FACULTY OF ENGINEERING AND ARCHITECTURE

ARTIFICIAL INTELLIGENCE (E016330)
PROFESSOR: ALEKSANDRA PIŽURICA
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BAYESIAN NETWORKS

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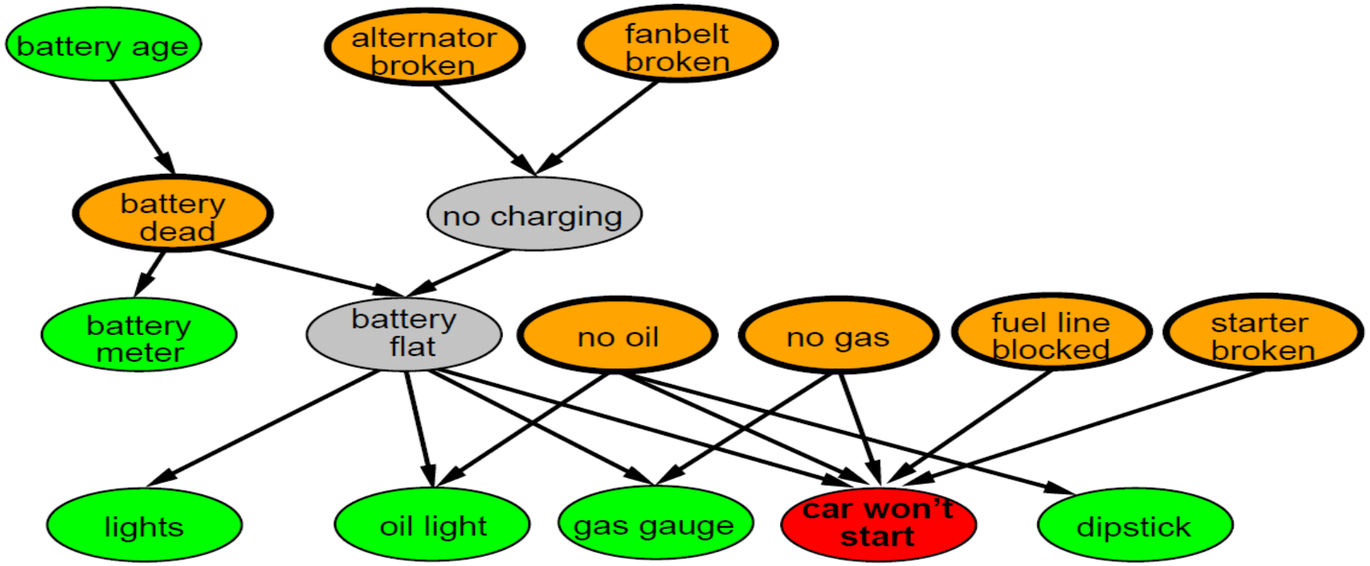
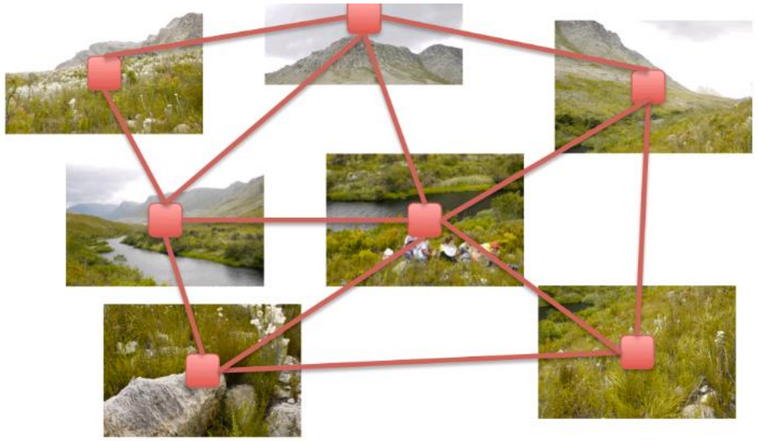
INTRODUCTION – BAYESIAN LOGIC





Image

Stitching

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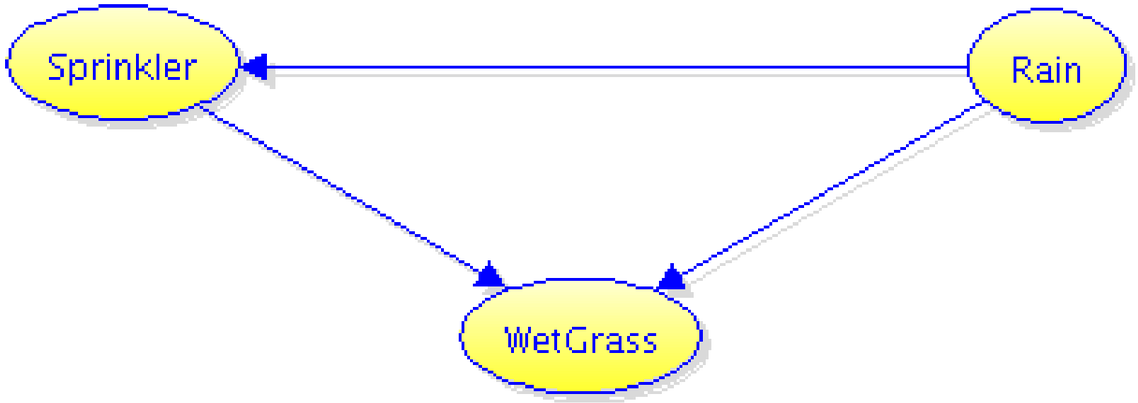
EXAMPLE UNBBAYES

P(Sprinkler | Rain)

P(Rain)



P(WetGrass | Sprinkler, Rain)

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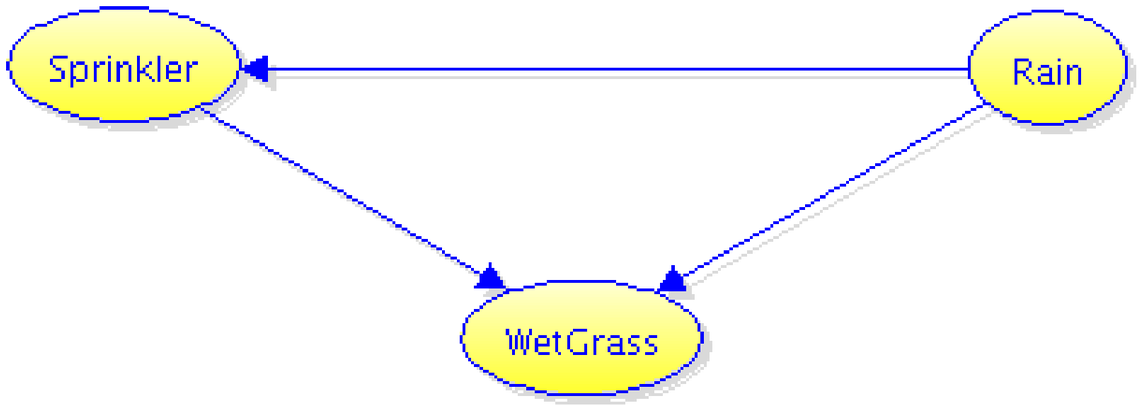
EXAMPLE UNBBAYES

Rain	Sprinkler: Yes	Sprinkler: No
Yes	0.01	0.99
No	0.40	0.60



Rain: Yes	Rain: No
0.20	0.80

Rain	Sprinkler	Wet grass: Yes	Wet grass: No
Yes	Yes	0.98	0.02
Yes	No	0.80	0.20
No	Yes	0.90	0.10
No	No	0.00	1.00

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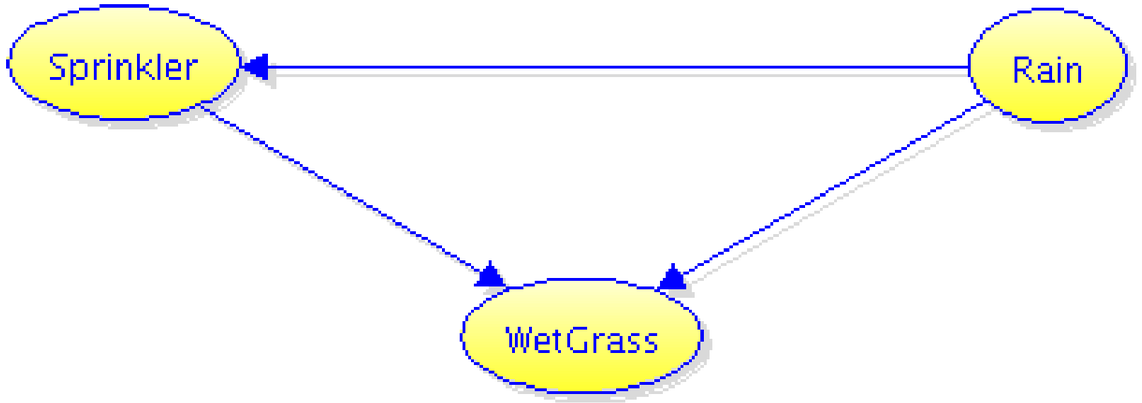
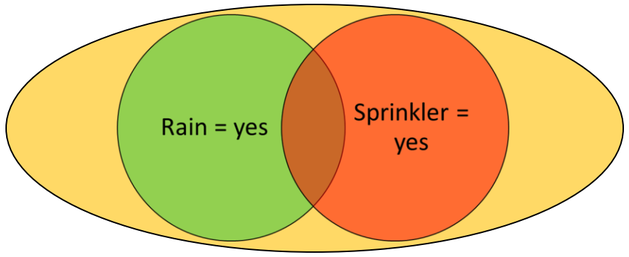
EXAMPLE UNBBAYES

Rain	Sprinkler: Yes	Sprinkler: No
Yes	0.01	0.99
No	0.40	0.60



Rain: Yes	Rain: No
0.20	0.80



Rain	Sprinkler	Wet grass: Yes	Wet grass: No
Yes	Yes	0.98	0.02
Yes	No	0.80	0.20
No	Yes	0.90	0.10
No	No	0.00	1.00

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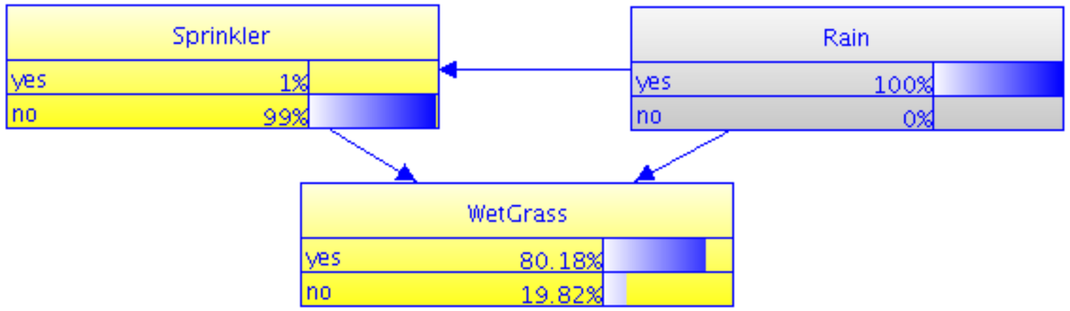
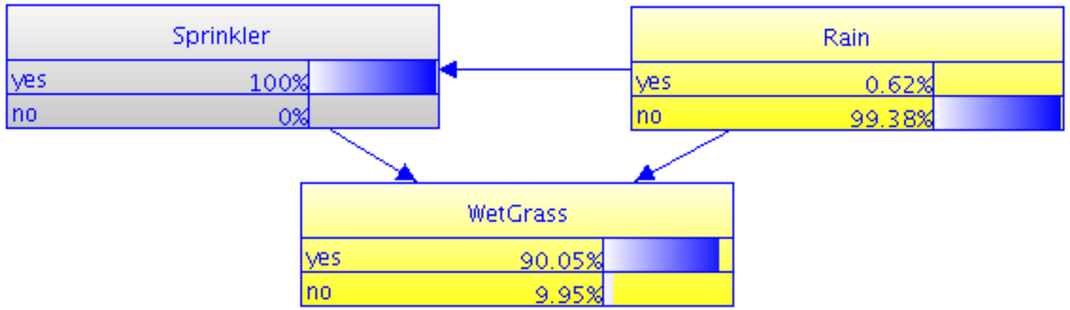
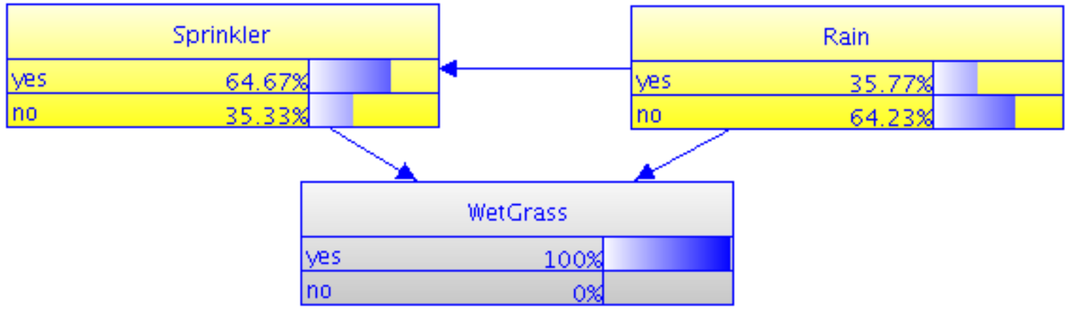
EXAMPLE UNBBAYES



(a) It is raining



(b) The sprinkler is on



(c) The grass is wet

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OVERVIEW

Get acquainted with the framework UnBBayes

- Download: https://sourceforge.net/projects/unbbayes/
- Tutorial: https://www.youtube.com/watch?v=ExlfjBQfvMk

Build the probabilistic network

- Identify the query variables (i.e., diseases) and the evidence variables (i.e., risk factors and symptoms) and establish the logical causality among them.
- Fill in the CPT's given the information available.

Analyze the diagnosis provided by the expert system

- Use the expert system to infer the probabilities of the potential diseases given the evidence available.
- Explain the results.

INCOMPLETE DATA

- In practice, we often deal with incomplete data, which do not allow to specify the CPT's completely.
- Often, we can make up for the missing information by using common sense reasoning, i.e., relying on some general knowledge (about the particular problem).
- In some cases we can also use a compact conditional distribution (less information needed, but there are inherent assumptions which are not always valid)

REMARKS:

- In most cases in practice, some **assumptions are made**
- Be aware of the assumptions made in your model!

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ASSIGNMENT

- Ufora: Content/B. Practicals/Practical 2
- In groups of 2 like for the previous assignment
- Send questions to ai@lists.ugent.be
- Submit your report and Bayesian network xml-file
- Deadline: November 22nd, 2019 (23:59)

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