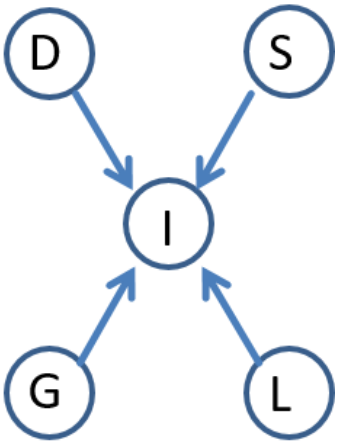
Information

Model Fitting and Structure Learning

Assume we are trying to learn a Bayesian network from a database ☐ of example students, i.e., atomic events from the world defined by the five random variables Difficulty (D), Intelligence (I), SAT (S), Grade (G), and Letter (L) as defined in the lecture slides (that is, D, I, S and L are boolean; G has 3 values).

Information

We are currently considering a model structure that assumes that all four aspects D, S, G, L directly tell us something about a student's I level, and models this by connecting all these four variables to I via a direct edge:



which has a certain likelihood X on ☐.

(Note: When we speak of the likelihood of a model structure, we always mean the likelihood *given its corresponding ML parameters)*.

Answer the following questions:

Frage 24

Richtig

Erreichte Punkte 1,00 von 1,00

How many unconditional distributions have to be estimated when calculating the likelihood of this model?

Antwort: 4 ✓

Die richtige Antwort ist: 4

Frage 25

Richtig

Erreichte Punkte 1,00 von 1,00

Can a model with this structure fit all possible joint distributions over the five variables (given appropriate conditional distribution tables)?

- Wahr
- Falsch ✓

Die richtige Antwort ist 'Falsch'.

Frage 26

Richtig

Erreichte Punkte 1,00 von 1,00

How many independent parameters must be learned for variable I?

Antwort: 24 ✓

Die richtige Antwort ist: 24

Information

If we assume that D and S are correlated and model that by adding an edge from D to S, which of the following statements are true:

Frage 27

Richtig

Erreichte Punkte 1,00 von 1,00

When we add additional edges to the model, the BIC score on the same dataset ☐ can only decrease

- Wahr
- Falsch ✓

Die richtige Antwort ist 'Falsch'.

Frage 28

Richtig

Erreichte Punkte 1,00 von 1,00

If the likelihood of the model with this additional edge increases, the BIC score will also increase in relation to the previous model

- Wahr
- Falsch ✓

Die richtige Antwort ist 'Falsch'.

Frage 29

Richtig

Erreichte Punkte 1,00 von 1,00

Compared to the previous model, the ML estimates for variables D, G, and L will not change

- Wahr ✓
- Falsch

Die richtige Antwort ist 'Wahr'.

Frage 30

Richtig

Erreichte Punkte 1,00 von 1,00

The likelihood of the new model cannot be lower than the likelihood of the previous one

- Wahr ✓
- Falsch

Die richtige Antwort ist 'Wahr'.