

Artificial Intelligence/ Intelligent Systems

Assignment 1: Bayesian Graphical Models

The assignment has two parts:

- A. Problem specification, problem analysis (knowledge acquisition), initial modelling and evaluation of a BN in Netica. Each group will present a 5 minute project presentation of their initial mode.
- B. Final model and evaluation

Part A: Design and implement a Bayesian Network (BN).

You may select any scenario for decision making. For example, sell or buy some share on the stock market; making some decision based on the predicted weather; or determining whether to perform some medical intervention for some condition. The model must be useful not just to yourself but to some wider target user community.

As part of the problem analysis, you should identify and incorporate knowledge from different sources. You should incorporate common knowledge (knowledge that is commonly accepted, but may not be written down anywhere) as well as formal (from published scientific sources) and/or expert knowledge (e.g. consultation with suitable medical experts). Bear in mind that the knowledge that you choose to incorporate in your model has a major influence on the potential usefulness and usability of the tool.

The network should have at a minimum five chance nodes which is appropriate to your problem scenario.

For your project pitch you should include the following:

- An objective, which can be specified as follows:
“The tool/network will be used to determine whether to ...[specify action/decision options] to bring about [some change] in [some condition]”
- Description of data sources/sets
- Description of expert knowledge in natural language
- A rough draft of a network structure (variables, states, and arcs) in Netica

Project pitch presentations will be held on the 18/19 September 2019

Assessment guide

Aspect	Weighting (%)
Novelty, difficulty of problem and usefulness	10
Design – knowledge acquisition, complexity and validity of model	30
Evaluation and validity testing	30
Final report and overall achievement	20
Presentations and engagement	10
TOTAL	100

Part B: Final model and report

Submit a single zip file before 20:00 on Wed 25 September 2019.

The file should contain the following folders:

- *report* – should contain a single PDF file using the ACM format – see guideline below
- *model* – your Netica file
- *data* – any data sets that you used
- *references* – any papers or knowledge sources that referenced

Late submissions will attract a penalty of 10% per day.

As a **guide** your paper should be between 6-10 pages. Use the following structure as a guide for writing your reports

1. Introduction

- Background and objective
- Potential user community

2. Problem analysis

- Described the potential factors to considered
- This should be support by references to knowledge sources and data sets

3. Decision Network model

- Provide a diagram of your final model
- Explain how and why you arrived at this particular structure and weights
- For complex models comprehensive CPTs are not necessary, since the Netica file will also be submitted

4. Model testing and evaluation

- Show the efficacy and usefulness of your model using an external UI or 1 or more use case scenarios
- Show how this model can be used to achieve the objective mentioned in section 1

5. Conclusion

6. References