

Key:

O	Occasion	Normal, Special
M	Money	Afford, Cannot Afford
MR	Movie Reviews	Good, Bad, Average
AT	Amount of Time willing to spend	High, Low
WSM	Willing to spend on movie	High, Low
CC	Choice of commute	Cab, Auto, Personal Vehicle
WSR	Willing to spend on restaurant	High, Low
CM	Choice of movie	Ki&Ka, Batman Vs. Superman
DM	Duration of Movie	High, Low
TM	Time the movie starts	6:00-8:00, 9:00-12:00
H	Hunger	High, Low
C	Cuisines	Indian, Continental, Italian
DT	Dinner Time	6:00-8:00, 9:00-1:00
CD	Coupons and Discounts	Yes, No
T	Choice of Theater	Imax, Forum, Inorbit
R	Choice of Restaurant	Punjabi Affair, Mainland China, Food Court
W	Weather	Sunny, Rainy, Other

Conditional Probability Tables:

Occasion:

O	Normal	Special
P(O)	0.6	0.4

Money:

Occasion	Afford	Not Afford
Normal	0.5	0.5
Special	0.8	0.2

Movie Reviews:

Movie Review	Good	Average	Bad
P(MR)	0.3	0.4	0.3

Coupons & Discounts:

CD	Yes	No
P(CD)	0.5	0.5

Willing to spend on Restaurant:

Money	High	Low
Afford	0.5	0.5
Cannot Afford	0.2	0.8

Choice of commute:

Money	Cab	Auto	Personal Vehicle
Afford	0.6	0.3	0.1
Cannot Afford	0.1	0.3	0.6

Amount of Time willing to spend:

Occasion	High	Low
Normal	0.5	0.5
Special	0.8	0.2

Willing to spend on movie:

Money	High	Low
Afford	0.5	0.5
Cannot Afford	0.2	0.8

Weather:

W	Sunny	Rainy	Other
P(W)	0.5	0.2	0.3

Hunger:

H	High	Low
P(H)	0.5	0.5

Cuisines:

C	Indian	Continental	Italian
P(C)	0.5	0.2	0.3

Choice of Movie:

Movie Reviews	Amount of Time willing to spend	Ki&Ka	Batman Vs. Superman
Good	High	0.7	0.3
Good	Low	0.3	0.7
Bad	High	0.3	0.7
Bad	Low	0.3	0.7
Average	High	0.6	0.4
Average	Low	0.4	0.6

Duration of the movie:

Choice of movie	High	Low
Ki&Ka	0.8	0.2
Batman Vs. Superman	0.3	0.7

Time the movie starts:

Choice of movie	Weather	6:00-8:00	9:00-12:00
Ki&Ka	Sunny	0.3	0.7
Ki&Ka	Rainy	0.6	0.4
Ki&Ka	Other	0.4	0.6
Batman Vs. Superman	Sunny	0.4	0.6
Batman Vs. Superman	Rainy	0.6	0.4
Batman Vs. Superman	Other	0.5	0.5

Dinner Time:

Duration of the movie	Time the movie starts	Hunger	6:00-8:00	9:00-1:00
High	6:00-8:00	High	0.4	0.6
High	6:00-8:00	Low	0.3	0.7
High	9:00-12:00	High	0.8	0.2
High	9:00-12:00	Low	0.6	0.4
Low	6:00-8:00	High	0.5	0.5
Low	6:00-8:00	Low	0.2	0.8
Low	9:00-12:00	High	0.7	0.3
Low	9:00-12:00	Low	0.5	0.5

Choice of theater:

Willing to spend on movie	Choice of commute	Coupons & Discounts	Forum	Imax	Inorbit
High	Cab	Yes	0.6	0.3	0.1
High	Auto	Yes	0.7	0.1	0.2
High	Personal Vehicle	Yes	0.3	0.6	0.1
High	Cab	No	0.5	0.3	0.2
High	Auto	No	0.5	0.1	0.4
High	Personal Vehicle	No	0.2	0.6	0.2
Low	Cab	Yes	0.5	0.3	0.2
Low	Auto	Yes	0.3	0.1	0.6
Low	Personal Vehicle	Yes	0.3	0.5	0.2
Low	Cab	No	0.2	0.3	0.5
Low	Auto	No	0.1	0.1	0.8
Low	Personal Vehicle	No	0.1	0.3	0.6

Choice of Restaurant:

Coupons & Discounts	Cuisines	Dinner Time	Willing to spend on restaurant	Punjabi Affair	Mainland China	Food Court
Yes	Indian	6:00-8:00	High	0.6	0.1	0.3
Yes	Continental	6:00-8:00	High	0.1	0.6	0.3
Yes	Italian	6:00-8:00	High	0.1	0.2	0.7
Yes	Indian	6:00-8:00	Low	0.7	0.1	0.2
Yes	Continental	6:00-8:00	Low	0.1	0.5	0.4
Yes	Italian	6:00-8:00	Low	0.1	0.3	0.6
Yes	Indian	9:00-1:00	High	0.8	0.1	0.1
Yes	Continental	9:00-1:00	High	0.1	0.7	0.2
Yes	Italian	9:00-1:00	High	0.1	0.2	0.7
Yes	Indian	9:00-1:00	Low	0.8	0.1	0.1
Yes	Continental	9:00-1:00	Low	0.1	0.7	0.2
Yes	Italian	9:00-1:00	Low	0.1	0.5	0.4
No	Indian	6:00-8:00	High	0.7	0.2	0.1
No	Continental	6:00-8:00	High	0.1	0.7	0.2
No	Italian	6:00-8:00	High	0.1	0.2	0.7
No	Indian	6:00-8:00	Low	0.8	0.1	0.1
No	Continental	6:00-8:00	Low	0.1	0.7	0.2
No	Italian	6:00-8:00	Low	0.1	0.4	0.5
No	Indian	9:00-1:00	High	0.6	0.1	0.3
No	Continental	9:00-1:00	High	0.1	0.7	0.2
No	Italian	9:00-1:00	High	0.1	0.3	0.6
No	Indian	9:00-1:00	Low	0.7	0.2	0.1
No	Continental	9:00-1:00	Low	0.1	0.6	0.3
No	Italian	9:00-1:00	Low	0.1	0.5	0.4

Justifications:

1. We have not added a dependency between choice of movie and choice of theater on the assumption that all the prospective theaters have shows for any of the movies we want to watch.
2. We tend to spend more money and time on a special occasion than a normal one.
3. Amount of money willing to spend on restaurant, theater and choice of commute is directly dependent on our affordability.
4. We would not prefer late night shows in rainy weather for the fear of difficulty in commuting back.
5. We may prefer to watch a Hollywood movie as it has a short duration if we have less time to spend or Bollywood otherwise. Movie Reviews will also directly affect the choice of movie.
6. Duration of movie is directly determined by choice of movie. The actual show time picked will also involve consideration of weather.
7. We'll prefer to have dinner before movie if we are really hungry and after the movie otherwise. Duration of movie and time it starts will also decide when we have dinner.
8. Choice of theater is dependent on how much money we are willing to spend and if any coupons or discounts are available. We have assumed that inorbit is cheaper and lmax and Forum are almost comparable in cost. If we have personal vehicle, we won't mind lmax even though it's really far away. On the other hand, if we are commuting by auto, we would prefer Inorbit as it is closer.
9. Choice of restaurant mainly depends on the cuisine we wish to have and amount we are willing to spend. Availability of coupons and dinner time are open to high adjustment and are not strong determinants.

Sample Query:

$P(\text{choice of commute} = \text{cab} \mid \text{Money} = \text{Afford}, \text{Occasion} = \text{Special}) =$

$P(\text{CC} = \text{cab} \wedge \text{M} = \text{afford} \wedge \text{O} = \text{special}) / P(\text{M} = \text{afford} \wedge \text{O} = \text{special})$

$P(\text{M} = \text{afford} \wedge \text{O} = \text{special}) = P(\text{M} = \text{afford} \mid \text{O} = \text{special}) * P(\text{O} = \text{special}) = 0.8 * 0.4 = 0.32$

$$\begin{aligned} P(\text{CC} = \text{cab} \wedge \text{M} = \text{afford} \wedge \text{O} = \text{special}) &= P(\text{O} = \text{special}) * P(\text{M} = \text{afford}) * P(\text{CC} = \text{cab}) \\ &= 0.4 * (0.4 * 0.8 + 0.6 * 0.5) * (0.62 * 0.6 + 0.38 * 0.1) \\ &= 0.10168 \end{aligned}$$

Therefore Ans = $0.10168 / 0.32 = 0.31775$