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Department of Meteorology

Using machine learning to predict the intensification and propagation of East African storms

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Declaration

I, Sean Kelley, of the Department of Meteorology, University of Reading, confirm that this is my own work and figures, tables, equations, code snippets, artworks, and illustrations in this report are original and have not been taken from any other person's work, except where the works of others have been explicitly acknowledged, quoted, and referenced. I understand that if failing to do so will be considered a case of plagiarism. Plagiarism is a form of academic misconduct and will be penalised accordingly.

I give consent to a copy of my report being shared with future students as an exemplar.

I give consent for my work to be made available more widely to members of UoR and public with interest in teaching, learning and research.

Sean Kelley
August 4, 2025

Abstract

This is a project report template, including instructions on how to write a report. It also has some useful examples to use \LaTeX . Do read this template carefully. The number of chapters and their titles may vary depending on the type of project and personal preference. Section titles in this template are illustrative should be updated accordingly. For example, sections named “A section...” and “Example of ...” should be updated. The number of sections in each chapter may also vary. This template may or may not suit your project. Discuss the structure of your report with your supervisor.

Guidance on abstract writing: An abstract is a summary of a report in a single paragraph up to a maximum of 250 words. An abstract should be self-contained, and it should not refer to sections, figures, tables, equations, or references. An abstract typically consists of sentences describing the following four parts: (1) introduction (background and purpose of the project), (2) methods, (3) results and analysis, and (4) conclusions. The distribution of these four parts of the abstract should reflect the relative proportion of these parts in the report itself. An abstract starts with a few sentences describing the project's general field, comprehensive background and context, the main purpose of the project; and the problem statement. A few sentences describe the methods, experiments, and implementation of the project. A few sentences describe the main results achieved and their significance. The final part of the abstract describes the conclusions and the implications of the results to the relevant field.

Keywords: a maximum of five keywords/keyphrase separated by commas

Report's total word count: Following the abstract, the word count must be stated. We expect at least 10,000 words in length and at most 15,000 words (starting from Chapter 1 and finishing at the end of the conclusions chapter, excluding references, appendices, abstract, text in figures, tables, listings, and captions), about 40 - 50 pages.

Program code should be uploaded to gitlab, and the gitlab link should be included alongside the word count, following the abstract.

You must submit your dissertation report (preferred in a PDF file) via the “Turnitin assignment” in Blackboard Learn by the deadline. If a student has resits from the taught modules, the dissertation deadline will be extended for 3 weeks from the original dissertation deadline.

Acknowledgements

An acknowledgements section is optional. You may like to acknowledge the support and help of your supervisor(s), friends, or any other person(s), department(s), institute(s), etc. If you have been provided specific facility from department/school acknowledged so.

Contents

List of Figures	v
List of Tables	vi
1 Introduction	1
1.1 Background	2
1.2 Problem statement	2
1.3 Aims and objectives	2
1.4 Solution approach	2
1.4.1 A subsection 1	2
1.4.2 A subsection 2	2
1.5 Summary of contributions and achievements	3
1.6 Organization of the report	3
References	4
Appendices	5
A An Appendix Chapter (Optional)	5
B An Appendix Chapter (Optional)	6

List of Figures

List of Tables

List of Abbreviations

SMPCS School of Mathematical, Physical and Computational Sciences

Chapter 1

Introduction

Gebrechorkos et al. (2019)

Guidance on introduction chapter writing: Introductions are written in the following parts:

- A brief description of the investigated problem.
- A summary of the scope and context of the project, i.e., what is the background of the topic/problem/application/system/algorithm/experiment/research question/hypothesis/etc. under investigation/implementation/development [whichever is applicable to your project].
- The aims and objectives of the project.
- A description of the problem and the methodological approach adopted to solve the problem.
- A summary of the most significant outcomes and their interpretations.
- Organization of the report.

Consult **your supervisor** to check the content of the introduction chapter. In this template, we only offer basic sections of an introduction chapter. It may not be complete and comprehensive. Writing a report is a subjective matter, and a report's style and structure depend on the "type of project" as well as an individual's preference. This template suits the following project paradigms:

1. software engineering and software/web application development;
2. algorithm implementation, analysis and/or application;
3. science lab (experiment); and
4. pure theoretical development (not mention extensively).

Use only a single **font** for the body text. We recommend using a clean and electronic document friendly font like **Arial** or **Calibri** for MS-word (If you create a report in MS word). If you use this template, DO NOT ALTER the template's default font "amsfont default computer modern". The default L^AT_EX font "computer modern" is also acceptable.

The recommended body text **font size** is minimum **11pt** and minimum one-half line spacing. The recommended figure/table caption font size is minimum 10pt. The footnote¹ font size is minimum 8pt. DO NOT ALTER the font setting of this template.

¹Example footnote: footnotes are useful for adding external sources such as links as well as extra information on a topic or word or sentence. Use command `\footnote{...}` next to a word to generate a footnote in L^AT_EX.

1.1 Background

Describe to a reader the context of your project. That is, what is your project and what its motivation. Briefly explain the major theories, applications, and/or products/systems/algorithms whichever is relevant to your project.

Cautions: Do not say you choose this project because of your interest, or your supervisor proposed/suggested this project, or you were assigned this project as your final year project. This all may be true, but it is not meant to be written here.

1.2 Problem statement

This section describes the investigated problem in detail. You can also have a separate chapter on “Problem articulation.” For some projects, you may have a section like “Research question(s)” or “Research Hypothesis” instead of a section on “Problem statement.”

1.3 Aims and objectives

Describe the “aims and objectives” of your project.

Aims: The aims tell a reader what you want/hope to achieve at the end of the project. The aims define your intent/purpose in general terms.

Objectives: The objectives are a set of tasks you would perform in order to achieve the defined aims. The objective statements have to be specific and measurable through the results and outcome of the project.

1.4 Solution approach

Briefly describe the solution approach and the methodology applied in solving the set aims and objectives.

Depending on the project, you may like to alter the “heading” of this section. Check with you supervisor. Also, check what subsection or any other section that can be added in or removed from this template.

1.4.1 A subsection 1

You may or may not need subsections here. Depending on your project’s needs, add two or more subsection(s). A section takes at least two subsections.

1.4.2 A subsection 2

Depending on your project’s needs, add more section(s) and subsection(s).

A subsection 1 of a subsection

The command `\subsubsection{}` creates a paragraph heading in \LaTeX .

A subsection 2 of a subsection

Write your text here...

1.5 Summary of contributions and achievements

Describe clearly what you have done/created/achieved and what the major results and their implications are.

1.6 Organization of the report

Describe the outline of the rest of the report here. Let the reader know what to expect ahead in the report. Describe how you have organized your report.

Example: how to refer a chapter, section, subsection. This report is organised into seven chapters. Chapter ?? details the literature review of this project. In Section ??...

Note: Take care of the word like “Chapter,” “Section,” “Figure” etc. before the \LaTeX command `\ref{}`. Otherwise, a sentence will be confusing. For example, In ?? literature review is described. In this sentence, the word “Chapter” is missing. Therefore, a reader would not know whether 2 is for a Chapter or a Section or a Figure. For more information on **automated tools** to assist in this work, see ??.

References

Gebrechorkos, S. H., C. Bernhofer, and S. Hülsmann, 2019: Impacts of projected change in climate on water balance in basins of east africa. *The Science of the total environment*, **682**, 160–170, <https://doi.org/10.1016/J.SCITOTENV.2019.05.053>.

Appendix A

An Appendix Chapter (Optional)

Some lengthy tables, codes, raw data, length proofs, etc. which are **very important but not essential part** of the project report goes into an Appendix. An appendix is something a reader would consult if he/she needs extra information and a more comprehensive understating of the report. Also, note that you should use one appendix for one idea.

An appendix is optional. If you feel you do not need to include an appendix in your report, avoid including it. Sometime including irrelevant and unnecessary materials in the Appendices may unreasonably increase the total number of pages in your report and distract the reader.

Appendix B

An Appendix Chapter (Optional)

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