In [1]:
```python
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler, OneHotEncoder
```

In [2]:
```python
df=pd.read_csv(r"C:\Users\Ramya\OneDrive\Documents\heart-diseases datset.csv")
df
```

Out[2]:

	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
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
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

1025 rows × 14 columns

missing values

In [3]:
```python
df.isnull()    # to find null values by true and false
```

Out[3]:

	age	sex	cp	trestbps	chol	fbs	restecg	thalach	exang	oldpeak	slope	ca	thal
0	False	False	False	False	False	False	False	False	False	False	False	False	False
1	False	False	False	False	False	False	False	False	False	False	False	False	False
2	False	False	False	False	False	False	False	False	False	False	False	False	False
3	False	False	False	False	False	False	False	False	False	False	False	False	False
4	False	False	False	False	False	False	False	False	False	False	False	False	False
...	...	...	...	...	...	...	...	...	...	...	...	...	...
1020	False	False	False	False	False	False	False	False	False	False	False	False	False
1021	False	False	False	False	False	False	False	False	False	False	False	False	False
1022	False	False	False	False	False	False	False	False	False	False	False	False	False
1023	False	False	False	False	False	False	False	False	False	False	False	False	False
1024	False	False	False	False	False	False	False	False	False	False	False	False	False

1025 rows × 14 columns

In [4]:

```
df.isnull().sum()  # to find no.of null values
```

Out[4]:

```
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
```

duplicate values finding

In [5]:

```
dp=df.duplicated().sum()    # to find duplicates values
print(f"Duplicate Rows:{dp}")
```

```
Duplicate Rows:723
```

In [6]:

```
dp=df.duplicated().sum()    # to remove duplicates vales
print(f"Duplicate Rows:{dp}")
if dp>0:
    df=df.drop_duplicates()
df
```

```
Duplicate Rows:723
```

Out[6]:

	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
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
723	68	0	2	120	211	0	0	115	0	1.5	1	0	2	1
733	44	0	2	108	141	0	1	175	0	0.6	1	0	2	1
739	52	1	0	128	255	0	1	161	1	0.0	2	1	3	0
843	59	1	3	160	273	0	0	125	0	0.0	2	0	2	0
878	54	1	0	120	188	0	1	113	0	1.4	1	1	3	0

302 rows x 14 columns

In [7]:

```
df.shape
```

Out[7]:

```
(302, 14)
```

In [8]:

```
df.info
```

Out[8]:

```
<bound method DataFrame.info of      age  sex  cp  trestbps  chol  fbs  restecg  thal
ach  exang  oldpeak  \
0     52    1   0       125   212    0        1      168      0      1.0
1     53    1   0       140   203    1        0      155      1      3.1
2     70    1   0       145   174    0        1      125      1      2.6
3     61    1   0       148   203    0        1      161      0      0.0
4     62    0   0       138   294    1        1      106      0      1.9
..   ...  ...  ..       ...   ...  ...      ...      ...    ...      ...
723   68    0   2       120   211    0        0      115      0      1.5
733   44    0   2       108   141    0        1      175      0      0.6
739   52    1   0       128   255    0        1      161      1      0.0
843   59    1   3       160   273    0        0      125      0      0.0
878   54    1   0       120   188    0        1      113      0      1.4

     slope  ca  thal  target
0        2   2     3       0
1        0   0     3       0
2        0   0     3       0
3        2   1     3       0
4        1   3     2       0
..     ...  ..   ...     ...
723      1   0     2       1
733      1   0     2       1
739      2   1     3       0
843      2   0     2       0
878      1   1     3       0

[302 rows x 14 columns]>
```

In [9]:
```
df.describe
```

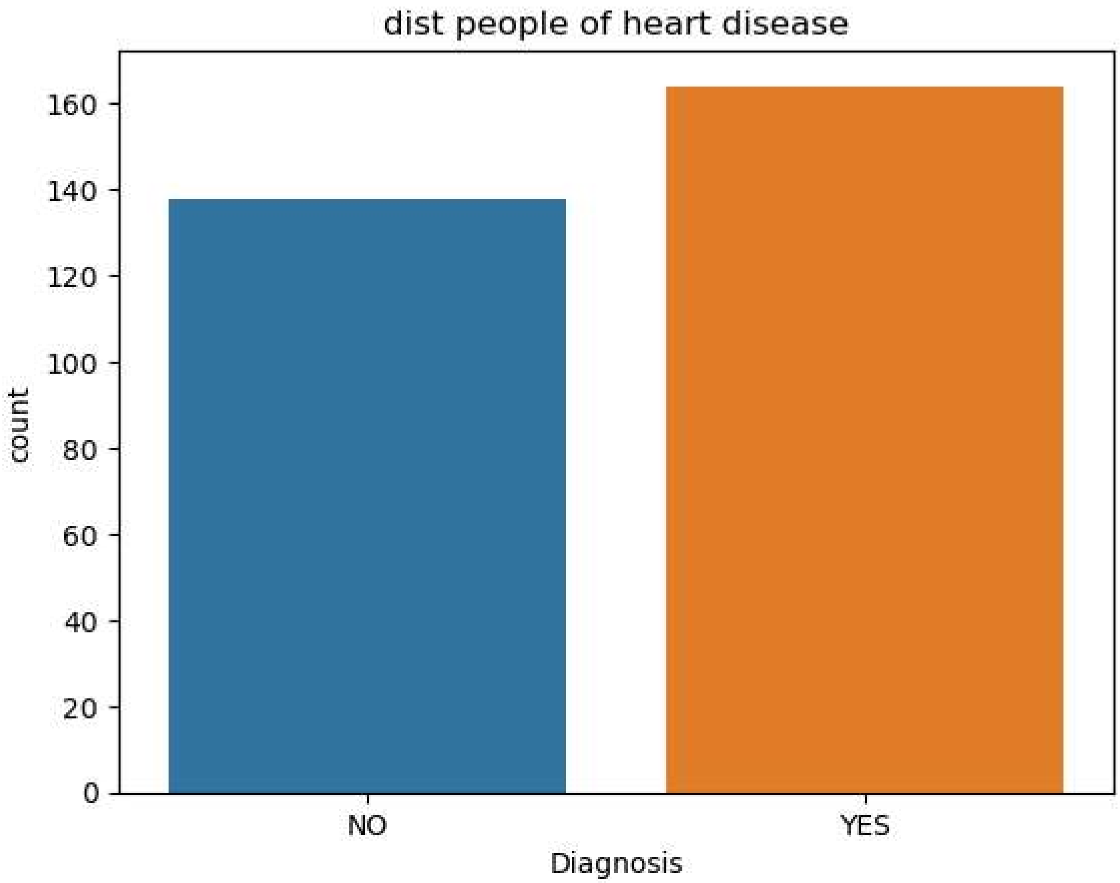
Out[9]:
```
<bound method NDFrame.describe of      age  sex  cp  trestbps  chol  fbs  restecg  th
alach  exang  oldpeak  \
0     52    1   0       125   212    0        1      168      0      1.0
1     53    1   0       140   203    1        0      155      1      3.1
2     70    1   0       145   174    0        1      125      1      2.6
3     61    1   0       148   203    0        1      161      0      0.0
4     62    0   0       138   294    1        1      106      0      1.9
..   ...  ...  ..       ...   ...  ...      ...      ...    ...      ...
723   68    0   2       120   211    0        0      115      0      1.5
733   44    0   2       108   141    0        1      175      0      0.6
739   52    1   0       128   255    0        1      161      1      0.0
843   59    1   3       160   273    0        0      125      0      0.0
878   54    1   0       120   188    0        1      113      0      1.4

     slope  ca  thal  target
0        2   2     3       0
1        0   0     3       0
2        0   0     3       0
3        2   1     3       0
4        1   3     2       0
..     ...  ..   ...     ...
723      1   0     2       1
733      1   0     2       1
739      2   1     3       0
843      2   0     2       0
878      1   1     3       0

[302 rows x 14 columns]>
```

In [10]:
```
df.columns
```

Out[10]:
```
Index(['age', 'sex', 'cp', 'trestbps', 'chol', 'fbs', 'restecg', 'thalach',
       'exang', 'oldpeak', 'slope', 'ca', 'thal', 'target'],
      dtype='object')
```

In [11]:
```
sns.countplot(x="target",data=df)
plt.title('dist people of heart disease')
plt.xlabel('Diagnosis')
plt.xticks(ticks=[0,1],labels=['NO','YES'])
```

Out[11]:
```
([<matplotlib.axis.XTick at 0x24977c86450>,
  <matplotlib.axis.XTick at 0x2497d9b11d0>],
 [Text(0, 0, 'NO'), Text(1, 0, 'YES')])
```



In [12]:

```
df.shape
```

Out[12]:

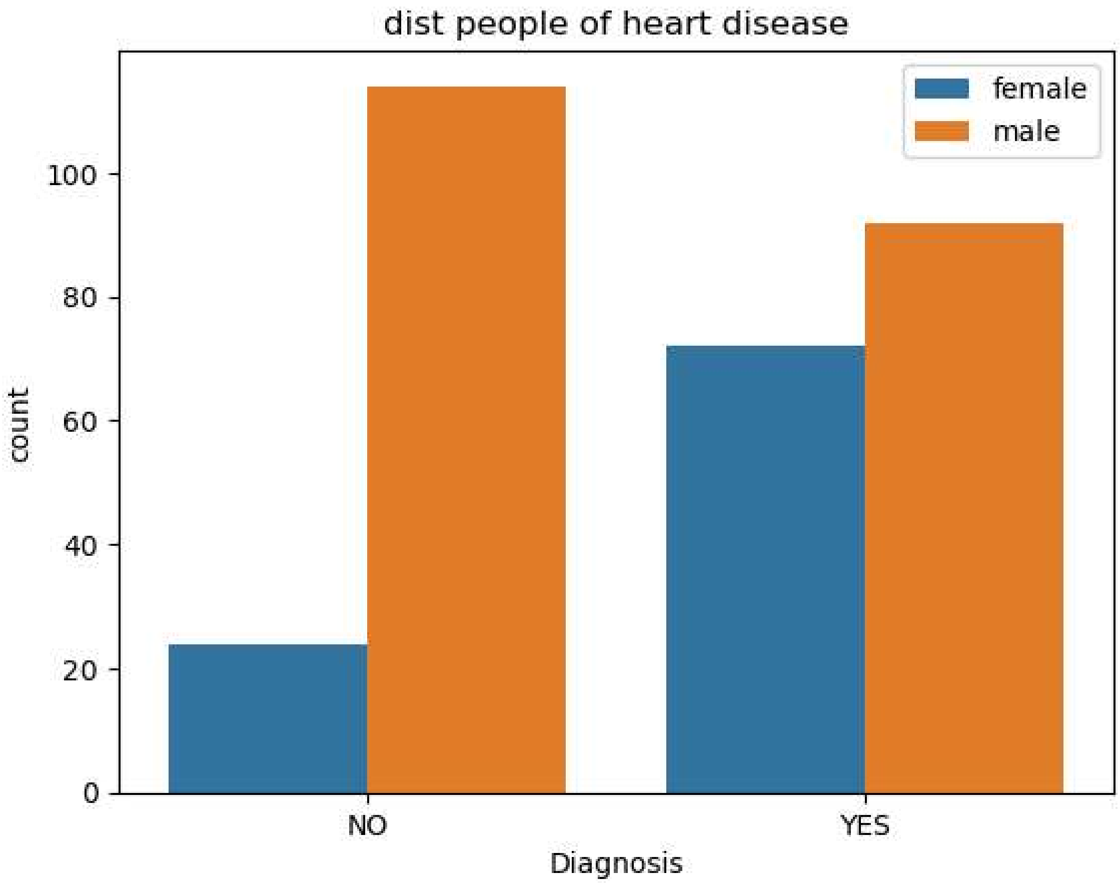
```
(302, 14)
```

In [13]:

```
sns.countplot(x="target",data=df,hue='sex')
plt.legend(labels=['female','male'])
plt.title('dist people of heart disease')
plt.xlabel('Diagnosis')
plt.xticks(ticks=[0,1],labels=['NO','YES'])
```

Out[13]:

```
([<matplotlib.axis.XTick at 0x2497da08b90>,
  <matplotlib.axis.XTick at 0x2497da78d50>],
 [Text(0, 0, 'NO'), Text(1, 0, 'YES')])
```

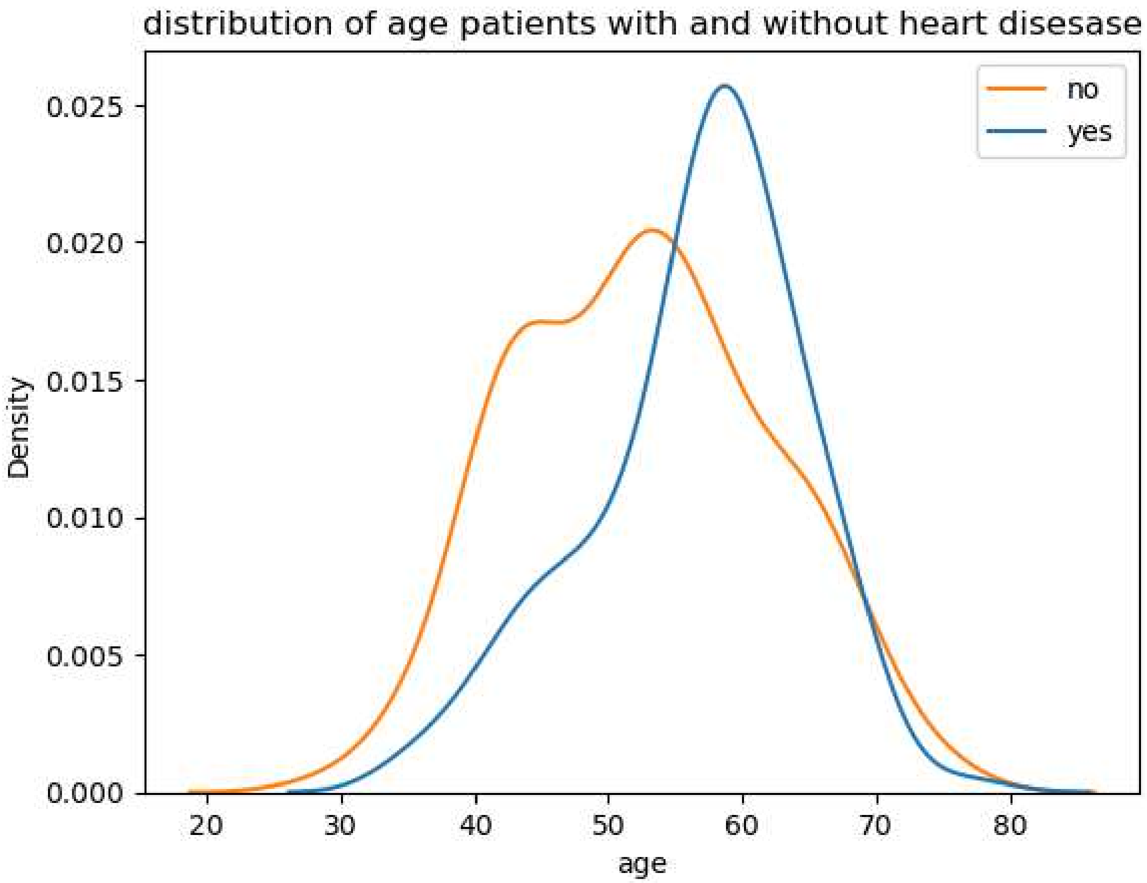


In [14]:

```
sns.kdeplot(x="age",data=df,hue="target")
plt.legend(labels=["no","yes"])
plt.title("distribution of age patients with and without heart disesase")
```

Out[14]:

```
Text(0.5, 1.0, 'distribution of age patients with and without heart disesase')
```



In [15]:

```
# categorical column
cat=["cp","fbs","restecg","exang","slope","ca","thal"]

# numerical column
num=["age","trestbps","chol","thalach","oldpeak","sex"]
num
```

Out[15]:

```
['age', 'trestbps', 'chol', 'thalach', 'oldpeak', 'sex']
```

In [16]:

```
cat
```

Out[16]:

```
['cp', 'fbs', 'restecg', 'exang', 'slope', 'ca', 'thal']
```

Encoding

In [19]:

```
encode=pd.get_dummies(df,columns=cat,drop_first=True)
encode
```

Out[19]:

	age	sex	trestbps	chol	thalach	oldpeak	target	cp_1	cp_2	cp_3	...	exang_1	slope_1	slop
0	52	1	125	212	168	1.0	0	False	False	False	...	False	False	
1	53	1	140	203	155	3.1	0	False	False	False	...	True	False	F
2	70	1	145	174	125	2.6	0	False	False	False	...	True	False	F
3	61	1	148	203	161	0.0	0	False	False	False	...	False	False	
4	62	0	138	294	106	1.9	0	False	False	False	...	False	True	F
...	...	...	...	...	...	...	...	...	...	...	...	...	...	
723	68	0	120	211	115	1.5	1	False	True	False	...	False	True	F
733	44	0	108	141	175	0.6	1	False	True	False	...	False	True	F
739	52	1	128	255	161	0.0	0	False	False	False	...	True	False	
843	59	1	160	273	125	0.0	0	False	False	True	...	False	False	
878	54	1	120	188	113	1.4	0	False	False	False	...	False	True	F

302 rows × 23 columns

In [20]:
```
encode.shape
```

Out[20]:
```
(302, 23)
```

In [22]:
```
print("original shape",df.shape)
print("encode shape",encode.shape)
```

```
original shape (302, 14)
encode shape (302, 23)
```

In [23]:
```
encode.columns
```

Out[23]:
```
Index(['age', 'sex', 'trestbps', 'chol', 'thalach', 'oldpeak', 'target',
       'cp_1', 'cp_2', 'cp_3', 'fbs_1', 'restecg_1', 'restecg_2', 'exang_1',
       'slope_1', 'slope_2', 'ca_1', 'ca_2', 'ca_3', 'ca_4', 'thal_1',
       'thal_2', 'thal_3'],
      dtype='object')
```

In [24]:
```
encode.head()
```

Out[24]:

	age	sex	trestbps	chol	thalach	oldpeak	target	cp_1	cp_2	cp_3	...	exang_1	slope_1	slope_
0	52	1	125	212	168	1.0	0	False	False	False	...	False	False	Tru
1	53	1	140	203	155	3.1	0	False	False	False	...	True	False	Fals
2	70	1	145	174	125	2.6	0	False	False	False	...	True	False	Fals
3	61	1	148	203	161	0.0	0	False	False	False	...	False	False	Tru
4	62	0	138	294	106	1.9	0	False	False	False	...	False	True	Fals

5 rows × 23 columns

In [25]:
```
encode.tail()
```

Out[25]:

	age	sex	trestbps	chol	thalach	oldpeak	target	cp_1	cp_2	cp_3	...	exang_1	slope_1	slop
723	68	0	120	211	115	1.5	1	False	True	False	...	False	True	F
733	44	0	108	141	175	0.6	1	False	True	False	...	False	True	F
739	52	1	128	255	161	0.0	0	False	False	False	...	True	False	
843	59	1	160	273	125	0.0	0	False	False	True	...	False	False	
878	54	1	120	188	113	1.4	0	False	False	False	...	False	True	F

5 rows × 23 columns

In [26]:
```
# convert true/false to 0/1
bool_col=encode.select_dtypes(include="bool").columns
encode[bool_col]=encode[bool_col].astype(int)
encode.head()
```

Out[26]:

	age	sex	trestbps	chol	thalach	oldpeak	target	cp_1	cp_2	cp_3	...	exang_1	slope_1	slope_
0	52	1	125	212	168	1.0	0	0	0	0	...	0	0	
1	53	1	140	203	155	3.1	0	0	0	0	...	1	0	
2	70	1	145	174	125	2.6	0	0	0	0	...	1	0	
3	61	1	148	203	161	0.0	0	0	0	0	...	0	0	
4	62	0	138	294	106	1.9	0	0	0	0	...	0	1	

5 rows × 23 columns

In [ ]: