

TD 4 Bayesian nets

Exercise 1

You are analyzing data from a transportation study that tracked whether people arrived on time for meetings based on weather and traffic conditions. The study recorded 10 trips with the following results:

W: Weather is good (1=Good, 0=Bad)

T: Traffic is light (1=Light, 0=Heavy)

L: On time for meeting (1=On time, 0=Late)

Calculate marginal frequencies:

- How many trips had good weather ($A=1$)?
- How many trips had light traffic ($B=1$)?
- How many trips were on time ($C=1$)?

Give the Bayesian net architecture.

Give the CPT of each node.

Give the probability in each case (inference)

1. If weather is bad ($W=0$), what's the probability of being on time?
2. If weather is good ($W=1$), what's the probability of being on time?
3. Given someone was late ($L=0$), what's the probability they had bad weather?
4. Given someone was on time ($L=1$), what's the probability they had good weather?
5. Given traffic is heavy ($T=0$), what's the probability of being on time?
6. Given traffic is heavy ($T=0$), what's the probability of bad weather?
7. We know someone was late ($L=0$). Now we learn traffic was heavy ($T=0$). How does this affect our belief about the weather?

#	Weather	Traffic	On Time
1	0	0	0
2	0	0	0
3	0	0	0
4	0	1	0
5	1	0	0
6	1	1	1
7	1	1	1
8	1	1	1
9	1	1	1
10	1	1	1