Expt. No. : 2
Date : 01 / 06 / 21

Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart disease Data Set.

Aim :-

To write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart disease Data Set.

Program :-

```
from pomegranate import *
asia = DiscreteDistribution({'True': 0.5, 'False': 0.5})
tuberculosis = ConditionalProbabilityTable(
[['True', 'True', 0.2],
['True', 'False', 0.8],
['False', 'True', 0.01],
['False', 'False', 0.98]], [asia])
smoking = DiscreteDistribution({'True': 0.5, 'False': 0.5})
lung = ConditionalProbabilityTable(
[['True', 'True', 0.95],
['True', 'False', 0.25],
['False', 'True', 0.02],
['False', 'False', 0.98]], [smoking])
bronchitis = ConditionalProbabilityTable(
[['True', 'True', 0.92],
['True', 'False', 0.08],
```

['False', 'True', 0.03],
['False', 'False', 0.98]], [smoking])
tuberculosis_or_cancer = ConditionalProbabilityTable(
[['True', 'True', 'True', 1.0],
['True', 'True', 'False', 0.0],
['True', 'False', 'True', 1.0],
['True', 'False', 'False', 0.0],
['False', 'True', 'True', 1.0],
['False', 'True', 'False', 0.0],
['False', 'False', 'True', 1.0],
['False', 'False', 'False', 0.0]], [tuberculosis, lung])
xray = ConditionalProbabilityTable(
[['True', 'True', 0.885],
['True', 'False', 0.115],
['False', 'True', 0.04],
['False', 'False', 0.96]], [tuberculosis_or_cancer])
dyspnea = ConditionalProbabilityTable(
[['True', 'True', 'True', 0.96],
['True', 'True', 'False', 0.04],
['True', 'False', 'True', 0.89],
['True', 'False', 'False', 0.11],
['False', 'True', 'True', 0.96],
['False', 'True', 'False', 0.04],
['False', 'False', 'True', 0.89],
['False', 'False', 'False', 0.11]], [tuberculosis_or_cancer, bronchitis])
s0 = State(asia, name="asia")

```
s1 = State(tuberculosis, name="tuberculosis")
s2 = State(smoking, name="smoker")
network = BayesianNetwork("asia")
network.add_nodes(s0, s1, s2)
network.add_edge(s0, s1)
network.add_edge(s1, s2)
network.bake()
print(network.predict_proba({"tuberculosis": 'True'}))
```

Result :-

Thus the program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart disease Data set has been executed successfully.

Output:-


```
[{
    "class" : "Distribution",
    "dtype" : "str",
    "name" : "Discrete Distribution",
    "parameters" : [
        {
            "True" : 0.5025125628140703,
            "False" : 0.4974874371859296
        }
    ],
    "frozen" : false
},
{
    "class" : "Distribution",
    "dtype" : "str",
    "name" : "Discrete Distribution",
    "parameters" : [
        {
            "True" : 0.10552763819095509,
            "False" : 0.8944723618090449
        }
    ],
    "frozen" : false
},
{
    "class" : "Distribution",
    "dtype" : "str",
    "name" : "Discrete Distribution",
    "parameters" : [
        {
            "True" : 0.5,
            "False" : 0.5
        }
    ],
    "frozen" : false
}]
```