' 'chol' 'fbs' 'restecg' 'thalach' 'exang'
 'oldpeak' 'slope' 'ca' 'thal' 'target']
```

```
#Checking for null values
print(df.isna().sum())
```

```
age         0
sex         0
cp          0
trestbps    0
chol        0
fbs         0
restecg     0
thalach     0
exang       0
oldpeak     0
slope       0
ca          0
thal        0
```

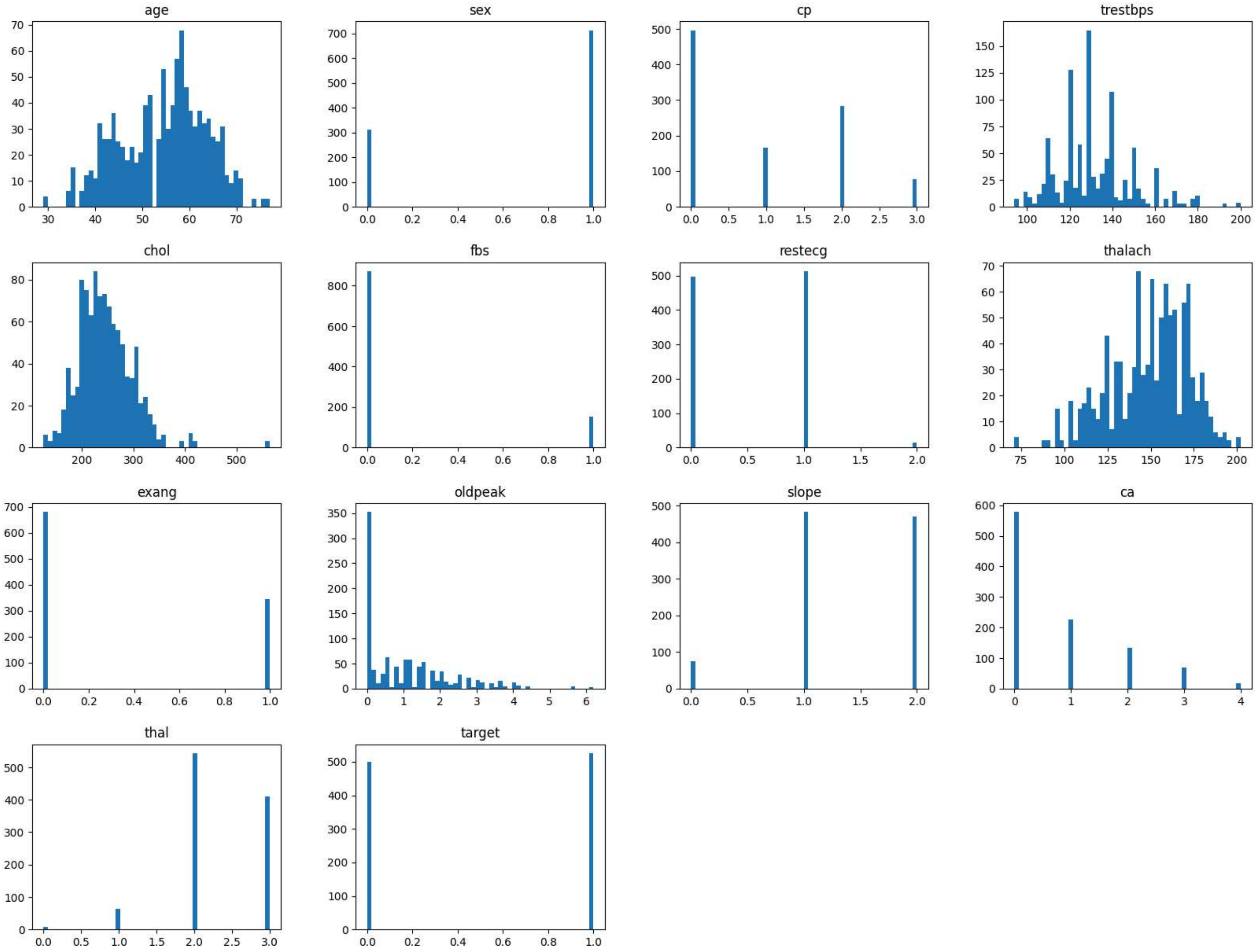
```
target      0
dtype: int64
```

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1025 entries, 0 to 1024
Data columns (total 14 columns):
 #   Column    Non-Null Count  Dtype  
---  ------    --------------  -----  
 0   age       1025 non-null   int64  
 1   sex       1025 non-null   int64  
 2   cp        1025 non-null   int64  
 3   trestbps  1025 non-null   int64  
 4   chol      1025 non-null   int64  
 5   fbs       1025 non-null   int64  
 6   restecg   1025 non-null   int64  
 7   thalach   1025 non-null   int64  
 8   exang     1025 non-null   int64  
 9   oldpeak   1025 non-null   float64
 10  slope     1025 non-null   int64  
 11  ca        1025 non-null   int64  
 12  thal      1025 non-null   int64  
 13  target    1025 non-null   int64  
dtypes: float64(1), int64(13)
memory usage: 112.2 KB
```

```
#Ploting histogram
df.hist(bins=50, grid=False, figsize=(20,15))
```

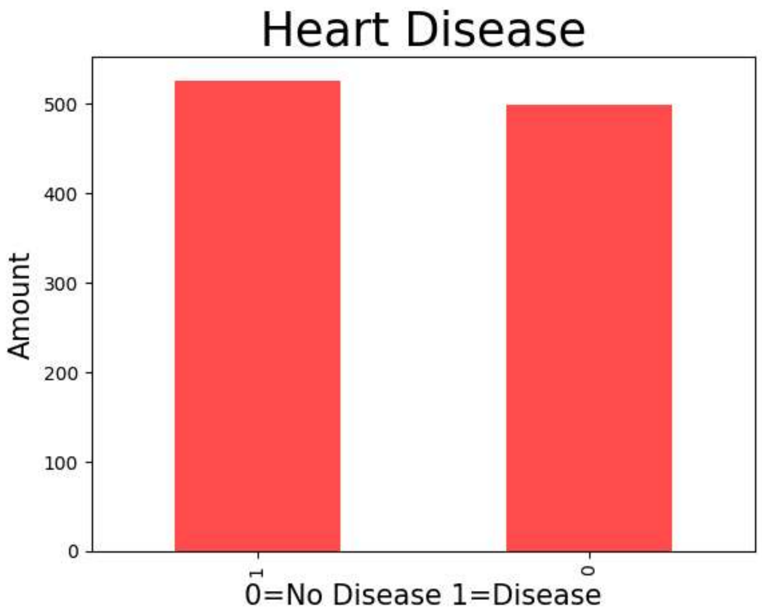
```
array([[<Axes: title={'center': 'age'}>, <Axes: title={'center': 'sex'}>,
        <Axes: title={'center': 'cp'}>,
        <Axes: title={'center': 'trestbps'}>],
       [<Axes: title={'center': 'chol'}>,
        <Axes: title={'center': 'fbs'}>,
        <Axes: title={'center': 'restecg'}>,
        <Axes: title={'center': 'thalach'}>],
       [<Axes: title={'center': 'exang'}>,
        <Axes: title={'center': 'oldpeak'}>,
        <Axes: title={'center': 'slope'}>,
        <Axes: title={'center': 'ca'}>],
       [<Axes: title={'center': 'thal'}>,
        <Axes: title={'center': 'target'}>, <Axes: >, <Axes: >]],
      dtype=object)
```



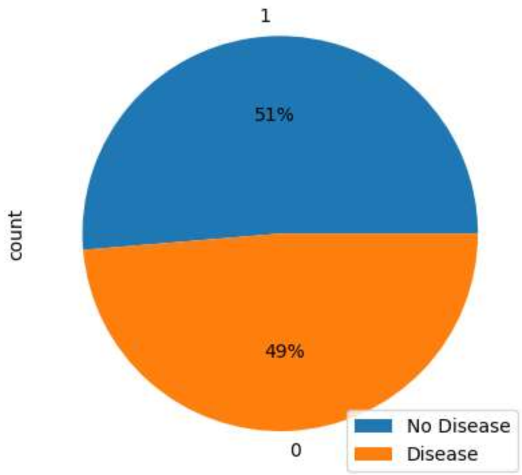
```
df.describe()
```

	age	sex	cp	trestbps	chol	fbs	restecg	thalach	exang	oldpeak	
count	1025.000000	1025.000000	1025.000000	1025.000000	1025.00000	1025.000000	1025.000000	1025.000000	1025.000000	1025.000000	1025
mean	54.434146	0.695610	0.942439	131.611707	246.00000	0.149268	0.529756	149.114146	0.336585	1.071512	1
std	9.072290	0.460373	1.029641	17.516718	51.59251	0.356527	0.527878	23.005724	0.472772	1.175053	0
min	29.000000	0.000000	0.000000	94.000000	126.00000	0.000000	0.000000	71.000000	0.000000	0.000000	0
25%	48.000000	0.000000	0.000000	120.000000	211.00000	0.000000	0.000000	132.000000	0.000000	0.000000	1
50%	56.000000	1.000000	1.000000	130.000000	240.00000	0.000000	1.000000	152.000000	0.000000	0.800000	1
75%	61.000000	1.000000	2.000000	140.000000	275.00000	0.000000	1.000000	166.000000	1.000000	1.800000	2
max	77.000000	1.000000	3.000000	200.000000	564.00000	1.000000	2.000000	202.000000	1.000000	6.200000	2

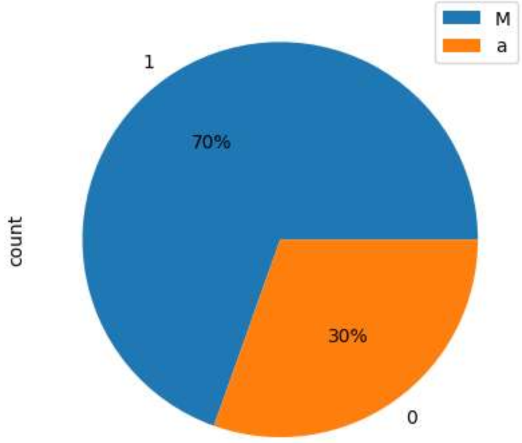
```
# Ques. 1 How many persons have heart disease and how many people do not have heart disease

df.target.value_counts()\
#plotting results using bar chart
df.target.value_counts().plot(kind='bar',color='red',alpha=0.7)
plt.title("Heart Disease",fontsize=25)
plt.xlabel("0=No Disease 1=Disease",fontsize=15)
plt.ylabel("Amount",fontsize=15)
plt.show()
```



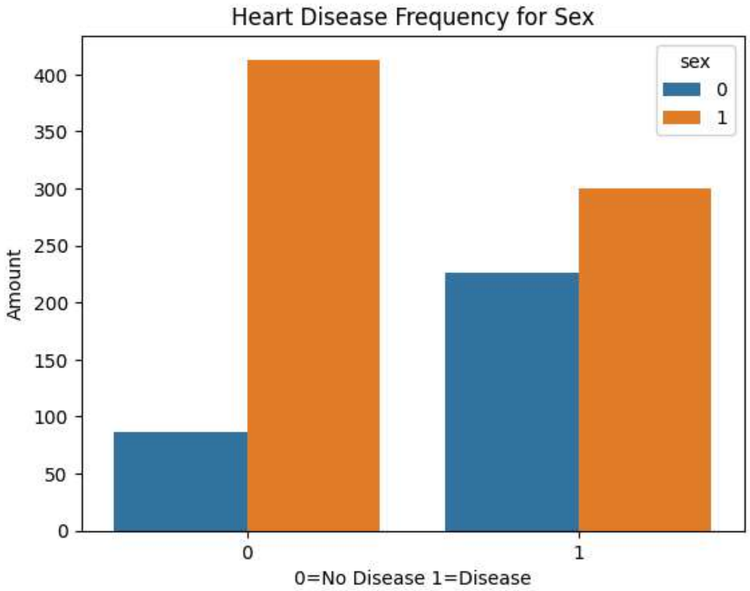
```
#using pie chart
df.target.value_counts().plot(kind='pie',autopct='%1.0f%%')
plt.legend(['No Disease','Disease'])
plt.show()
```



```
# How many male and female are in dataset
df.sex.value_counts()
#Plotting results
df.sex.value_counts().plot(kind='pie',autopct='%1.0f%%')
plt.legend(['Female','Male'])
plt.legend("Male Female Ratio")
plt.show()
```

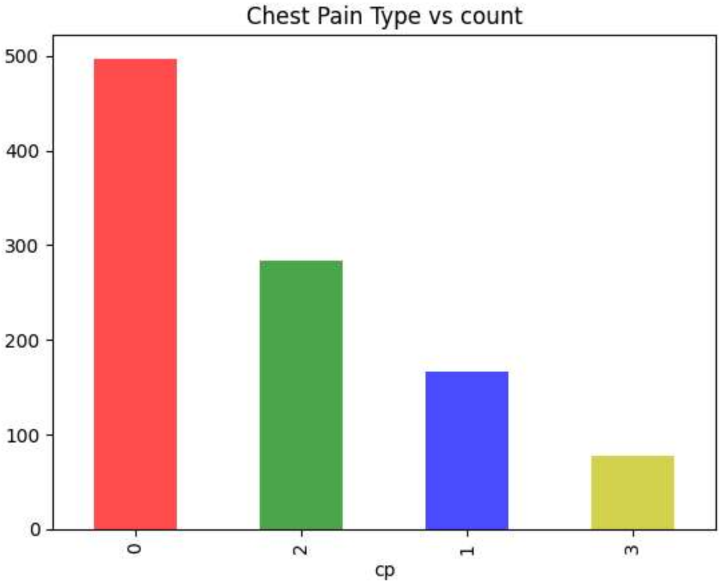


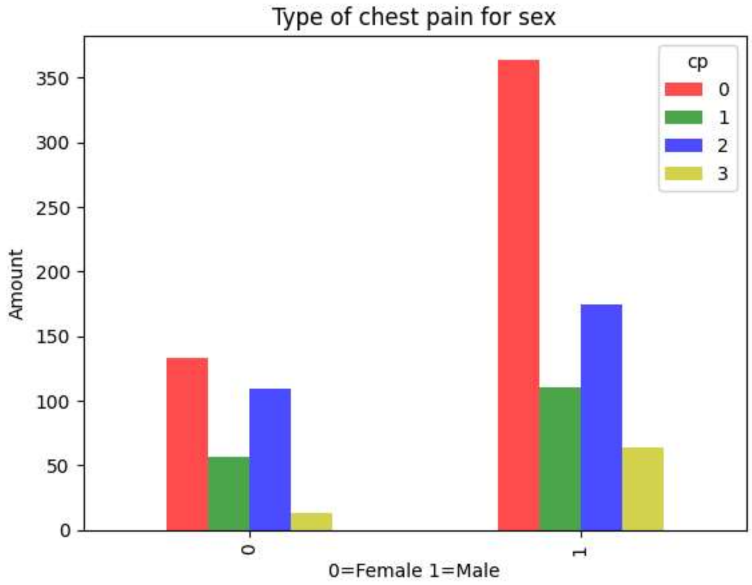
```
#Ques.2 People of which sex has the most heart disease
pd.crosstab(df.target,df.sex)
sns.countplot(x='target',hue='sex',data=df)
plt.title("Heart Disease Frequency for Sex")
plt.xlabel("0=No Disease 1=Disease")
plt.ylabel("Amount")
plt.show()
```



```
#Ques.3 People of which sex has which type of chest pain most?
cp=df.cp.value_counts()
print(cp)
#plotting results
# df.cp.value_counts().plot(kind='pie',autopct='%1.0f%%')
# plt.legend(['ASY','ATA','NAP','TA'])
# plt.title("Chest Pain")
# plt.show()
df.cp.value_counts().plot(kind='bar',color=['r','g','b','y'],alpha=0.7)
plt.title("Chest Pain Type vs count")
pd.crosstab(df.sex,df.cp)
#plotting crosstab
pd.crosstab(df.sex,df.cp).plot(kind='bar',color=['r','g','b','y'],alpha=0.7)
plt.title("Type of chest pain for sex")
plt.xlabel('0=Female 1=Male')
plt.ylabel('Amount')
plt.show()
```

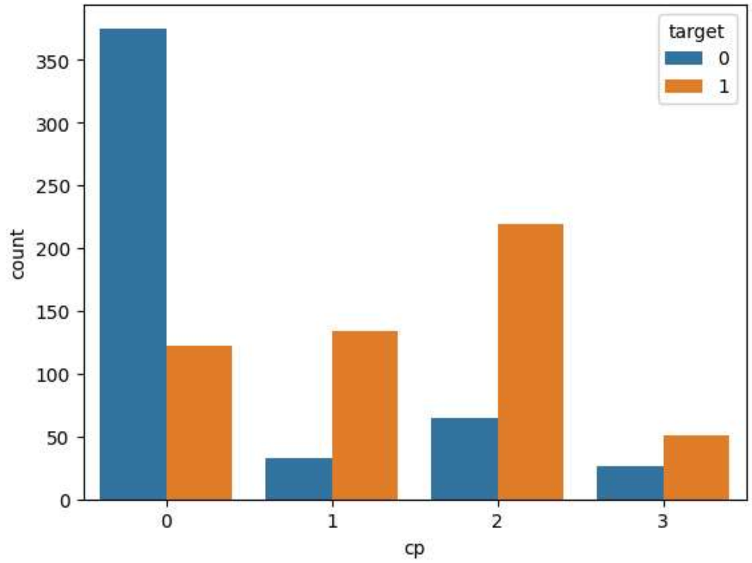
```
cp
0    497
2    284
1    167
3     77
Name: count, dtype: int64
```

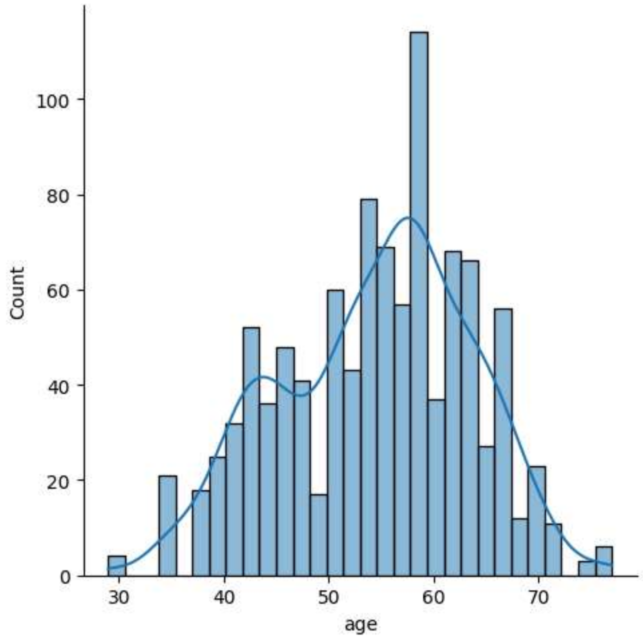

Chest Pain Type vs count

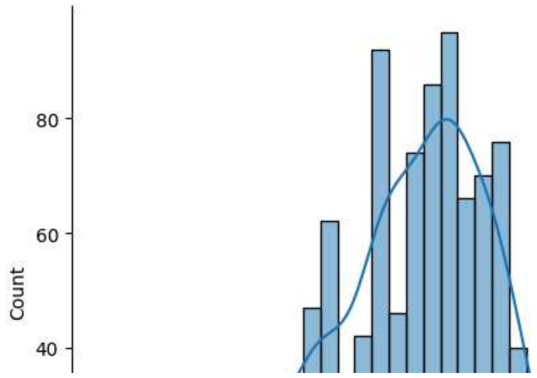

Type of chest pain for sex

```
#Ques.4 People with which chest pain are most pron to have heart disease?
pd.crosstab(df.target,df.cp)

sns.countplot(x=df.cp,data=df,hue='target')

#Plotting for age
sns.displot(x='age',data=df,bins=30,kde=True)

#plotting for maximum heart rate
sns.displot(x='thalach',data=df,bins=30,kde=True)
```

```
<seaborn.axisgrid.FacetGrid at 0x7d531f30cb80>
```







```
#Ques. 5 How Many person having fbs value 0 or  1 are pron to have heart disease?
```