Expt. No. 9

-	Write a program to construct a Bayesian network considering
1	-medical data. Ose this model to demonstrate the diagnosis
4	of heart patients using Standard Heart disease data set.
1	400 can use Java/Python me library classes/API.
_	
1	emport numby as mp
4	import pandas as bd
1	import csv
1	from pampy estimators import Maximum Likelihood Estimator
	from pgmpy. models import Bayesian Model
	from pampy. Inference import Variable Elimination
	heart Disease = pd. read_csv ('Lab7_heart (sv')
	heart Disease = heart Disease replace ('?', mp. nan)
	print ('Sample instances from the dataset one given below')
	print (heart Disease head())
	print ('In Attributes and datatypes')
- 1	print (heant Disease - dtypes)
	model = Bayesian Model ([('age', 'heantdiscase'), ('scr', 'heantdiscouse')
	('exang', 'heantdisease'), ('cp', 'heantdisease'), ('heantdisease
_	(resterg!) ('heantalisease', (chol')))
_	
_	print ('In Leanning CDP Using Maximom Likelihood estimators')
	model fit Cheant Disease, estimator = Maximon Likelihood Estimator)

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print ('In Interenting with Baye	afan Network.")
Heant Disease test_infen = Vaniage	
print ('In 1. Probability of Heant	Discare given evidence=restery 1')
91 = Heart Discase test_1-nfer. query	(variable = [heartd: sease 1]
evidence = ('resterq':13)	
print (91)	
print ('In 2. Probability of Hear	nt Disease given evidence = cp: 2')
q2 = Heart Diseasetest_inter. query	vaniable = ['heart disease'],
evidence= {'cp': 2})	
print (92)	
	70 Ve
	Teacher's Signature :

Dataset:

						1	(
Sex	ch.	trestos	. chol	fbs	resterg	thalach	exang	hp
1			. 233 .	. 1	2	150	0	0
L			286	0	a	108	7	2
7	4		2 29	0	2	149	1	T
7	3	130	250	0	0	(87	0	0
0	a	130		0	a	172	0	0
T	a	130		0	0 .	178	5 0%	0
0	4	140	268	0	a	160	0	3
0	4		354	0	0	163	7	0
1	4	140	254	0	a	[47]	0	1 2
	0 T T T	1 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	1 1 145 1 4 160 1 4 120 1 3 130 0 2 130 1 20 140 0 4 120 0 4 120	1 1 145 233 1 4 160 286 1 4 120 249 1 3 130 250 0 2 130 204 1 2 120 236 0 4 140 268 0 4 120 354 0 4 130 354	1 1 145 233 1 1 4 160 286 0 1 4 120 224 0 1 3 130 250 0 0 2 130 204 0 1 2 120 236 0 0 4 120 254 0	1 1 145 233 1 2 1 4 160 286 0 2 1 4 120 249 0 2 1 3 130 250 0 0 0 2 130 204 0 2 1 2 120 236 0 0 0 4 140 268 0 2 0 4 120 354 0 0 2 130 354 0 0	1 1 145 233 1 2 150 1 1 4 160 286 0 2 108 1 4 120 249 0 2 149 1 3 130 250 0 0 187 0 2 130 204 0 2 172 1 2 140 236 0 0 178 0 4 140 268 0 2 160 0 4 120 354 0 0 163	1 1 195 233 1 2 150 0 1 1 195 233 1 2 150 0 1 4 160 286 0 2 108 1 1 4 120 249 0 2 149 1 1 3 130 250 0 0 187 0 0 2 130 204 0 2 172 0 1 2 120 236 0 0 178 0 0 4 140 268 0 2 160 0 0 4 130 354 0 0 163 1

Output:

Sample instancy from the dataset are given below

age	Sex	Ср	trestbps	chol	fbs	restecy	thalach	exang	hD
63	1	1	145	233	1	2	150	0	0
67	1	4	160	286	0	a	108	1	a
67	1	4	190	229	0	a	129	1	L
37	+	3	130	250	0	0	187	0	0
41	0	a	130	804	0	a	172	10	0

Attributes and datatypes
age (1164
sex inteq
cp inteq
trestbps inteq
enal
fbs inte4

resterg inter

thalach inter

exang inter

ho Object lint 64

dtype : object

Learning CPD using maximum likelihood estimators.

Interenting with Bayesian network:

1. Probability of Heant Discare given evidence = regtecg. L

heantdiscase	ph: (heartdiscase)
heantdisease(0) heantdisease(1) heantdisease(3) heantdisease(3) heantdisease(4)	0.2000 0.2392 0.2015 0.4581

2. Probability of heart Disease given evidence cp:2

heuntdisease	ph: (heantdisease)
heantdiseauclo)	0.3610
heartdi sease(1)	0-5724
heartdiseasch)	0.1313
heartdiscar(3)	0.1537
heantd:scale (4)	0.1321