Assignment 2

TDT4171 — Bayesian networks

February 2026

Information

- **Delivery deadline: February 09, 2026 by 23:59**. No late delivery will be graded! Deadline extensions will only be considered for extraordinary situations such as family or health-related circumstances. These circumstances must be documented, e.g., with a doctor's note ("legeerklæring"). Having a lot of work in other classes is not a legitimate excuse for late delivery.
- Cribbing ("koking") from other students is not accepted, and if detected, will lead to immediate failure of the course. The consequence will apply to both the source and the one cribbing.
- Students can **not** work in groups. Each student can only submit a solution individually.
- Required reading for this assignment: Chapter 13. Probabilistic Reasoning (the parts in the curriculum found on Blackboard, "Sources and syllabus") of Artificial Intelligence: A Modern Approach, Global Edition, 4th edition, Russell & Norvig.
- For help and questions related to the assignment, **ask the student assistants during the guidance hours**. The timetable for guidance hours can be found under "Course work" → "Guidance Hours" on Blackboard. For other inquires, an email can be sent to tdt4171@idi.ntnu.no.
- Deliver your solution on Blackboard, "Course work" → "Assignments". Please upload your assignment as one PDF report.

Note. We are interested in your problem-solving process (i.e., how you arrived at the final results) and not only the final results.

The Monty Hall Problem

You are confronted with three doors A, B, and C. Behind exactly one of the doors there is \$10 000. The money is yours if you choose the correct door. After you have made your first choice of door but still not opened it, an official comes in. He works according to two rules:

1. He starts by opening a door. He knows where the prize is, and he is not allowed to open that door. Furthermore, he cannot open the door you have chosen. Hence, he opens a door with nothing behind.

2. Now there are two closed doors, one of which contains the prize. The official will ask you if you want to alter your choice (i.e., to trade your door for the other one that is not open).

Should you do that?
You can choose to answer this question by hand or use the recommended tool (see below):

By hand Draw a Bayesian network that represents this problem. One possibility is to use three nodes representing the following door status: ContainsPrize, MyChoice, and OpenedByOfficial. Draw the structure of conditional dependency, probability tables to the nodes. Show how the probability tables changes as each of the described actions are taken. Answer the question through providing constructed Bayesian network, conditional probability table, and the descriptive or numerical evidence to support your final decision. Numerical evidence entails calculating

$$P(\textbf{ContainsPrize}|\cdot).$$

where $\cdot$ is some condition.

Using GeNIe The Graphical Network Interface GeNIe can be used to complete this question. Add the results from GeNIe in your PDF report as screenshots. You don't need to include the GeNIe file itself in your delivery.

The installation guide and documentation for GeNIe can be found on Blackboard, "Course work" $\rightarrow$ "GeNIe".