School of Physics and Astronomy

Senior Honours Project
Computational Physics

Analyzing a ranking system

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Abstract

The abstract is a short, concise explanation of the project covering the aims, outlines of techniques used and a short summary of the results. It should contain enough information to make the aims and success of the project clear, but contain no details. A typical abstract should be between 50 and 100 words.

Declaration

I declare that this project and report is my own work.

Signature: Date:

Supervisor: Prof. Graeme Ackland 10 Weeks

Contents

1 Introduction

The introduction section of the report should introduce the project in more detail than in the abstract. In particular it should present the motivation, the aims, outline of techniques used, and the scope of the project. It should also contain references to similar work in the same field to put your work in the correct context.

As a general rule, people reading the abstract and introduction alone should have a good idea of the material in the project, the techniques employed and the results obtained. A typical introduction should be about 1 page, (300-450 words).

2 Background or Theory

This section should cover the theory of the material in the project in sufficient detail to make the following work understandable to the average physicist. It should not contain large sections of standard bookwork, but should contain references to this material. The exact contents of this section will depend on the project being undertaken.

This section should contain only the relevant theory. In particular a life history of the inventor of the technique to be used is totally irrelevant[1]. Here use common sense and the general rule, "If in doubt: leave it out", however include information that you judge would be useful to one of your peers if they wehe to repeat the project. If you are undertaking a 12 week project and it includes a literature search, put the result of the search here. As a rough guide this section should be about 3-4 pages for a 6 week project, longer for longer projects.

Note that if the project consists of a series of short experiments each of which requires a different theory and method, it may be appropriate to have one **Theory, Method, Results** section for each experiment.

3 Method or Strategy

This section should contain the details of the method employed. As in the previous sections standard techniques should not be written out in detail. For example if you use an oscilloscope to take a measurement, the theory of the CRO tube[2] is **not relevant**. In computational projects this section should be used to explain the algorithms used and the layout of the computational code. A copy of the acutal code must be given in the appendices. Long detailed sections of theory, data tables and details of computational code used in data analysis only should not appear in this section, but should/may be included in the appendices.

This section should emphasise the philosophy of the approach used and detail novel techniques. However please note: this section in **not** a blow-by-blow account of what you did throughout the project, and in particular it should **not** contain large detailed sections about things you tried and found to be completely wrong. Remember you are writing a technical report, and not a diary. If however you find that a technique that was expected to work failed, that is a valid result and should be included.

[1] I have seen a report that contained three pages on the life of Gabor, and it was not very interesting.

[2] Don't laugh, I have actually seen this.

Here logical structure is particularly important, and you may find that to maintain good structure you may have to present the experiments in a different order from the one in which you carried them out.

4 Results & Discussion

This section should detail the obtained results in a clear, easy-to-follow manner. Remember long tables of numbers are just as boring to read as they are to type-in. Use graphs to present your results where -ever practicable. When quoting results or measurements **DO NOT FORGET ABOUT ERRORS**. Remember there are two basic types of errors, these being random and systematic, which you must consider. Remember also the difference between an error and a mistake, computer program bugs are mistakes.

Again be selective in what you include. Half a dozen tables that contain totally wrong data you collected while you forgot to switch on the power supply are **not relevant** and will frequently mask the correct results.

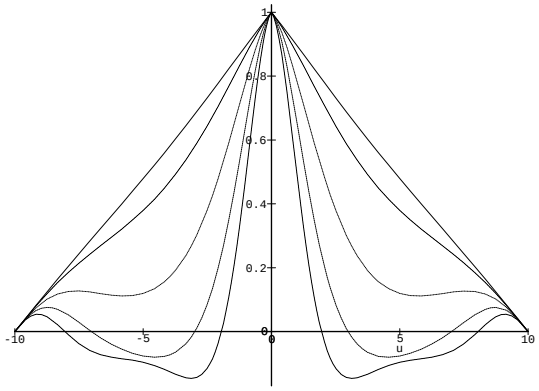

Figure 1: This is an inserted Postscript file

This section must contain a discussion of the results. This should include a discussion of the experimental and/or numerical errors, and a comparison with the predictions of the background and theory underlying the techniques used. This section should highlight particular strengths and/or weaknesses of the methods used.

5 Conclusion

This section should summarise the results obtained, detail conclusions reached, suggest future work, and changes that you would make if you repeated the experiment. This section should in general be short, 100 to 150 words being typical for most projects.
If you have opted to have multiple **Theory, Method, Results** sections, draw all the results together in a **single** conclusion.

6 References

Don't forget this section. Detail the relevant references which should be cited at the correct place in the text of the report. There are no fixed rules as to how many references are *needed*. Generally the longer the project, and the more background reading you had to do, the more references will be required.

When you cite a reference you must give sufficient information. For example, for a journal article give, *Author*, *Title of article*, *Journal Name*, *Volumn*, *Page*, and *Year*, while for a book give, *Author*, *Title*, *(Editor if there is one)*, *Publisher*, and *Year*.

A Appendices

Material that is useful background to the report, but is not essential, or whose inclusion within the report would detract from its structure and readablity, should be included in appendices. Typical material could be diagrams of electronic circuits built, specialist data tables used to analyse results, details of computer programs written for analysis and display of results, photographic plates, and, for computational projects, a copy of all written code.

Again be selective. The appendix is **not** an excuse for you to add every last detail and piece of data, but should be used to assist the reader of the report by supplying additional material. Not all reports require appendices and if the report is complete without this additional material leave it out.