Source Code:

```
import pandas as pd
data=pd.read_csv("heart_disease_data1.csv")
heart_disease=pd.DataFrame(data)
print(heart_disease)

from pgmpy.models import BayesianModel
model=BayesianModel([
('age','Lifestyle'),
('Gender','Lifestyle'),
('Family','heartdisease'),
('diet','cholestrol'),
('Lifestyle','diet'),
('cholestrol','heartdisease'),
('diet','cholestrol')
])
from pgmpy.estimators import MaximumLikelihoodEstimator
model.fit(heart_disease, estimator=MaximumLikelihoodEstimator)

from pgmpy.inference import VariableElimination
HeartDisease_infer = VariableElimination(model)

print('For age enter SuperSeniorCitizen:0, SeniorCitizen:1, MiddleAged:2, Youth:3, Teen:4')
print('For Gender Enter Male:0, Female:1')
print('For Family History Enter yes:1, No:0')
print('For diet Enter High:0, Medium:1')
print('for lifeStyle Enter Athlete:0, Active:1, Moderate:2, Sedentary:3')
print('for cholesterol Enter High:0, BorderLine:1, Normal:2')

q = HeartDisease_infer.query(variables=['heartdisease'], evidence={
    'age':int(input('enter age')),
    'Gender':int(input('enter Gender')),
    'Family':int(input('enter Family history')),
    'diet':int(input('enter diet')),
    'Lifestyle':int(input('enter Lifestyle')),
    'cholestrol':int(input('enter cholestrol'))
    })

print(q['heartdisease'])
```

Sample Dataset:

	age	Gender	Family	diet	Lifestyle	cholestrol	heartdisease
2	0	0	1	1	3	0	1
3	0	1	1	1	3	0	1
4	1	0	0	0	2	1	1
5	4	0	1	1	3	2	0
6	3	1	1	0	0	2	0
7	2	0	1	1	1	0	1
8	4	0	1	0	2	0	1
9	0	0	1	1	3	0	1
10	3	1	1	0	0	2	0
11	1	1	0	0	0	2	1
12	4	1	0	1	2	0	1
13	4	0	1	1	3	2	0
14	2	1	0	0	0	0	0
15	2	0	1	1	1	0	1
16	3	1	1	0	0	1	0
17	0	0	1	0	0	2	1
18	1	1	0	1	2	1	1
19	3	1	1	1	0	1	0
20	4	0	1	1	3	2	0

Output:

```
    For age enter SuperSeniorCitizen:0, SeniorCitizen:1, MiddleAged:2,
Youth:3, Teen:4
For Gender Enter Male:0, Female:1
For Family History Enter yes:1, No:0
For diet Enter High:0, Medium:1
for lifeStyle Enter Athlete:0, Active:1, Moderate:2, Sedentary:3
for cholesterol Enter High:0, BorderLine:1, Normal:2
enter age2
enter Gender1
enter Family history1
enter diet1
enter Lifestyle0
enter cholestrol2
+----------------+---------------------+
| heartdisease   |   phi(heartdisease) |
+================+=====================+
| heartdisease_0 |              0.8333 |
+----------------+---------------------+
| heartdisease_1 |              0.1667 |
+----------------+---------------------+
```

Source Code:

```
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
from sklearn.cluster import KMeans
from sklearn.mixture import GaussianMixture
import pdb
df1 = pd.read_csv("clusterdata.csv")
print(df1)
f1 = df1['Distance_Feature'].values
f2 = df1['Speeding_Feature'].values

X = np.matrix(list(zip(f1,f2)))
plt.plot(1)
plt.subplot(511)
plt.xlim([0, 100])
plt.ylim([0, 50])
plt.title('Dataset')
plt.ylabel('speeding_feature')
plt.xlabel('distance_feature')
plt.scatter(f1,f2)

colors = ['b', 'g', 'r']
markers = ['o', 'v', 's']
# create new plot and data for K- means algorithm
plt.plot(2)
ax=plt.subplot(513)
kmeans_model = KMeans(n_clusters=3).fit(X)

for i, l in enumerate(kmeans_model.labels_):
    plt.plot(f1[i], f2[i], color=colors[l],marker=markers[l])

plt.xlim([0, 100])
plt.ylim([0, 50])
plt.title('K- Means')
plt.ylabel('speeding_feature')
plt.xlabel('distance_feature')

# create new plot and data for gaussian mixture
plt.plot(3)
plt.subplot(515)
gmm=GaussianMixture(n_components=3).fit(X)
labels= gmm.predict(X)
```

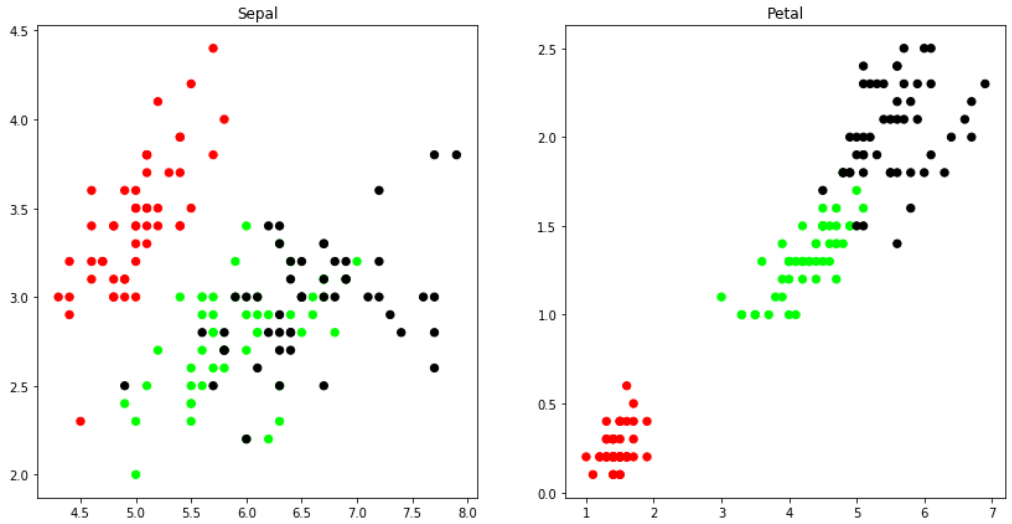
```
    for i, l in enumerate(labels):
        plt.plot(f1[i], f2[i], color=colors[l], marker=markers[l])

    plt.xlim([0, 100])
    plt.ylim([0, 50])
    plt.title('Gaussian Mixture')
    plt.ylabel('speeding_feature')
    plt.xlabel('distance_feature')
    plt.show()
    pdb.set_trace()
```

Sample Dataset:

	age	Gender	Family	diet	Lifestyle	cholestrol	heartdisease
2	0	0	1	1	3	0	1
3	0	1	1	1	3	0	1
4	1	0	0	0	2	1	1
5	4	0	1	1	3	2	0
6	3	1	1	0	0	2	0
7	2	0	1	1	1	0	1
8	4	0	1	0	2	0	1
9	0	0	1	1	3	0	1
10	3	1	1	0	0	2	0
11	1	1	0	0	0	2	1
12	4	1	0	1	2	0	1
13	4	0	1	1	3	2	0
14	2	1	0	0	0	0	0
15	2	0	1	1	1	0	1
16	3	1	1	0	0	1	0
17	0	0	1	0	0	2	1
18	1	1	0	1	2	1	1
19	3	1	1	1	0	1	0
20	4	0	1	1	3	2	0

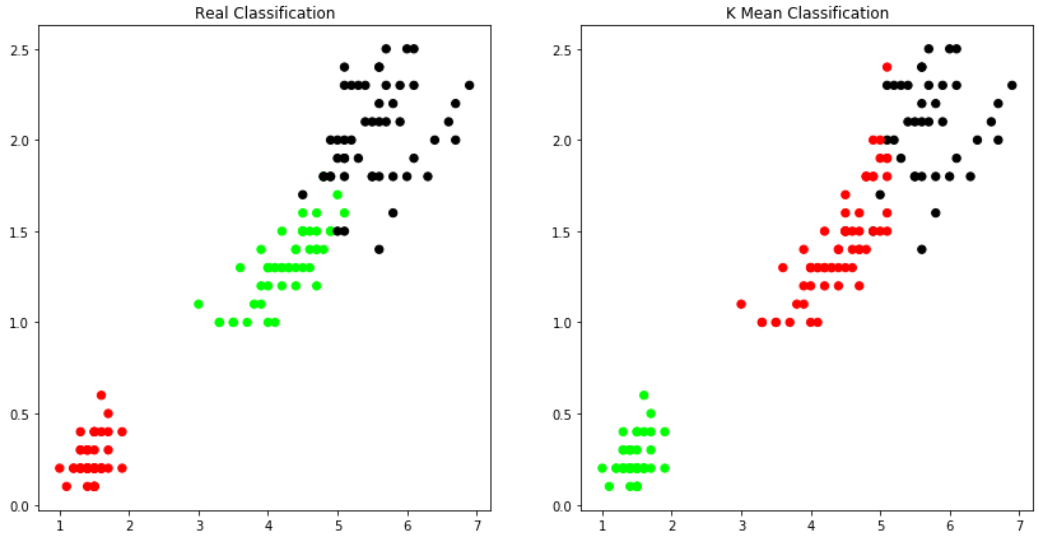
Output:

```
Text(0.5, 1.0, 'Petal')
```




```
[1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
 1 1 1 1 1 1 1 1 1 1 1 1 1 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
 0 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 0 2 2 2 2 0 2 2 2 2
 2 2 0 0 2 2 2 2 0 2 0 2 0 2 2 0 0 2 2 2 2 2 0 2 2 2 2 0 2 2 2 0 2 2 2 0 2
 2 0]
```

```
Text(0.5,1,'K Mean Classification')
```



```
array([1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
       1, 1, 1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 2,
       0, 2, 0, 2, 0, 0, 0, 0, 2, 0, 0, 0, 0, 0, 2, 0, 0, 0, 0, 0, 0, 0,
       0, 0, 0, 0, 0, 0, 0, 0, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,
       2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,
       2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2], dtype=int64)
```

```
Text(0.5,1,'GMM Classification')
```