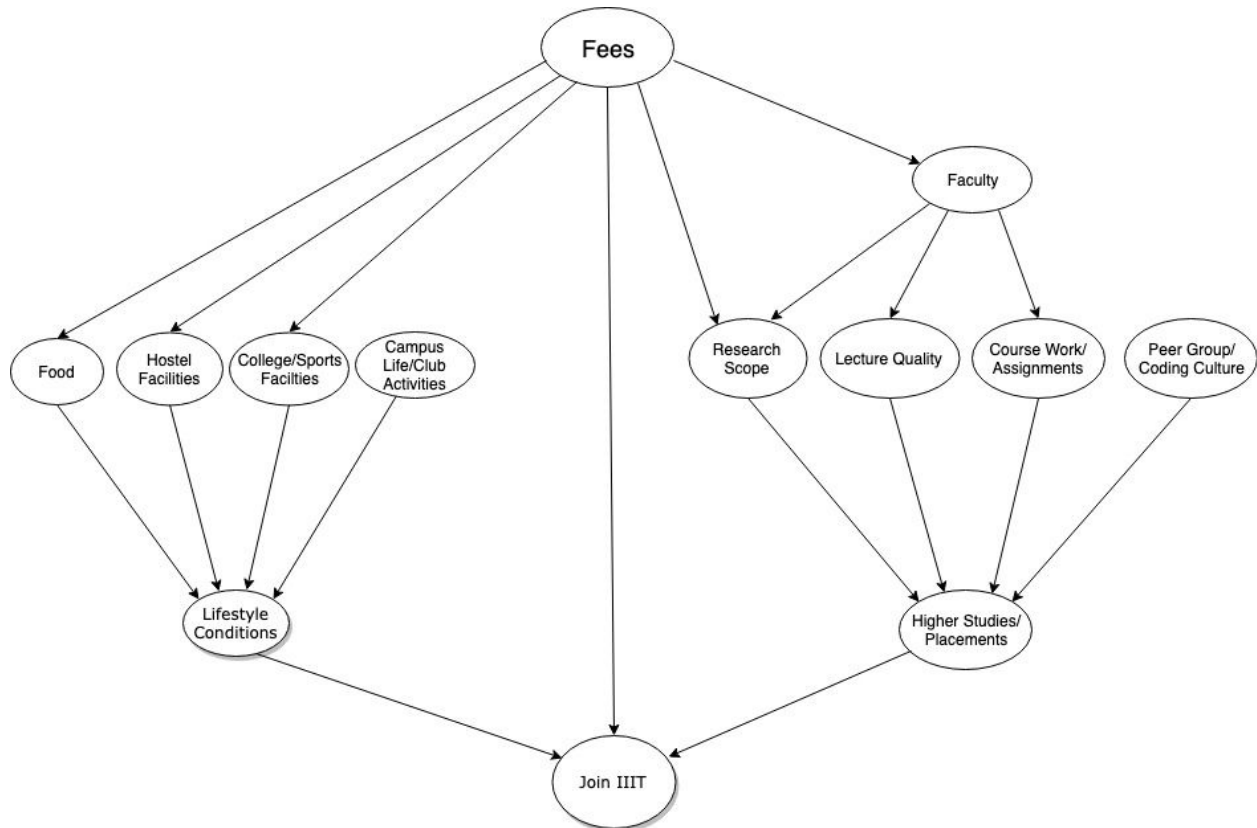


Bayesian Networks

Diagram:



Conditional Probability Tables:

Assumptions:

We have taken an arbitrary binary good/bad status as a matrix for many of our nodes. Here, good and bad is the opinion collected from people. So when we say lecture quality is good with probability of 0.7, we actually mean that 70% of the people claim that the lectures are good while remaining 30% said it is bad. Similarly, when we say lifestyle good with probability 0.5, we mean during our survey we had 50% of people claiming their life good. We're assuming that this probability applies to a new comer as well.

Fees(F):

F	HIGH	LOW
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P(F)	0.5	0.5
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Students from all economic backgrounds apply, hence around half the sample set would classify the fees to be high vs low.

Campus Life/Club Activities(CA):

CA	GOOD	BAD
P(CA)	0.35	0.65

IIITH being known for its academics, club activities have a low probability of satisfying an individual as their major focus is coding/research. The fees has no effect on club activities as it is the college's focus which matters where they will invest the money on

Faculty(PROF):

F	PROF.GOOD	PROF.BAD
HIGH	0.75	0.25
LOW	0.4	0.6

With a high fees, the institute can afford higher salaries, which will attract a better set of professors.

Even with lower fees, since the institute places great emphasis on good quality research profs, there's still a decent possibility of getting great profs.

Food(Fo):

F	Fo.GOOD	Fo.BAD
HIGH	0.9	0.1
LOW	0.3	0.7

It is very difficult to produce good food(hygiene wise as well as taste wise) with a low fees. Therefore, with low fees there is a low probability of getting good food whereas with higher fees probability that the food is bad is almost negligible.

Hostel Conditions(H):

F	H.GOOD	H.BAD
HIGH	0.8	0.2
LOW	0.2	0.8

With higher fees you obviously get better facilities. This is because a lot of cost goes in maintenance, electricity bills etc.

College amenities/ Sports Facilities(Faci):

F	Faci.GOOD	Faci.BAD
HIGH	0.8	0.2
LOW	0.3	0.7

Huge costs are required to maintain/build sports facilities and other college amenities. Therefore, a low fees almost gives no scope of having good college amenities/ sports facilities.

Lifestyle/Living conditions(Life):

Fo	CA	H	Faci	Life.GOOD	Life.BAD
GOOD	GOOD	GOOD	GOOD	0.9	0.1
GOOD	GOOD	GOOD	BAD	0.75	0.25
GOOD	GOOD	BAD	GOOD	0.6	0.4
GOOD	GOOD	BAD	BAD	0.58	0.42
GOOD	BAD	GOOD	GOOD	0.8	0.2
GOOD	BAD	GOOD	BAD	0.78	0.22
GOOD	BAD	BAD	GOOD	0.5	0.5
GOOD	BAD	BAD	BAD	0.4	0.6

BAD	GOOD	GOOD	GOOD	0.5	0.5
BAD	GOOD	GOOD	BAD	0.1	0.9
BAD	GOOD	BAD	GOOD	0.2	0.8
BAD	GOOD	BAD	BAD	0.05	0.95
BAD	BAD	GOOD	GOOD	0.15	0.85
BAD	BAD	GOOD	BAD	0.12	0.88
BAD	BAD	BAD	GOOD	0.1	0.9
BAD	BAD	BAD	BAD	0.05	0.95

We can see that there is a good 75% of the students who don't care about the college amenities/sports facilities but consider their lifestyle good as long as the food, hostel conditions is good and of course there is a good scope of co curricular activities.

We can also see that there is 50% of students extremely satisfied with their living conditions even if the quality/taste of food is bad. This is a clear indication that there are 50% students who order food from outside.

There is 10% of students who are looking for good sports facilities and are very happy if only good facilities are present. These are probably students who wish to be champions in fields related to sports etc.

There is 5% students who are coming here only to study. They don't care about lifestyles as evident from the last row of the Lifestyle/Living conditions table. But needless to say this is a very small probability

Lecture Quality(L):

PROF	L.GOOD	L.BAD
GOOD	0.8	0.2
BAD	0.1	0.9

We can see that 20% of students claim that the lectures are of bad quality even if the professors are good. This shows their lack of attention in the class or incompetency to follow the class/courses/lectures. At the same time when we have bad professors there is that 10% of the students who still can connect and understand the lectures probably they had advanced those topics on their own or can catch up really quickly and fill up the gaps by the professor.

Course Scope/Assignments(Assn):

PROF	Assn.GOOD	Assn.BAD
GOOD	0.9	0.1
BAD	0.2	0.8

Quality of professor clearly affects how much assignments and course scope.

Research Work(RW):

F	PROF	RW.GOOD	RW.BAD
HIGH	GOOD	0.95	0.05
HIGH	BAD	0.1	0.9
LOW	GOOD	0.4	0.6
LOW	BAD	0.05	0.95

Research work depends a lot on funding(fees of students) and professors. We can see that even without good funding there is a good 40% chance that the research is good if the professors are good. This shows the importance of professors in research. And, even with proper funding, bad professors have very low probability(0.1) of pulling off amazing research work. With bad professors and bad funding, there is a slight probability that research work is good because of the quality of students at IIIT, who can motivate themselves on their own and can progress without much guidance and mentorship. But as we can see this is only 5% of the population.

Peer Group/Coding culture(PGCC)

PGCC	GOOD	BAD
P(PGCC)	0.7	0.3

Most of the students feel that IIITH has a good peer group. This is evident from our excellent results in GSOC/ICPC etc. The general public has a very high view of this peer group based on these results.

Higher Studies/Placements(Fut):

PGCC	RW	Assn	L	Fut.GOOD	Fut.BAD
GOOD	GOOD	GOOD	GOOD	0.9	0.1
GOOD	GOOD	GOOD	BAD	0.6	0.4
GOOD	GOOD	BAD	GOOD	0.5	0.5
GOOD	GOOD	BAD	BAD	0.5	0.5
GOOD	BAD	GOOD	GOOD	0.6	0.4
GOOD	BAD	GOOD	BAD	0.5	0.5
GOOD	BAD	BAD	GOOD	0.45	0.55
GOOD	BAD	BAD	BAD	0.4	0.6
BAD	GOOD	GOOD	GOOD	0.8	0.2
BAD	GOOD	GOOD	BAD	0.6	0.4
BAD	GOOD	BAD	GOOD	0.3	0.7
BAD	GOOD	BAD	BAD	0.01	0.99
BAD	BAD	GOOD	GOOD	0.6	0.4
BAD	BAD	GOOD	BAD	0.5	0.5
BAD	BAD	BAD	GOOD	0.2	0.8
BAD	BAD	BAD	BAD	0.01	0.99

Quality of research work has no effect on future of a student if the lecture qualities and scope of courses/assignments are bad but there is a good peer group. Bad lectures and courses can never result in good research work and hence the variable RW has very diminished returns.

Having a good peer group, good courses and good lectures can result in a really good future even if research work is bad. This is because Software Engineers(who do not do research but

only do coding) are paid pretty high nowadays. Coding is a very demanding skill to have which can be developed because of the good peer group/coding culture.

We can also see the quality of assignment/course content has a very high correlation with a student's future. This is because in modern world practical knowledge is of utmost importance. There is no use of theoretical(lecture) knowledge if you cannot apply. This explains why lecture quality being bad or good has no effect if the assignments/course content quality is bad.

Finally, if all RW, L, Assn are all bad, a student still has a good probability of 0.4 of having a good future only because of the good coding culture.

In spite of having bad peer group, bad lectures and bad course design but a good research reputation, very few 1% of students consider they might have a good future. This is probably because they are independently motivated and don't depend on the institute for anything but just a degree.

Join IIIT (J):

Life	F	Fut	J.YES	J.NO
GOOD	HIGH	GOOD	0.5	0.5
GOOD	HIGH	BAD	0.001	0.999
GOOD	LOW	GOOD	0.99	0.01
GOOD	LOW	BAD	0.001	0.999
BAD	HIGH	GOOD	0.4	0.6
BAD	HIGH	BAD	0.001	0.999
BAD	LOW	GOOD	0.6	0.4
BAD	LOW	BAD	0.001	0.999

We can see that lifestyle and fees has no effect if future prospects is bad. Also, recommendation for a "YES" is extremely low with a probability of 0.001.

If fees is high, and lifestyle is good and so is future prospects, a recommendation of YES is with probability 0.5. This is because of the 50% of the students who cannot afford

If fees is low and living conditions is not upto the mark, with 60% chance it's recommend YES. This is for those types of students who focus on study only but come from lower economic background

QUERY1:

$$\begin{aligned}
& P(J = \text{"YES"} \mid \text{Fut} = \text{"GOOD"}, \text{PGCC} = \text{"GOOD"}) \\
&= P(J = \text{"YES"}, \text{Fut} = \text{"GOOD"}, \text{PGCC} = \text{"GOOD"}) / P(\text{Fut} = \text{"GOOD"}, \text{PGCC} = \text{"GOOD"}) \\
&= \sum_{a=F} \sum_{b=Fo} \sum_{c=CA} \sum_{d=H} \sum_{e=Fac} \sum_{f=Life} \sum_{g=RW} \sum_{h=L} \sum_{i=Assn} \sum_{j=PROF} P(J = \text{"YES"}, \text{Fut} = \text{"GOOD"}, \text{PGCC} = \\
&\text{"GOOD"}, a, b, c, d, e, f, g, h)
\end{aligned}$$

$$\begin{aligned}
& \sum_{a=F} \sum_{b=Fo} \sum_{c=CA} \sum_{d=H} \sum_{e=Fac} \sum_{f=Life} \sum_{g=RW} \sum_{h=L} \sum_{i=Assn} \sum_{j=PROF} \sum_{k=J} P(k, \text{Fut} = \text{"GOOD"}, \text{PGCC} = \\
&\text{"GOOD"}, a, b, c, d, e, f, g, h)
\end{aligned}$$

$$= 0.240955 / 0.429765 \sim 0.560667$$

QUERY2:

$$\begin{aligned}
& P(J = \text{"NO"} \mid \text{Fut} = \text{"GOOD"}, \text{PGCC} = \text{"GOOD"}) \\
&= P(J = \text{"NO"}, \text{Fut} = \text{"GOOD"}, \text{PGCC} = \text{"GOOD"}) / P(\text{Fut} = \text{"GOOD"}, \text{PGCC} = \text{"GOOD"}) \\
&= \sum_{a=F} \sum_{b=Fo} \sum_{c=CA} \sum_{d=H} \sum_{e=Fac} \sum_{f=Life} \sum_{g=RW} \sum_{h=L} \sum_{i=Assn} \sum_{j=PROF} P(J = \text{"NO"}, \text{Fut} = \text{"GOOD"}, \text{PGCC} = \\
&\text{"GOOD"}, a, b, c, d, e, f, g, h)
\end{aligned}$$

$$\begin{aligned}
& \sum_{a=F} \sum_{b=Fo} \sum_{c=CA} \sum_{d=H} \sum_{e=Fac} \sum_{f=Life} \sum_{g=RW} \sum_{h=L} \sum_{i=Assn} \sum_{j=PROF} \sum_{k=J} P(k, \text{Fut} = \text{"GOOD"}, \text{PGCC} = \\
&\text{"GOOD"}, a, b, c, d, e, f, g, h)
\end{aligned}$$

$$= 0.18881 / 0.429765 \sim 0.439333$$

QUERY3:

$$\begin{aligned}
& P(J = \text{"YES"} \mid \text{Fo} = \text{"GOOD"}, \text{F} = \text{"HIGH"}) \\
&= P(J = \text{"YES"}, \text{Fo} = \text{"GOOD"}, \text{F} = \text{"HIGH"}) / P(\text{Fo} = \text{"GOOD"}, \text{F} = \text{"HIGH"}) \\
&= \sum_{a=PGCC} \sum_{b=Fut} \sum_{c=CA} \sum_{d=H} \sum_{e=Fac} \sum_{f=Life} \sum_{g=RW} \sum_{h=L} \sum_{i=Assn} \sum_{j=PROF} P(J = \text{"YES"}, \text{Fo} = \text{"GOOD"}, \text{F} = \\
&\text{"HIGH"}, a, b, c, d, e, f, g, h)
\end{aligned}$$

$$\sum_{a=PGCC} \sum_{b=Fut} \sum_{c=CA} \sum_{d=H} \sum_{e=Faci} \sum_{f=Life} \sum_{g=RW} \sum_{h=L} \sum_{i=Assn} \sum_{j=PROF} \sum_{k=J} P(k, Fo = \text{“GOOD”}, F = \text{“HIGH”},$$

a, b, c, d, e, f, g, h)

= 0.125881 / 0.4 ~ 0.314702