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Study Guidelines

Student Project Survival Guide: Tips and Common Mistakes when Working on your Thesis, Research or Student Project

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Contents

Thank you for taking the time to work through the tips compiled in this document! It aims to provide a collection of common points of confusion and solutions, style recommendations, etiquette and frequent mistakes when working on a research or thesis project including your RnD report, Master thesis, but also any other kind of document or project (in the following referred to as *report*). This guide is meant for, but not restricted to, use during your student life.

1 Finding a Topic and Writing a Proposal

1.1 External Partners

Doing your project with an external partner has several benefits: you have competent and continuous supervision, perhaps you earn some money, you have access to important experimental hardware, you gain relevant practical experience and important contacts for your later career, and others.

On the other hand, please be aware that external partners have a primary interest in your project results and not your grade. Mostly, these goals align well, but you should be aware of this dichotomy to identify conflicts of interest early on. There are a few points you should keep in mind:

- Administrative issues regarding your project are handled by the university (contact either your supervisors or the examination office). They are in your responsibility. Don't delegate them to your external supervisors or rely on their advice or opinion.
- Grading is mainly the university's responsibility. If unsure, check with your university supervisors what the criteria are and what deliverables are important if prioritizing becomes necessary.
- Your project will be evaluated by its scientific output and rigor rather than the amount or quality of implementation that was done (Master projects in the Master of Computer Science study program might be an exception here).

1.2 Risk Analysis: Relying on Third Parties

If you have a project constellation in mind in which you will require results (data, supervision, active help, delivery or proper functioning of hardware, ...) from other parties than the university, please be extra cautious. Most other parties (e.g., the company in which you work on the project) have an interest in providing you with a good working environment and equipment, this may, however, wane if other matters become more urgent. You should present these risks and work out alternative plans (e.g., working in simulation instead of waiting for hardware) or fallback solutions

(e.g., only performing the last set of experiments if everything before has worked out perfectly) in your proposal. If something like this still happens, it may also be a reason to extend your project deadline (c.f. Sec. 2.1).

2 Conducting the Work

2.1 Extension of Your Project: Illness and Other Vagaries

If you are unable to proceed with your project for significant periods of time (that is several days or longer, usually), there are a few things you need to immediately take care of in order to not endanger your project. This may be an additional obligation in an already difficult time but delaying this will make the situation worse.

1. Inform your supervisors of the problem. They may be able to help. By all means, they need to know. You **do not need to** provide specifics about your problem that you want to keep private (e.g., the type of illness).

2. Care for written records or certificates of the problem you are facing.

   (a) In case of illness, this would be a medical certificate stating the number of days that you have been or will not be able to work.

   (b) In case of hardware failure (e.g., a cluster you need is not available for longer periods of time), set up a small statement for the administrator and have it signed by them.

3. Once you have the documentation, submit it to the examination board with request for extending your thesis. **Do not wait** until your original deadline approaches (or passes) as requests for extension will then be regarded as not plausible.

4. If you have a problem that may repeatedly come back, you unfortunately will have to do the steps above several times.

Basically all delays that are out of your control will be potential reasons for extension. Lack of time due to inadequate planning or lack of work ethic will not qualify.

3 Writing your Report

The final report is the document that will survive and therefore represent your work in the long run. Furthermore, a good part of your grading will be based on the report. It is, hence, worth allocating time and putting in the effort to make the report shine.

3.1 Plagiarism

As a reminder, using material (text, figures) from another source (including one of your own) without citing the underlying source, thus insinuating it has been created for the given report or by yourself, is plagiarism. **Plagiarism leads to failure of the class. In the repeated case, the student will be expelled from the university.**
The amount, the content, and the importance of the material with respect to the report is irrelevant. It is possible to commit plagiarism in the introductory section by copying an example that is completely off-topic. Please adhere to these few rules to be on the safe side and neither purposefully nor unknowingly (much more common!) commit an attempt of plagiarism:

1. If you take verbatim excerpts from other work, cite the work and put the excerpt in quotation marks. Is is not sufficient to cite the work at the beginning of the section and then take verbatim excerpts without indicating the source there. It is furthermore not sufficient to make a verbatim quote and cite the author at the end of the sentence. You have to use quotation marks for every verbatim quote.

2. If you use figures or tables from other work, cite the work in the caption. See the previous point for verbatim quotes of or within figure and table captions.

3. If you use different pieces of information without verbatim quotation from another source, indicate you did so in the beginning of the respective section. Let's say you have benefitted a lot from a survey paper to get a grasp of the field and you will therefore cite a lot of the papers referenced in the survey. Then indicate in the beginning of your related work section that you

use structure and some of the references from this survey. Every verbatim excerpt, table, or figure still needs to be cited properly, that is with quotation marks and a reference to the survey paper.

4. If you are unsure how to handle a certain kind of quotation, contact your supervisor.

For more information, refer to `https://www.ox.ac.uk/students/academic/guidance/skills/plagiarism`

3.1.1 But I'll reformulate it later

The moment you copy verbatim text into your report draft, you are doing something severely wrong. There are two things that can happen now:

1. You forget to reformulate the text (in part or as a whole) and commit plagiarism. As described above, you will fail your exam.

2. You have a reformulated version of someone else's work in your report that you have not worked with yourself (thus, technically no plagiarism). It is taken from another context and will, hence, break the style, level of abstraction, level of detail, perspective or line of thought in your report.

3.1.2 ChatGPT and other AI Assistants

There have been instances where AI Assistants verbatimly quote pieces from literature without indicating. This usually happens if they are prompted to formulate larger passages from little input.

3.2 Spelling and Grammar

Spelling and grammar carry an important first impression that readers (e.g., your supervisors) will glean from your report within the first minutes of reading. It reflects the amount of preparation and diligence that went into the report, or even more so, the lack of those. It is hard to ignore a bad first impression.

1. Proof-read your complete report carefully, preferably a day after you have finished it, before submitting.

2. Set up and consistently use an automatic spellchecker for your writing environment. Most modern solutions will also help you with phrasing, check grammar rules and suggest synonyms. Examples of the tools that have users within MAS:

   - `https://www.deepl.com/write` (beta)
   - `https://app.grammarly.com`
   - `https://quillbot.com/grammar-check`
   - `https://languagetool.org/de?utm_campaign=addon2-popup-logo`

   Still, don't accept the suggestions without checking.

3.3 Title Page

The title page is the cover of your report, everything has to shine.

1. In English, titles are capitalized.[1]

2. Use the correct academic titles of your supervisors (e.g., Prof. Dr.) before the name and the academic degrees (e.g., M.Sc.) after the name separated with a comma.

3. If you have supervisors from external partner institutions, provide affiliations for all (!) supervisors.

3.4 Tables and Figures

Tables and figures are the core items of your report and should present your findings in a concise way. After reading the report once, people will mostly try to regrasp the core message by reviewing the tables and figures only.

[1] `https://www.grammarly.com/blog/capitalization-in-the-titles/`

1. Use with restraint! It is easy to generate tables and figures with your data. Only show them if they carry a message (even if that message doesn't agree with the core message of your report) or if the absence of a message is the message.

2. Reference every figure and table in the surrounding text. As LaTeX can place floating objects (i.e. figures or tables) at the most *convenient* position, you should help your reader by indicating the spot in the text at which paying attention to the respective figure or table would help most in order to follow your line of thought.

3. Make the figures and tables as self-contained as possible. Try to convey the message even if the surrounding text has not been read in much detail. This is a judgement call at times.

   (a) Provide a specific caption that takes the reader through the elements of the figure / table and maybe provides a short interpretation or parts to which to pay attention. As a rule of thumb, the reader should be able to grasp the key message even if it is the first thing they look at after they have not opened the report for a long while.

   (b) Use specific axis labels and table headings, provide units if possible (instead of "Average distance" use "Average distance of camera to scene over sequence [m]").

   (c) Abstract from the raw data as much as possible, e.g., don't provide frame counts if you can convert to seconds. Don't use indices if you have labels in natural language.

   (d) Don't use program internal nomenclature (e.g., `frame_cnt_scn_1`), find and consistently use a comprehensible nomenclature.

   (e) Use the table and figure captions to provide necessary information to understand the item with only little context. The captions can, thus, be redundant to the surrounding text.

   (f) If something is strange (but correctly so) in the table or figure, point it out in the caption: E.g., "Please note that plot 1 is not visible due to perfect alignment with plot 2."

4. If you have a lot of similar experiments with similar tables and figures, consider moving some of them to the appendix or leaving them out.

5. If you have different tables or figures over the same items (e.g., experiments), try to keep the visualization consistent. E.g., use the same colour for the same experiment in all plots.

6. For figures, think about the right type of plot for your data, e.g., don't connect the dots in a curve if you don't expect continuous behaviour. Don't show (quasi-)exponential behaviour on a linear scale.

7. For tables, if it is not obvious, support your reader with a little up or downpointing arrow indicating whether "higher is better" or "lower is better".

8. For tables, indicate the "best" result in bold.

3.5 Equations

Mathematical notation is useful if you want to be precise about the workings of a mechanism or if you want to perform some way of formal logical argumentation. If you do not want to do any of these, it is maybe easier to convey your argument in natural language.

It is not easy to write down a comprehensible mathematical line of thought. You may need to try out different notations or ways of presentation.

1. Be consistent throughout your entire report. Changing notation half-way through your report will confuse your reader. If you use arguments from more than one piece of related work, you will, thus, likely need to adapt their notation to yours.

2. Make sure all variables are introduced properly. Vice versa, don't assign variables if you do not want to use them in a mathematical argument.

3. Do also provide the structure of a variable if it is not clear. Is it a vector (how many dimensions?), an integer, a real number, ...?
   (correct) Let $x \in \mathbb{R}^n$ be the input to the neural network with n input neurons.

4. If you write down a non-trivial equation, assign it a number to be referenced. Even if you do not reference it yourself, someone reading your report might want to reference it in their work.

5. You can indicate via subscript, superscript or parentheses (A_ϕ, A^ϕ, $A(\phi)$) if a variable is dependent on another variable. However, this may detract from readability within your text, so use with restraint. Also, check if superscript may be confused with potentiation, then use parenthesized superscript instead ($A^{(\phi)}$).

6. If there are several ways to express something (e.g., $E[X], E(X)$), choose the least ambiguous for your report and stick with it.

3.6 Structure

Following some simple rules can save your readers a lot of time scrolling back and forth or looking things up online.

1. The table of contents helps the reader to get a quick grasp of the key aspects and focus of the report. It should help them to immediately recognize what is to be found where.

   (a) Capitalize chapter and section headings as you did with the title of your report.

   (b) Don't "divide" a chapter or section into only one subsection. You will need at least two.[2] Having only one subheading is a sign the report's structure is broken.

   (c) Avoid abbreviations in chacpter or section headings. Spell it out.

   (d) At least the deepest heading level should be informative of what is to be found within. A title called "Results" is not specific enough (if it is not further subdivided).

[2]The author of this document is aware to have violated this rule in this very document. His excuse is that it is "work in progress".

2. Don't start a chapter or section directly with the heading of the next subsection. Write at least an introductory paragraph. Here, you can explain what is to be found in this section.

3. Use cross-references to point the reader forward or backward within your report for related information. This makes your report more coherent and avoids unnecessary repetitions. You can also cross-reference sections from the report's appendix to offer the reader more details if they want to dive deeper.

4. Think about whether a list of abbreviations, a list of figures, a list of tables, etc. helps the reader. If not, leave it out.

5. Use the package `hyperref` to facilitate navigating in the PDF version of your report.

3.7 References

3.7.1 Citing Properly

1. If the formal requirements don't specify anything else, use a citation style that provides a hint on the authors and the year of publication (e.g., APA).

2. Prefer peer-reviewed papers over non-peer-reviewed ones. In particular, if a paper is available on arXiv and as a conference or journal version, cite the latter. It should be assumed that a proper scientific contribution can be published in the scope of three years. If you cite a non-reviewed paper (e.g., from arXiv) that is older, it does not appear to be a trustworthy scientific piece of literature.

3. Don't use the citation token as part of the sentence structure:
   (incorrect) (Earl et al., 2020) propose a multi-target optimization to address the problem.
   (incorrect) The authors of (Earl et al., 2020) propose a multi-target optimization to address the problem.
   (correct) The authors propose a multi-target optimization to address the problem (Earl et al., 2020).

(correct) The problem is addressed with a multi-target optimization (Earl et al., 2020).

3.7.2 A Tidy Reference Section

`bibtex` or other reference snippets that you can find on the internet are generally not in a good format. In order to have an appealing reference section you will need to work over the `bibtex` entries yourself.

1. Be consistent! Try to present each reference item with the same pieces of information and in the same way.
   - If you provide the authors' first names, do so for all the references (good luck googling them all). Alternatively, abbreviate all first names.
   - If you provide the publication month (and year), do so for all references.
   - If you provide a permalink, do so for all references that have one.
   - Keep the names of conference proceedings consistent. If you start with "Proceedings of ...", do so for all conference proceedings. If you name the organization (e.g., IEEE) in the conference name, do so for all the conferences. If you name the abbreviation of the conference (e.g., CVPR, ICLR, NeurIPS), do so for all conferences. The same goes for "Journal of ...".
2. Avoid redundant information. For example, it happens a lot that the year of publication appears twice in a reference item.
3. Capitalize titles (of references, journals and conferences) correctly. Double curly brackets will make `bibtex` keep the given capitalization.
   ```
   title = {Mask R-CNN}, => Mask r-cnn
   title = {{Mask R-CNN}}, => Mask R-CNN
   title = {{Conference on Computer Vision and Pattern Recognition}},
   => Conference on Computer Vision and Pattern Recognition
   ```

3.8 Miscellaneous

1. Introduce abbreviations the first time they are used. You might find the LaTeX package `glossaries` helpful.
2. Separate at least the numbers larger than 9,999 with a comma.
3. Adhere to the convention for indicating significant digits.
4. If available, provide a measure of error (usually one standard deviation, e.g., ± 0.1)

4 Oral Examination

4.1 Timely Defence

Depending on the time of year and their workload, your supervisors might not be available for a timely defence shortly after your thesis submission. Hence, please ask for an appointment for the defence about six weeks in advance. This applies in particular if you have obligations scheduled (new job, travel, end of semester) before which you want to have given your defence.

4.2 Extent

The defence will take 60 to 90 minutes alltogether starting with a presentation of 25 to 30 minutes. After this, a potentially public and closed question and answer sessions will take place with questions around the topic of your thesis. Depending on your presentation style (It is adviced to rehearse your presentation), you should have at most one slide per minute of presentation.

4.3 Slide Preparation

The subsections 3.1, 3.2, 3.5, and 3.8 apply to your slides as well. Furthermore, make sure to adhere to the following guidelines:

1. You should avoid encumbering your slides with too much written text. Restrict it to keywords and provide the context in your oral presentation. That is, also figures and tables will not need extensive captions (unlike it is recommended in section 3.4 for your written report).
2. All slides should have a slide number to allow for referencing it during questioning.
3. You can prepare additional slides to only show if asked about something in particular.
4. Keep your report handy (in a digital or printed version) to be able to answer questions about details therein.

5 Common Fallacies

There are some recurring themes and common mistakes in the overall process of working on a thesis. These are pointed out in the following:

Underestimating the Importance of the Written Report

The report is the main result and deliverable of your thesis. It deserves a proportionate amount of the project time. Four weeks are a good average, but some students need more. In particular, in the last weeks of their project, students tend to improve their project results (even if they are promising already) instead of working on the report. Writing coherent text, finding a good technical notation, and creating intuitive plots takes time and sometimes several iterations.

Delaying the Experimental Work / Not Questioning the Results / Not Discussing Experimental Work with the Supervisors

Your experimental results will not be correct on the first try. Even if they look right, they probably are not. This means that experimental work will take time and several iterations to get right. Make time for this trial and error phase. Think about ways to verify that your metrics are computed correctly (maybe you can create

visualizations of the results for some examples and verify it this way). If necessary, take the time to prepare a presentation of your results for your supervisors, in particular if they are yet unconclusive. They will understand it is work in progress.

Discussing the Entire Thesis during the Defence

It is not necessary to explain everything you have done during your defence presentation. Your presentation will become hard to follow (and you might not get any good questions from the audience then). You are restricted to present your results in a short period of time and people expect you to select points that you deem important. You can mention that you only go over some of the points in the beginning of your presentation and you can mention what else has been done in your project during the conclusion. The audience and the examiners will ask if they want to know more.