Cognitive Modelling Final assignment

Steven Miletić, 11 November 2024

Universiteit Leiden
The Netherlands

Final assignment

- For your final project, you’ll fit a DDM to a dataset of 12 participants.
- You'll write a report in the style of a **scientific article** (as we've practiced in each of the workgroup assignments).

- The final assignment will count for 40% of your grade
  - *If you hand in late (and didn’t email me about an exception), I will deduct 0.05 point for each hour.*

- **Deadline**: 16 December 2024, 23:59

Final assignment

1. Check out the PyDDM tutorial/codebook on Brightspace

1. To help you get started with fitting DDMs with pyDDM
2. Not all sections are needed for the final assignment, but it will help you understand DDMs

2. Find your dataset

1. See the BrightSpace menu for each.

3. Fit a DDM to your dataset in Python.

1. Use the PyDDM tutorial and pyDDM cookbook and quickstart as starting points.
    1. If you're re-using existing code that you found elsewhere on the web, (i) indicate this clearly by citing the original source and (ii) remove any extra code that's not needed for your final assignment. Keep it lean.
2. Make sure that we can run your code, to generate each figure in your report.
3. *Note*: if you can't replicate a certain model pattern or you get stuck for an interesting reason, that's OK! Just explain what you've done, and where you failed.

Final assignment

4. **Write a report** about your findings, in the style of a scientific article.

- You should minimally have:

1. *Abstract* (elevator pitch & summary of your research)
2. *Introduction* (why is this interesting? Summarize the scientific background),
3. *Methods* (summarize the experimental design and modelling approach),
4. *Results* (Summarize & visualize the data; visualize the model fit; which parameter(s) differed between conditions?),
5. *conclusion and discussion* (what did we learn? what are some limitations of this model/approach? what are the next questions?)

6. Submit your **PDF report + link to code** (ideally, Google Colab or public GitHub Repo)

Cognitive modelling - programming assignment rubric

Course: 2324-S1 Cognitive Modelling

Criteria	Excellent	Proficient	Sufficient	Poor	Criterion Score
Scientific insight	30 points The report ties together information from different sources; the writing demonstrates a deep understanding of the material; the introduction and conclusion show an analysis and synthesis of original ideas.	22.5 points The report mostly combines information from different sources; the author demonstrates a understanding of the material; author has applied concepts learned in the course. However, some conclusions and ideas are disjointed, lack embedding in the literature, or not supported by the data.	15 points The author understands the concepts to a certain extent; the paper connects information from different sources but the arguments do not flow; the writing does not demonstrate an understanding of the material.	6 points The paper does not demonstrate that the author understands the course material; the writing appears to be put together from different issues, without a natural flow of argument, making it hard to draw any insights from the report.	/ 30
Code	20 points Code runs without problems; code is clear to read, with helpful variable names and comments throughout; code is efficient and elegant. All code has a clear function.	15 points Code runs without problems; code is mostly readable and well-structured. Some code or comments do not seem to have a clear function.	10 points Code is hard to understand or poorly commented; code contains small errors; code is inefficient and takes a long time to run. There is quite some code or text which does not have a function.	4 points Code doesn't run or gives errors; code is illegible or is poorly commented; code contains a major error that affects the scientific conclusion; code is very inefficient and takes too long to run. The is a large amount of code or text from the notebooks that has not been removed.	/ 20
Presentation and figures	10 points Data visualizations are used to clearly support the conclusions; all figures have correct axis labels, annotations, titles and legends.	7.5 points Data visualizations are correctly labeled and presented, but do not always work to support scientific conclusions in the best way.	5 points Some figures miss labels or annotations; understanding scientific message from the figures is sometimes difficult.	2 points Figures miss many labels, titles or legends; it is unclear what is visualized and why.	/ 10
Writing and language	15 points No grammar and/or spelling mistakes; clear sentences; clear paragraph structure and arguments.	11.25 points Minimal grammar and/or spelling mistakes; some unclear sentences or paragraph structure.	7.5 points Noticeable grammar and/or spelling mistakes; many unclear sentences or paragraphs.	3 points Unacceptable number of spelling and/or grammar mistakes; unclear sentence or paragraph structure throughout.	/ 15
Scope and ambition	15 points The report goes far beyond the initial assignment, adding several novel components.	11.25 points The report takes the assignment specified, and extends it in small ways.	7.5 points The report covers the minimum assignment as specified.	3 points The report does not cover the assignment specified.	/ 15
References	10 points Appropriate original sources are cited; citations are correctly used and listed in a bibliography.	7.5 points Some data or ideas from other sources are not correctly cited; correct citation styles are used.	5 points Citation style is incorrect and/or a noticeable amount of data or ideas obtained from other sources are not cited.	2 points (Hardly) any data obtained from other sources is cited satisfactorily.	/ 10

Grading

- *Quality of writing*
  - Is the language correct and clear? Does each sentence and paragraph have a clear structure, and does the argument flow well?
  - Are there appropriate references to the literature? There may be some papers references in the original tutorials, but also look a bit further (e.g. in those reference lists, or on Google scholar) for more work.
- *Clarity and usability of the code*
  - Is it clear how to run the code? If I can't get the scripts to run easily (< 5 minutes), I will deduct 0.5 points from your grade.
  - How long will it take to run? Try to avoid sending me code that occupies my laptop's CPUs for hours.
  - Can I read the code and understand it? Are the scripts labeled clearly, do the variables have obvious names, do comments and docstrings explain what's going on?
- *Presentation of results*
  - Are the figures clearly described in the text? Do they have accurate and complete legends?
  - Do the figure have labels, legends, axes, annotations? Are they visually appealing?

Grading

- *Scientific insight*
    - Is the problem clearly stated, and the original paper/model described in sufficient detail to appreciate this project? Write for a colleague/classmate who knows about cognitive models, but may not be familiar with this specific model or implementation.
    - Can you apply concepts we learned in the course, and extend/integrate them with your own ideas?
    - Do the introduction and discussion indicate a solid understanding of the literature in which this paper/model is embedded?
- *Scope and ambition*
    - If you add more interesting extensions or come up with other ways to investigate/visualize your model, you'll receive a higher grade than if you stick to the bare minimum.
    - Quality first: if the code, writing and figures are sloppy, I won't grade you for 'more is better'!

Rules

- You can most definitely work together and give feedback (like we've done in class). However, everyone will have to hand in their own project, and your reports will be automatically checked for duplication. So don't try and hand in the same text/code as your classmates; *you will fail the course if plagiarism is detected.*
- Ideally, your code lives in a public repo where I can easily inspect and run it (Google Colab or public Github repo).
- If you're interested in pursuing cognitive modelling further (*beyond the scope of this course, e.g. in a Bachelor project*), check out Anne's lab wiki: https://anne-urai.github.io/lab_wiki/ProjectIdeas.html or contact me (I don't have a fancy website ☺)

Dataset example

- The aim of this experiment was to assess the influence of implicit time pressure on a perceptual decision-making task.
- Participants completed two sessions on two separate days. In one session, a slowly ticking clock (0.5 Hz) could be heard clearly during the experiment. In the other session, a fast clock (3 Hz) could be heard.
- On each trial, a noisy visual stimulus appeared, consisting of a field of randomly moving dots in which a small proportion of dots had a consistent direction. Participants had to indicate the direction (left/right) of those dots.
- The decision accuracy and response time (i.e., time between onset of the visual stimulus and button press) were recorded as outcome measures.
- The key question of this experiment was whether the implicit time pressure caused by clock ticking would affect performance. And if so, whether this was due to altered sensory evidence accumulation (reflected in drift rate), response cautiousness (reflected in the threshold), or response bias (reflected in starting point of the accumulation process).
- Condition 1 = fast clock, condition 2 = slow clock

The next few weeks

- Next week: Mini-quiz + ACT-R
- 25/11: In Silico & the future of modelling the mind & the brain
- 2 and 9 December: drop-in hours
  - Location: Pieter de la Court building
  - 9-11h: Anne Urai (room 2B14)
  - 11-13h: Steven Miletić (room 2B24)
  - Get help on something you're stuck with, or just come to chat about research/cognition/AI or other topics we research!


DOC NYC
2020
IN SILICO