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Robotics Research Proposal

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RRR: First Impressions

- Use LaTeX
- Start with abstract or summary, include TOC
- Descriptive section titles (“With robots”)
- Use 12pt times new roman.
- Footnotes/endnotes are actually possible.
- Use a spel chacker.
- Consider transition to LaTeX

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

- Good: References, figures, lengths, style, argument ...
- 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).
- More than one sentence per paragraph.
- Use “chapters” in the thesis, but not in RRR or RRP.

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,
 - You may cancel if you had no time to work on things.
 - On the other hand, do not cancel if you are stuck.
- Show initiative: meetings, questions, ideas
- Suggestions from supervisor
 - What to improve: Do it.
 - What to do: Not every ramification needs to be followed, but you can learn what is interesting 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 13/4/2017)
- Same submission procedure as for RRR
- Use turnitinuk.com

What to improve in second block?

(Robotics Research Proposal)

- Lessons learnt (recall 1st RRR session)
- More | less specific | general teaching?
- Working style, time management, working conditions, ...
- External help, research group, co-supervision?
- Suggestions?

Structure of the proposal

- Motivation: aims and objectives, hypothesis, timeliness, significance, feasibility, novelty, beneficiaries
- Background material (use improved version of RRR)
- Methodology and techniques to be used
- Metrics for evaluation
- Expected outcomes
- Impact: applications, theoretical advances, public attention, ...
- Fallback options: Identify critical stages and how to react on failure
- Research plan (ideally as a Gantt chart)

Common problems

- Hypothesis is unclear, ill-formed, trivial
- Assuming, without reason, that you will succeed where others have failed
- Insufficient detail to assess outcomes
- Unaware of related research
- Bad presentation, incomprehensible report
- Unjustified complicatedness
- Too ambitious (better two good results, than five half results)

Which (super-|sub-) topic to work on towards your thesis?

While writing or after finishing ask yourself:

- Is any aspect particularly interesting?
- Can you identify a more general approach?
- Do authors tend to repeat a seemingly trivial fact?
- Have you ignored any papers?
 - because they were too hard to read
 - too theoretical or out of scope
 - required equipment or background knowledge
- Some of these considerations may show up in Conclusion/Outlook/Further-work section

How to start

- Define a trivial version of your main problem
- Solve it (in one or two days)
 - If unsolvable go to first item
- Evaluate the solution
 - Define an evaluation metrics
 - How does this metrics distinguish between the trivial version and the actual problem?
- Now move on to full problem
 - Decide in one or two days whether an intermediate version is preferable

Motivation, History, Politics, Finance

- In Introduction only (if you are writing a robotics paper)
- You may return to such issues in Impact or Conclusion

Images

- Not for illustration, but to make a point.
- Make this point clear in the caption
- Caption also contains all necessary details and/or reference (if applicable).
- Make sure they are clear and have aesthetic quality and all details are visible.
- From literature review to PhD thesis less and less pictures from other people's work.
- You may need to reproduce your competitor's results, so why showing their figures?

Critical Evaluation

X is better than **Y** on task **Z** along some
dimension **W**

- Assume **Z** is “under lab conditions”
- Is it worth mentioning “was not tested under real-world conditions” (if this isn't what you are proposing)?
- Is real-world-ness an evaluation dimension?

Critical Evaluation

X is better than **Y** on task **Z** along some dimension **W**

- Assume **X** is better than Y_1 but worse than Y_2
- Do I have to mention Y_2 ?
- Are the Y_2 guys going to mention you? ;-)
- Is **X** vs Y_1 the same dimension as **X** vs Y_2 ?
- Which evaluation dimension is relevant?
- Try propagating the dimension of your choice.

Whom to cite?

- Self-citations
- Own group supervisor
- Predecessors
- Competitors
- Parallel work
- Theoretical/applied work

Summary

- RRP is the beginning of the actual work towards the MSc project.
- Avoid getting stuck.

“Wisdom”

- Nihilō nihil fit.
- If at first you don't succeed, try again.
- If it seems too good to be true, it probably is.
- It's the early bird that catches the worm.