

Artificial Intelligence

Assignment-3: Bayesian Networks

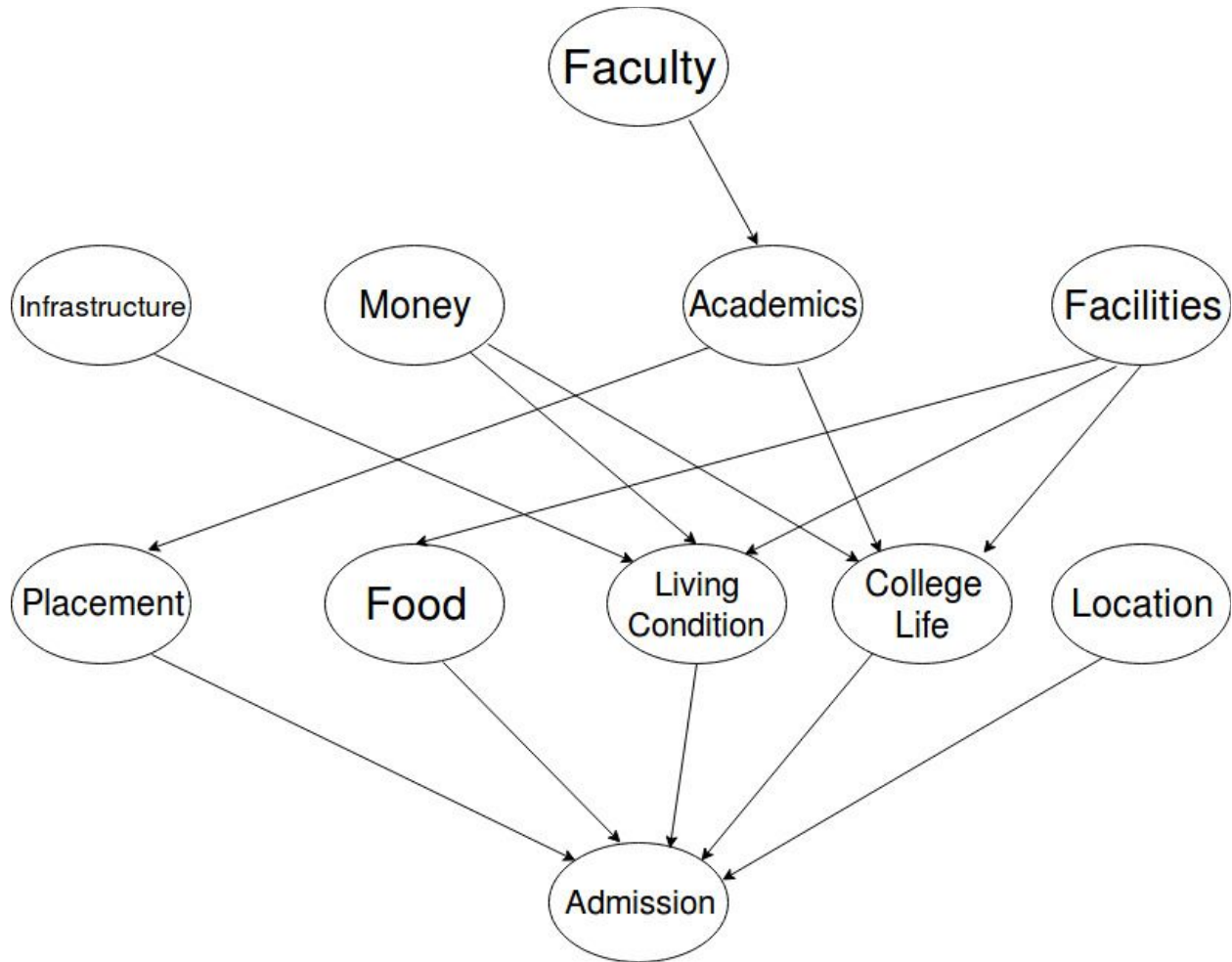
Team Number: 36

Team Members

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Key

F	Faculty	Good/Bad
M	Money	Afford/Can not Afford
A	Academics	Good/Bad
I	Infrastructure	Good/Bad
FA	Facilities	High/Low
P	Placement	High/Low
FD	Food	Healthy/Not Healthy
LC	Living Condition	Good/Bad
CL	College Life	Good/Bad
L	Location	Far/Near
AD	Admission	Yes/No



Conditional Probability Tables

Faculty

F	Good	Bad
P(F)	0.8	0.2

Infrastructure

I	Good	Bad
P(I)	0.6	0.4

Facilities

FA	High	Low
P(FA)	0.6	0.4

Location

L	Far	Near
P(L)	0.7	0.3

Money

M	Afford	Can not Afford
P(M)	0.5	0.5

Academics

F	A.Good	A.Bad
Good	0.9	0.1
Bad	0.4	0.6

Placement

A	P.High	P.Low
Good	0.8	0.2
Bad	0.4	0.6

Food

FA	FD.High	FD.Low
High	0.7	0.3
Low	0.5	0.5

Living Conditions

I	FA	M	LC.Good	LC.Bad
Good	High	Afford	0.8	0.2
Good	High	Can not Afford	0.6	0.4
Good	Low	Afford	0.7	0.3
Good	Low	Can not Afford	0.4	0.6
Bad	High	Afford	0.5	0.5
Bad	High	Can not Afford	0.4	0.6
Bad	Low	Afford	0.3	0.7
Bad	Low	Can not Afford	0.2	0.8

College Life

A	FA	M	CL.Go od	CL.Bad
Good	High	Afford	0.9	0.1
Good	High	Can not Afford	0.7	0.3

Good	Low	Afford	0.85	0.15
Good	Low	Can not Afford	0.6	0.4
Bad	High	Afford	0.4	0.6
Bad	High	Can not Afford	0.3	0.7
Bad	Low	Afford	0.25	0.75
Bad	Low	Can not Afford	0.1	0.9

Admission

P	FD	LC	CL	L	AD.Yes	AD.No
High	Healthy	Good	Good	Good	0.99	0.01
High	Healthy	Good	Good	Bad	0.96	0.04
High	Healthy	Good	Bad	Good	0.93	0.07
High	Healthy	Good	Bad	Bad	0.90	0.10
High	Healthy	Bad	Good	Good	0.87	0.13
High	Healthy	Bad	Good	Bad	0.84	0.16
High	Healthy	Bad	Bad	Good	0.81	0.19
High	Healthy	Bad	Bad	Bad	0.78	0.22
High	Non-Healthy	Good	Good	Good	0.75	0.25

High	Non-Healthy	Good	Good	Bad	0.72	0.28
High	Non-Healthy	Good	Bad	Good	0.69	0.31
High	Non-Healthy	Good	Bad	Bad	0.66	0.34
High	Non-Healthy	Bad	Good	Good	0.63	0.37
High	Non-Healthy	Bad	Good	Bad	0.60	0.40
High	Non-Healthy	Bad	Bad	Good	0.57	0.43
High	Non-Healthy	Bad	Bad	Bad	0.54	0.46
Low	Healthy	Good	Good	Good	0.51	0.49
Low	Healthy	Good	Good	Bad	0.48	0.52
Low	Healthy	Good	Bad	Good	0.45	0.55
Low	Healthy	Good	Bad	Bad	0.42	0.58
Low	Healthy	Bad	Good	Good	0.39	0.61
Low	Healthy	Bad	Good	Bad	0.36	0.64
Low	Healthy	Bad	Bad	Good	0.33	0.67
Low	Healthy	Bad	Bad	Bad	0.30	0.70
Low	Non-Healthy	Good	Good	Good	0.27	0.73
Low	Non-Healthy	Good	Good	Bad	0.24	0.76
Low	Non-Healthy	Good	Bad	Good	0.21	0.79
Low	Non-Healthy	Good	Bad	Bad	0.18	0.82
Low	Non-Healthy	Bad	Good	Good	0.15	0.85
Low	Non-Healthy	Bad	Good	Bad	0.12	0.88
Low	Non-Healthy	Bad	Bad	Good	0.09	0.91
Low	Non-Healthy	Bad	Bad	Bad	0.06	0.94

Justifications

- In location, we have given the probabilities of the location favourable to the person whom we are or will be recommending the college.
- We are assuming an equal balance between the will to spend money or not, so that the recommendation does not give bias results for money factor.
- We are assuming that the money we are willing to give has no relation with the faculty.
- We have also assumed that the college life has no dependence with the infrastructure.
- We have assumed that Infrastructure and Facilities are independent of Location.

Query

Parent(CL) = A and Parent(A) = F

P(CL=Bad | A=Bad, F=Good):

=> $(P(CL=Bad | A=Bad, FA=High, M=Afford) * P(FA=High) * P(M=Afford) +$
 $P(CL=Bad | A=Bad, FA=High, M=Can not Afford) * P(FA=High) * P(M=Can not$
 $Afford) + P(CL=Bad | A=Bad, FA=Low, M=Afford) * P(FA=Low) * P(M=Afford) +$
 $P(CL=Bad | A=Bad, FA=Low, M=Can not Afford) * P(FA=Low) * P(M=Can not$
 $Afford)) * P(A=Bad | F=Good)$

=> $(0.6 * 0.6 * 0.5 + 0.7 * 0.6 * 0.5 + 0.75 * 0.4 * 0.5 + 0.9 * 0.4 * 0.5) * 0.1$

=> 0.072

P(CL=Good | A=Bad, F=Good):

=> $(P(CL=Good | FA=High, M=Afford) * P(FA=High) * P(M=Afford) +$
 $P(CL=Good | FA=High, M=Can not Afford) * P(FA=High) * P(M=Can not$

Afford) + $P(\text{CL}=\text{Good} \mid \text{FA}=\text{Low}, \text{M}=\text{Afford}) \cdot P(\text{FA}=\text{Low}) \cdot P(\text{M}=\text{Afford}) +$
 $P(\text{CL}=\text{Good} \mid \text{FA}=\text{Low}, \text{M}=\text{Can not Afford}) \cdot P(\text{FA}=\text{Low}) \cdot P(\text{M}=\text{Can not Afford})) \cdot P(\text{A}=\text{Bad} \mid \text{F}=\text{Good})$

$\Rightarrow (0.4 \cdot 0.6 \cdot 0.5 + 0.3 \cdot 0.6 \cdot 0.5 + 0.25 \cdot 0.4 \cdot 0.5 + 0.1 \cdot 0.4 \cdot 0.5) \cdot 0.1$

$\Rightarrow 0.028$