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import numpy as np
import pandas as pd
from pgmpy.estimators import MaximumLikelihoodEstimator
from pgmpy.inference import VariableElimination
from pgmpy.models import BayesianNetwork

heartDisease = pd.read_csv("datasets/8-bayesian-network.csv").replace("?", np.nan)
print('Sample instances from the dataset are given below')
heartDisease.head()

model = BayesianNetwork(
    [('age', 'heartdisease'), ('gender', 'heartdisease'), ('exang', 'heartdisease'), ('cp', 'heartdisease'),
     ('heartdisease', 'restecg'), ('heartdisease', 'chol')])
print('\nLearning CPD using Maximum likelihood estimators')
model.fit(heartDisease, estimator=MaximumLikelihoodEstimator)
print('\n Inferencing with Bayesian Network:')
HeartDisease_test_infer = VariableElimination(model)

print('\n 1. Probability of HeartDisease given evidence = restecg')
q1 = HeartDisease_test_infer.query(variables=['heartdisease'], evidence={'restecg': 1})
print(q1)

print('\n 2. Probability of HeartDisease given evidence = cp')
q2 = HeartDisease_test_infer.query(variables=['heartdisease'], evidence={'cp': 2})
print(q2)
```