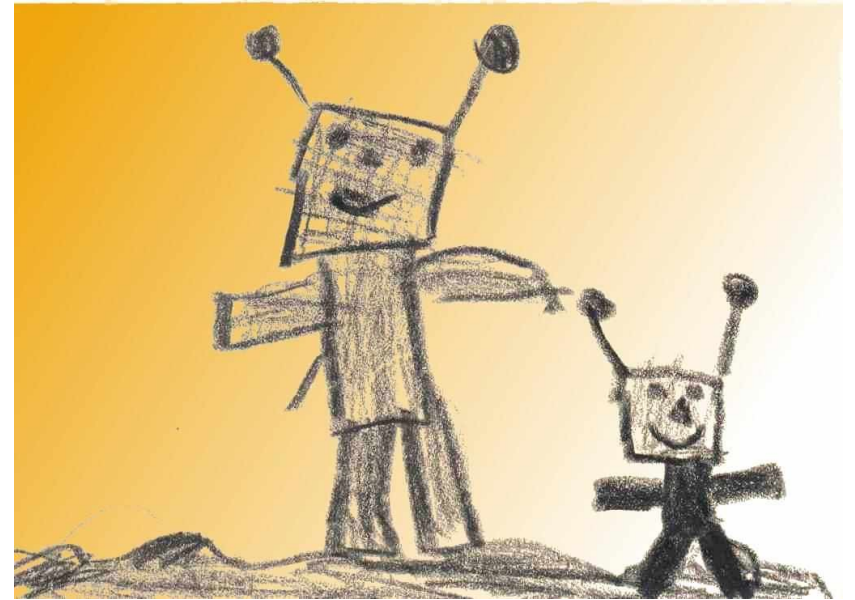


Robotics Research Proposal

(Starting with feedback on RRR)

J. Michael Herrmann

University of Edinburgh



THE UNIVERSITY
of EDINBURGH



MSc project: Upcoming dates

- 5/4 RRP Submission
- 26/6 (date t.b.c.) Midterm presentations
 - 15 min talk to present your approach and first results
 - This event is in place to give you feedback along the way
- 18/8, 12 noon, submission of theses
- August: Final presentations (t.b.c.)
 - The presentation will 30 min talks focussing on the main results of your project and should leave sufficient time for questions (mainly from the second marker).

RRR: Good points

- Good set of papers and presentation of these papers' results
- Amount of material rather too large than too small
- Scope well set, focused, interesting and up-to-date
- Using *emphasis* (at a well-measured rate)
- Good command of argument and style
- References, figures, equations ...
- Relevance towards research project

RRR: General Feedback

- Consider transition to LaTeX
- Start with project title, abstract or summary, include TOC
- Difference between theory and applied projects
Anyway: Try to avoid textbook style.
- Use page numbering (also sections, figs. etc.)
- Not sure whether one-column isn't actually the better option here (more convenient on-screen)

Front matter

- “Branding”: The respective University is expected, the other university and ECR are fine, too.
- Authorship: Just you (supervisor or other contributors are mentioned in the Acknowledgement)
- Date is usually not necessary (at least not in title: “\date{”)
- Explain all acronyms. If they cannot easily be resolved (e.g. “SARSA”), add a remark or footnote. A list of acronyms is fantastic.

Figures and tables

- Put more information in the figure captions.
- Make clear why a figure or table was included.
- Use table floats for tables and figure floats for figures.
- Ref to all figures and all tables from the main text.
- Figures and tables must be numbered in order to refer to them.
- Avoid “In figure X, we can clearly see ...”
- Use standard references in Figures (incl. “Adapted from” or “with permission”)

Further remarks on RRR

- “In [30] authors extend this approach”:
 - John Dow [30] extended this approach”
- “.. .size of specification [22]. [23] proposed to restrict the ...” Grammatical role of “[Ref.]”?
- N. O. Body (2019) showed that xyz [32].
- “In the quoted paper, ...” Use [Ref.] again, unlike previous use: opere citato (op.cit.), ibidem (ibd.)
- “In this paper, Noorani and Fernandez discovered ...”
- If you refer to a webpage, add date when accessed.

Bibliography

- Not only to retrieve sources, but also provides information whether the sources is credible and informative
- Make sure to include all relevant bibliographic informations: Google scholar (e.g.) is not always correct or complete in this respect: page numbers, publisher, or superfluous “et al.”
- Use correct publication types, e.g. “In:” only for conference proceedings
- DOI is not required (if used then consistently)
- Be consistent

Organisation and Structure

- A paragraph contains more than one sentence
- A section contains more than one subsections
- Human working memory grasps 6 ± 3 items:
 - Break sections in smaller units
 - Use not more than a few subsection in each section
- Use numbering also for subsections and below

Examples

“Pronobis [19] also shows how SVMs can be used for robust place classification with semantic labels. They integrate high-level cues from range and vision data as input to an SVM which outputs semantic categories likely to be found in an indoor environment.”

- Pronobis et al. [19] + plural
- Is the second sentence repeating parts of the first? Is the second sentence telling how it is done?
- Why is the classification robust? Is it actually?
- Is it a good idea? A breakthrough? Does it work at all?

Examples

- “The focus of this work is the idea of the safety of ...”
- “The authors emphasise that their technique is not complete: ...”
- “Table 3 we show a performance comparison of the most recent and most influential work in the literature.”
- “The following are commonly used datasets for bench-marking of ...”

What to put in an abstract

- In a paper:
 - A bit of motivation and/or classification
 - A list of all important results
- In RRR
 - Motivation of the subject
 - The main directions of relevant research
 - A brief outlook
- For RRP
 - A bit of motivation
 - The main hypothesis
 - A list of the expected results

- Don't aim at writing a text book instead of a thesis.
- If you have more than 20 pages, you will need to focus.
- If you have less than 10 pages, improve structure, add figures, ask other people for suggestions.
- Formulas in Introduction? No formulas elsewhere?
- Avoid repetitions: “Here we describe X&Ys experiment and results.”
- “Information on ... has been displayed in Table x.y” (better moved to an appendix).
- Use “chapters” in the thesis, but not in RRR or RRP.

RRR: “Discussion” section

- A short version of the RRP (future work)
- The discussion of the main approaches
- No discussion
- A first conclusion
- **Anticipation and rebuttal of counterarguments**
- A discussion cannot have only short bullet point items

Example: Conclusion

This work will be further extended with:

- 1) a concrete plan for the techniques we will be using and how,
- 2) a Gantt chart that will allow us to best keep track of our work in order to not run late,
- 3) the development of the metric, and finally
- 4) the evaluation with both existing metrics and human judgement.

RRR vs. RRP

- RRR
 - Literature review
 - Assessed by completeness/argument/depth etc.
- RRP
 - Proposal of a research project
 - Assessed by clarity/realism/innovativeness etc.
 - regular meetings with supervisor

Relation with Supervisor

- Weekly meetings are a good starting point,
 - Do not cancel just because you believe you did not work enough to report
 - Ask questions, especially if it seems that you are stuck.
- Show initiative: meetings, questions, ideas
- Suggestions from supervisor
 - What to improve: Do it (or find a reason why not)
 - What to do: Not every ramification needs to be followed, but you can learn what are the interesting questions in the field
- Suggestions from other people
 - Always interesting, but may not be necessary for the project.
 - Will help you to write a good discussion
- Continue to search and read literature
- Start doing the actual project

Goal of RRP

- Learn skills of research planning
- Confirm choice of research area
- Scope out your summer project
- Compulsory course in your Master's degree
- Worth 30 credits

Further goals of RRP

- Knowing what to work on is a big part of research
- Motivation is identifying a void in the literature, or a real-world problem that has not been solved
- Coming up with a feasible way to address the problem
- Propose ways of evaluating the techniques
- Present expected outcomes succinctly and objectively
- Important skill:
 - For applications
 - For grant writing

What to do

- Establish aims and objectives of the project
- Establish hypothesis and evaluation
- Break project into work-packages
- Submit full proposal (deadline: 4pm 05/04/2019)
- Same submission procedure as for RRR
- Use turnitinuk.com

RRP Structure

(to be adapted to your project)

- Introduction (motivation)
- State of the art (literature review)
- Hypothesis
- Exposition
 - Approach (methods, resources)
 - **Research plan (overview, steps, Gantt chart)**
 - Evaluation (criteria, statistics)
- Discussion (potential difficulties, fall-back options)
- Conclusion (outlook to PhD project, impact)

Towards a workplan

- Do the approaches discussed in the RRR show any gaps, or unused potential?
- Are combinations with other approaches promising?
- Why has this potential not been used before?
 - it just became visible
 - Others lack resources, experience, ideas, ...
- You will need (to be able) to reproduce existing work or solve a trivial problem. This is often the first step.
- General scheme: Hypothesis, Preparation, Realisation, Evaluation, Analysis, Discussion

Towards RRP

- Concentrate on methods and workplan
- Reconsider literature review after these parts are by and large finished
 - streamline review towards your project goals
 - focus and clean up
 - add recent papers
 - include contrasting views into discussion
- Check which of the literature is under your control: Can/could you reproduce existing results? Do you have access to software? ...
- Improve motivation, style and argument
- **Keep up the good work**