Introduction to the AI Master Class

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AI Master Class

- We do computer **science**
  - Science is about method over results
  - Science is about theory over belief
- We need to
  - know what we know
  - be thorough in our approach
  - be able to argue our results
- This is what the AI Master Class is about: **you doing your best possible work**
Overview of the Master Class, 2023

- 04/09/2023 — Introduction, how to do research questions, and CSSC
- 18/09/2023 — Doing structured literature reviews, how to read a research paper
- 02/10/2023 — How to write a thesis
- 16/10/2023 — Using HPC at NTNU, Reproducibility
- 30/10/2023 — How to do qualitative empirical research and how to write a paper
- 13/11/2023 — Sustainability in AI
- Week 2, 2024? — Computer Science Student Conference (exam)
Computer Science Student Conference

- January, 2024?
- One day conference for computer students at IDI
- Everybody publish an extended abstract of their work
- Everybody contributes reviews and questioning
- IDI supports the conference with logistics and food
- You fill all remaining roles
- This is your conference (and exam)
https://i.ntnu.no/wiki/-/wiki/Norsk/TDT70+-+AI+Masterclass
Computer Science
The Scientific Method
Scientific Method in AI Research

Belief about AI method ➔ Study design ➔ Hypothesis ➔ Prediction ➔ Experiment ➔ Results ➔ Interpretation

Adjust

Compare
Your thesis

- You might save the planet
  - However, if you do not know *how* and *why*, and can’t describe it — it has little value
- What do you aim for?
  - The average student can **reproduce knowledge**
  - The above average student can **add to knowledge**
  - The good student can **reflect on said addition**
- All of this goes into your thesis!
How to grade ‘science’

❖ A — Excellent
   ❖ An excellent performance, clearly outstanding. The candidate demonstrates excellent judgement and a high degree of independent thinking.

❖ B — Very Good
   ❖ A very good performance. The candidate demonstrates sound judgement and a very good degree of independent thinking.

❖ C — Good
   ❖ A good performance in most areas. The candidate demonstrates a reasonable degree of judgement and independent thinking in the most important areas.

❖ D — Satisfactory
   ❖ A satisfactory performance, but with significant shortcomings. The candidate demonstrates a limited degree of judgement and independent thinking.

❖ E — Sufficient
   ❖ A performance that meets the minimum criteria, but no more. The candidate demonstrates a very limited degree of judgement and independent thinking.

❖ F — Fail
   ❖ A performance that does not meet the minimum academic criteria. The candidate demonstrates an absence of both judgement and independent thinking.
Method is our friend

❖ Say this every morning when you look in the mirror: “Method is our friend!”
How to Formulate a Research Question

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What are Research Questions

- These are the questions that your work should answer
- These are the questions you are evaluated on
- There are the questions your thesis answer
- There are the questions that guide your choice of methods or problem
- They guide your choice of evaluation method, which guides your choice of research questions
Research Questions

❖ How to chose you research question
❖ There is a very difficult(*) and interesting(**) problem that needs to be solved
❖ There is a very interesting(*) and promising(**) method that could be applied on an existing problem
❖ There are some flaws or issues with an existing method
❖ Research questions are all pointing towards the same goal
What is your Goal?
What are your Research Questions?
Going Forward
First Question ...

❖ ... is always: “have anybody been doing something similar before?”
❖ The answer is (almost) always yes!
❖ How to evaluate?
In this case we can approach figuring out who did what and how in a systematic manner.

Stay tuned for September 18th.
Second Question …

❖ … is always: “what is my contribution?”
❖ This is formally not a research question.
❖ How to evaluate?
Third Question ... and beyond
Example: From Single-objective to Multi-objective

❖ **Goal** Create a multi-objective meta-heuristic algorithm based on a single-objective algorithm from the literature.

❖ **RQ1** Which single-objective algorithm has the best potential for multi-objective extension?

❖ **RQ2** Which multi-objective techniques are most suitable for extending the selected algorithm to multi-objective?

❖ **RQ3** How does the proposed algorithm’s performance compare to other competitive algorithms from the literature?
Example: Telenor Watchdog

❖ **Goal** Create an application that increase users ability to maintain privacy on an Android device by informing about actual and possible threats for disclosure of sensitive information.

❖ **RQ1** Which techniques can be used to detect possible malicious behaviour of third-party applications based on real-time system monitoring and application analysis on an unrooted Android device?

❖ **RQ2** What is the best way to inform users about threats in installed third-party applications on an Android device and provide them with incentives to uninstall these applications?

❖ **RQ3** Which user interaction patterns can be employed to make users aware of their privacy-related behaviour?
Example: Sliding Door

❖ **Goal 1** Design a model of features, human behaviour and intentions.
❖ **Goal 2** Design a mechanism for capturing and extracting features according to the model.
❖ **Goal 3** Design a reasoning mechanism for inference of intention.
❖ **Goal 4** Implement software comprising the results from Goal 1, 2 and 3 Develop a complete software application for the operation of a door equipped with sensors giving it the ability to reason.
❖ **Goal 5** Build a motorised sliding door
   ❖ **RQ 1** What set of computer vision algorithms will meet Goal 2 efficiently?
   ❖ **RQ 2** What is a well suited reasoning mechanism for this task?
What is your Poison?
Computer Science Student Conference (CSSC)

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One day conference, January 2024?

- We need organisation
- We need a venue
- We need a program
- We need a key not speaker?
- We need you!

- What should IDI do?
- ....
- ...
- ..
- .
Why on Earth would we want a conference?

❖ A conference teaches you to
❖ ... disseminate science by
  ❖ ... summarise your work in written form in very few pages
  ❖ ... summarise your work in brief oral form
❖ ... evaluate science by
  ❖ ... evaluate other peoples work from a scientific perspective
  ❖ ... contribute in presentations, both giving and receiving
  ❖ ... critique information transfer
❖ ... organise serious events
❖ ... (have a fun and different exam)
❖ ...
See you all on September, 18th