AI-ASSIGNMENT3

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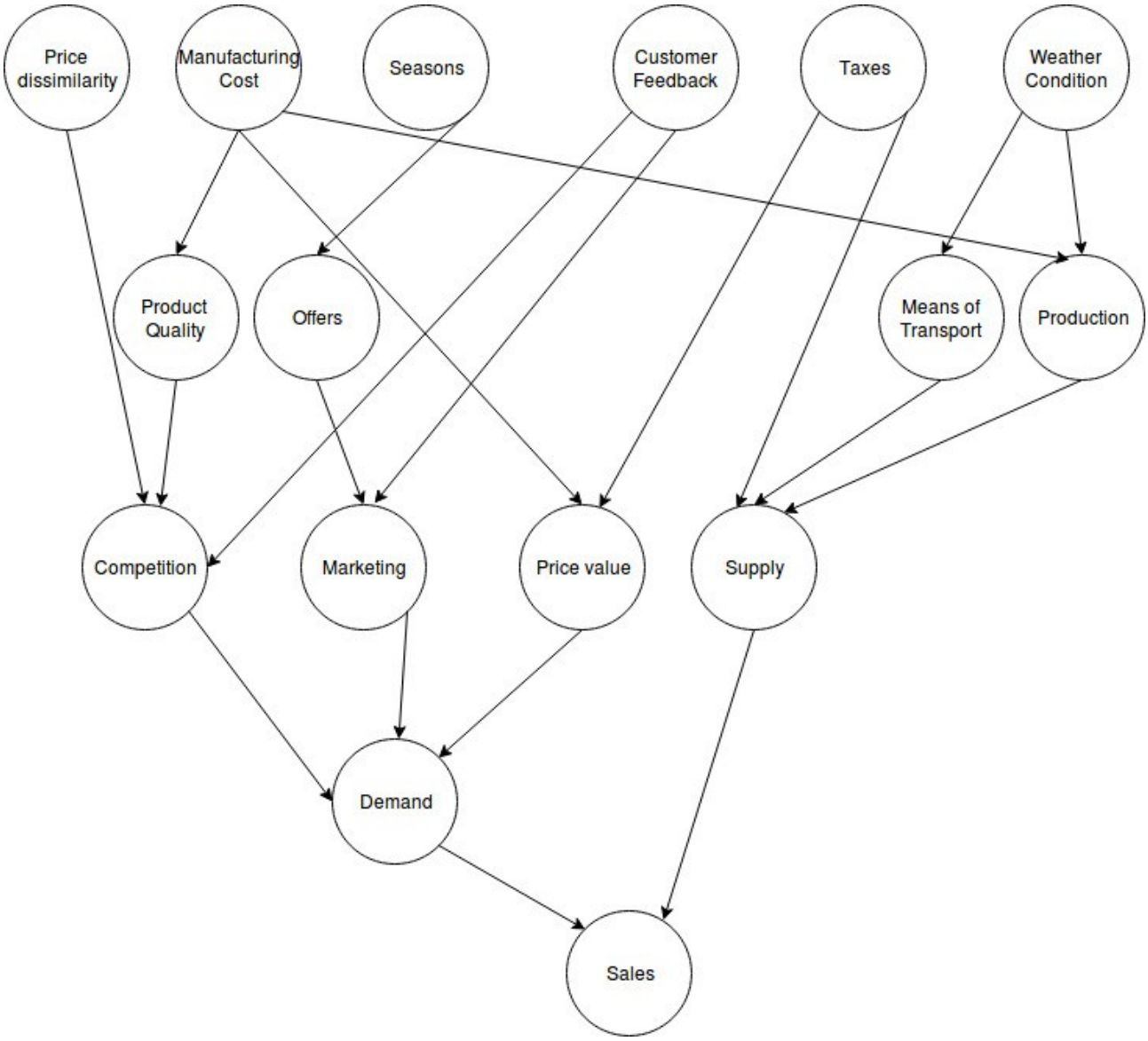
Question 15 - iPhoneXI Sales Prediction

Bayes Net:



Key:

S	Supply	High,Low
D	Demand	High,Low

Sl	Sales	High,Low
P	Price value	1-5000,5001-40000, Above 40000
Se	Seasons	Festive,Normal
M	Marketing	Good,Poor
PQ	Product Quality	Good,Bad
T	Taxes	High,Low
O	Offers	High,Low
C	Competition	High,Low
CF	Customer Feedback	Good,Ok,Bad
Pr	Production	High,Medium,Low
WC	Weather Condition	Good,Bad
MT	Means of transport	Fast,Slow
MC	Manufacturing Cost	1-5000,5001-40000,above 40000
PD	Price dissimilarity	High,Less

Conditional Probability Tables:

Manufacturing Cost

MC	1-5000	5001-40000	Above 40000
P(MC)	0.3	0.55	0.15

Means of Transport

MT	Fast	Slow
P(MT)	0.7	0.3

Weather Condition

WC	Good	Bad
P(WC)	0.9	0.1

Price dissimilarity:

PD	High	Less
P(PD)	0.2	0.8

Customer Feedback:

CF	Good	Ok	Bad
P(CF)	0.3	0.4	0.3

Seasons

Se	Festive	Normal
P(Se)	0.2	0.8

Taxes

T	High	Low
P(T)	0.2	0.8

Quality

MC	Q.Good	Q.Bad
1 - 5000	0.2	0.8

5001 - 40000	0.6	0.4
Above 40000	0.9	0.1

Offers

Se	O.High	O.Low
Festive	0.9	0.1
Normal	0.1	0.9

Price value

MC	T	P.1-5000	P.5001-40000	Above P.40000
1-5000	High	0.7	0.3	0
1-5000	Low	0.9	0.1	0
5001-40000	High	0	0.85	0.15
5001-40000	Low	0	0.95	0.05
Above 40000	High	0	0	1
Above 40000	Low	0	0	1

Marketing

CF	O	M.Good	M.Poor
Good	High	0.95	0.05
Good	Low	0.8	0.2
Ok	High	0.75	0.25
Ok	Low	0.6	0.4
Bad	High	0.3	0.7
Bad	Low	0.1	0.9

Production

MC	WC	Pr.High	Pr.Medium	Pr.Low
1-5000	Good	0.7	0.2	0.1
1-5000	Bad	0.3	0.1	0.6
5001-40000	Good	0.5	0.4	0.1
5001-40000	Bad	0.25	0.15	0.7
Above 40000	Good	0.2	0.3	0.5
Above 40000	Bad	0.05	0.15	0.8

Competition

PQ	PD	CF	C.Less	C.More
Good	High	Good	0.9	0.1
Good	Less	Good	0.8	0.2
Good	High	Ok	0.85	0.15
Good	Less	Ok	0.7	0.3
Good	High	Bad	0.75	0.25
Good	Less	Bad	0.6	0.4
Bad	High	Good	0.65	0.35
Bad	Less	Good	0.4	0.6
Bad	High	Ok	0.5	0.5
Bad	Less	Ok	0.35	0.65
Bad	High	Bad	0.4	0.6
Bad	Less	Bad	0.25	0.75

Demand

P	C	M	D.High	D.Low
1-5000	More	Good	0.7	0.3
1-5000	More	Poor	0.4	0.6
1-5000	Less	Good	0.6	0.4
1-5000	Less	Poor	0.3	0.7
5001-40000	More	Good	0.6	0.4
5001-40000	More	Poor	0.3	0.7
5001-40000	Less	Good	0.5	0.5
5001-40000	Less	Poor	0.2	0.8
Above 40000	More	Good	0.45	0.55
Above 40000	More	Poor	0.15	0.85
Above 40000	Less	Good	0.35	0.65
Above 40000	Less	Poor	0.05	0.95

Supply

T	MT	Pr	S.High	S.Low
High	Fast	High	0.85	0.15
High	Fast	Medium	0.75	0.25
High	Fast	Low	0.7	0.3

High	Slow	High	0.75	0.25
High	Slow	Medium	0.7	0.3
High	Slow	Low	0.65	0.35
Low	Fast	High	0.9	0.1
Low	Fast	Medium	0.8	0.2
Low	Fast	Low	0.75	0.25
Low	Slow	High	0.8	0.2
Low	Slow	Medium	0.75	0.25
Low	Slow	Low	0.7	0.3

Sales

D	S	Sl.High	Sl.Low
High	High	0.95	0.05
High	Low	0.7	0.3
Low	High	0.4	0.6
Low	Low	0.3	0.7

Justifications

1. Whenever there are more festive seasons there will be more offers.Hence during festive season probability of offers is very high. Hence inorder to increase their sales they do more marketing.

2. Whenever there is demand even though the supply is less, the sales of the product will be the number of products got through supply, though the ratio of being sold is high the number of products sold is less.

3. Whenever the weather conditions are bad , it will affect the production rate as the labour will demand high wages and also the transportation will be hard.

4. Competition depends on comparison between different companies selling that good.It also depends mainly on customer satisfaction and price dissimilarities for similar kind of features.

5. Price value of a good is decided by cost of the production of the good as well as the taxes that need to be paid to the government.

6. Generally less priced goods have more demand as people show more interest towards them.

7. Whenever there is more transportation there is more supply.

8. The product quality is determined by the attractivness, sustainability and safeness. The quality of the product determines the demand of the good

Query

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P(S=High | MT = Fast and WC = Good)

= P(S=High | MT = Fast and Pr = High) * P(Pr= High | WC = Good) + P(S=High | MT = Fast and Pr = Medium) * P(Pr= Medium | WC= Good) * P(S=High | MT = Fast and Pr = Low) * P(Pr= Low | WC= Good)

---Eq1

P(Pr=High | WC = Good) = P(MC=1-5000)*0.7 + P(5001 – 40000)*0.5 + P(Above 40000)*0.2

= 0.3*0.7 + 0.55*0.5 + 0.15*0.2
= 0.21 + 0.275 + 0.03
= 0.515

P(Pr=Medium | WC = Good) = P(MC=1-5000)*0.2 + P(5001 – 40000)*0.4 + P(Above 40000)*0.3

= 0.3*0.2 + 0.55*0.4 + 0.15*0.3
= 0.06 + 0.22 + 0.045
= 0.325

P(Pr=Low | WC = Good) = P(MC=1-5000)*0.1 + P(5001 – 40000)*0.1 + P(Above 40000)*0.5

= 0.3*0.1 + 0.55*0.1 + 0.15*0.5
= 0.03 + 0.055 + 0.075
= 0.16

from Eq1:

= (0.8*P(T=High)+0.85*P(T=Low))*(0.785) + (0.75*P(T=High)
+0.8*P(T=Low))*(0.325)+(0.7*P(T=High)+0.75*P(T=Low))*(0.16)

= (0.85*0.2+0.9*0.8)*(0.515) + (0.75*0.2+0.8*0.8)*(0.325) + (0.7*0.2 +
0.75*0.8)*(0.16)

= (0.89)*(0.515) + (0.79)*(0.325) + (0.74)*(0.16)

= 0.8335

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Therefore
P(S=High | MT = Fast and WC = Good)=0.8335
Here X=S,p(X)=MT and p(p(X))=WC