

King Saud University

College of Computer and Information Sciences

Computer Engineering Department

**A Long Title of Research Thesis that takes up to two lines of text [English]**

**عنوان مطول للرسالة باللغة العربية مكون من جملة قد تمتد الى سطرين متتاليين**

DISSERTATION

by

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Submitted in Partial Fulfilment of the Requirements

For the Degree of Master of Science (or Doctor of Philosophy) in the Department of Computer Engineering at the College of Computer and Information Sciences.

Riyadh, Kingdom of Saudi Arabia

March, 2020

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# Examination Committee Page

The committee for

**[Student Full Name]**

certifies that this is the approved version of the following dissertation and is acceptable in quality and form for publication in paper and in digital formats:

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King Saud University

2020

# Declaration

I, [student full name], hereby declare that the work presented in this thesis has not been submitted for any other degree or professional qualification, and that it is the result of my own independent work.

Signed:

Date:

# Abstract

**A Long Title of Research Thesis that takes up to two lines of text [English]**

by

First name Last name

Master of Science (or Doctor of Philosophy) in the Department of Computer Engineering at the College of Computer and Information Sciences.

King Saud University, Riyadh, March, 2020

 Dr. First name Last name, Chair

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The abstract is a brief summary of your research thesis, and should be no longer than 200 words. It starts by describing in a few words the knowledge domain (broad area of research) where your research takes place and the key issues of that domain that offer opportunities for the scientific or technological innovations you intend to explore. You then present briefly your research statement (focus area), your research approach, the results you have achieved, and the anticipated implications of such results on the advancement of the knowledge domain. It is important to keep your abstract concise, clear, and objective.

# الخلاصة

**عنوان مطول للرسالة باللغة العربية مكون من جملة قد تمتد الى سطرين متتاليين**

الخلاصة عبارة عن تلخيص للعمل البحثي، ويجب ان لا يحتوي أكثر من 200 كلمة. يبدأ الملخص بوصف مختصر لمجال المعرفة (المجال العام للبحث) والتي تظهر أهمية البحث والنقاط الأساسية في المجال. بعد ذلك يتم عرض خطوات البحث (المجال الدقيق)، طريقة البحث المتبعة، و ملخص للنتائج النهائية. يمكن أيضا عرض الاثر المتوقع لهذه النتائج على مجال المعرفة. كما يجب التنبيه على جعل الملخص مختصر، واضح، وموضوعي.



# Associated Publications

List of publications goes here, formatted as a full citation.

Consider including publication in an appendix, too.

# Acknowledgements

*In the name of Allah, Most Gracious, Most Merciful*

This page is used to thank individuals, groups, or organizations for their support. If you are required to acknowledge the support of a sponsor, this is generally an appropriate place to do so.

An acknowledgments page must be included in your final dissertation or thesis. The acknowledgments page should be listed in the table of contents. Place it after the final list used in the document, and before any dedication, abstract, or epigraph that is included.

It is appropriate to acknowledge sources of academic and financial support; some fellowships and grants require acknowledgment.

We offer special thanks to the CCIS at KSU for allowing us to use their dissertation and thesis template as a starting point for the development of this document.

First name, Last name
June 2020

Dedicated to my parents.

**Note:** If you include a special dedication as shown here be sure to keep it brief and center it on the page both horizontally and vertically. Alternatively, you may remove this page altogether, and a special dedication can be placed as the final paragraph of your acknowledgments page. **Do not include the dedication page in your table of contents.**

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# List of Figures

Figure ‎1.1 You can left justify your figures. 1

Figure ‎3.1 You should put a figures with multiple sub-figures in a table (centred). Then describe each part in the caption, (a) This figure talks about this, (b) this figure describes that, (c) this figure explains these, (d) this figure is the ultimate truth.. 3

If one or more figures are used in the document, there must be a list of all figures and it must be included in the table of contents. The list should be spaced at 1.15. Begin each listing on a new line.

To update the List of Figures, which is a specialized TOC, right-click anywhere in it (not including the title) and select “Update Field”. You will be given the choice of “Update page numbers only” or “Update entire table”. The former will, as it says, change only the page numbers, and only for items already in the TOC; the latter will update the titles as well, and will add new items in accordance with any new figure titles you may have created. These will be determined by the use of the appropriate styles. If a figure title is missing from the list after updating the entire table, check that the figure title in question is using the Figure Title style, then update the entire TOC again

# List of Tables

Table ‎3‑1: This is the table caption. 4

If one or more tables are used in the document, there must be a list of all tables and it must be included in the table of contents. The list should be spaced at 1.15. Begin each listing on a new line.

To update the List of Tables, which is a specialized TOC, right-click anywhere in it (not including the title) and select “Update Field”. You will be given the choice of “Update page numbers only” or “Update entire table”. The former will, as it says, change only the page numbers, and only for items already in the TOC; the latter will update the titles as well, and will add new items in accordance with any new table titles you may have created. These will be determined by the use of the appropriate styles. If a table title is missing from the list after updating the entire table, check that the table title in question is using the Table Title style, then update the entire TOC again

# List of Abbreviations

KSU King Saud University

CNN Convolutional Neural Networks

# Introduction

## Overview and Background

Give an overview of the knowledge domain (broad area of research) where your research takes place. This section should take the form of an abstract of the general subject or study area and identify the discipline(s) within which it falls.

This template is designed to assist you in writing a research thesis in the correct structure and format as required by the College of Computer and Information Sciences (CCIS). This template should serve as a starting point for any student writing a research thesis. The headings and styles give an indication of the sections required in the research thesis. A research thesis is an outline of your project that is designed to:

* Define a clear question and approach to answering it
* Highlight its originality and/or significance
* Explain how it adds to, develops (or challenges) existing literature in the field
* Persuade readers of the importance of the work.

The introduction of the research thesis should aim to catch the reader’s interest and should be written in a style that can be understood easily by any reader with a general computing science background. It gives an overview of the research project you propose and explains the background of the project, focusing briefly on the major issues of its knowledge domain. It then proceeds with the presentation of the research focus, which can take the form of a hypothesis, a research question, a project statement, or a goal statement.

## Motivation

In this section you should write about the major motivations of your research.

## Problem Statement

In this section you should provide a research statement that captures both the essence of the project and its delimiting boundaries (scope). Hence it should be followed by a clarification of the extent to which you expect its outcomes to represent an advance in the knowledge domain you have described. This section states the problem that you are exploring. The research statement is specific, concise, and clear. Answer the question: “What is the gap that needs to be filled?” and/or “What is the problem that needs to be solved?” State the problem clearly early in a paragraph. Limit the variables you address in stating your problem. Consider framing the problem as a question. You will probably need to address questions such as;

* What is the specified aspect in the defined area (you provided the area in the research problem section) in which you will be working?
* What is the shortcoming in the defined area or gap in this defined area that you would like to address

## Research Objectives

Next, you have to describe the research goal(s) as it relates to solving the uncertainty or question you are interested in. It should explicitly hint towards the contribution you want to make with the intended study. You will elaborate on the scientific contribution made in a later section. **Goal** describes what you want to achieve. **Objectives** describe **how** you are going to achieve the goal(s).

Objectives should be S.M.A.R.T.:

* **Specific** – be precise about what you are going to do
* **Measureable** – specify an indicator for success, so that you will know when you have reached your goal
* **Achievable** –a less ambitious but completed objective is better than an over-ambitious one that you cannot possible achieve.
* **Realistic** – do you have the necessary resources to achieve the objective?
* **Time constrained** – determine when each stage needs to be completed.

The clarification of the research objectives should relate your research to the work carried out by others. It should explain the measure to which your work develops from their work and the extent to which it diverges from theirs to open up new and yet unexplored avenues. It explains what you plan to do to tackle your research problem, why you plan to do it that way, and how you are going to do it.

## Thesis Contribution to the Field/ Significance and /or Impact of the Research

You will need to explain the research significance, and locate it within the relevant literature. A convincing statement is required as to why your topic is worth scientific research, i.e. how it will contribute to and enrich the academic knowledge. This contribution results from your research activities, which are conducted to discover new information, as well as to expand and verify existing knowledge. You need to provide indication of how you feel your research can make an original contribution, how it may fill gaps in existing work and how it may extend understanding of particular topics in your particular subject area.

The working paper by Dr. John Morrison [1] is a good resource for helping you understand what constitutes a contribution.

You should also relate the research to the existing specialties in the department in which you are studying and understanding of computing within your specific discipline (department specialty)

## Thesis Outline

Let the reader know how the thesis is presented. It might be appropriate to provide a 1-2 sentence description of each chapter.

# Literature Review

## Introduction

Introduction to the literature review as a whole.

The Literature Review serves several purposes. First of all, it demonstrates that you have built a solid knowledge of the field where the research is taking place, that you are familiar with the main issues at stake, and that you have critically identified and evaluated the key literature [2]–[4]. On the other hand, it shows that you have created an innovative and coherent view integrating and synthesizing the main aspects of the field, so that you can now put into perspective the new direction that you propose to explore. It should be accompanied by comprehensive references, which you list at the end of the thesis. The number of references may vary depending on the subject but in general it should be no less than 70 references for M.Sc. and 100 references for a Ph.D.

In this section you should demonstrate that you are aware of the issues raised in related literature. You should provide a description of recent academic research in your chosen focus area; including the below parts:

1. How other scholars have written about your topic: include the list of references to key texts and recently published articles should be made to convince that you appreciate their integrative relevance to your research area.
2. The range of methods/ theories used to scrutinize, analyze and or test data: *List the best methodologies and research techniques for your particular topic.* Justifies methodological choices.
3. How other scholars connect their specific research topics to larger issues, questions, or practices within the field.
4. Identify potential gaps in knowledge: illustrates the uniqueness, importance of and need for your particular project.
5. Establish a need for current and/or future research projects.

## Next Section

Quick introduction to contents of section

### Sub-section

#### Maybe another sub-section

But don’t get too deep into subsequent sections. Think carefully about how far into sub-sections you need to go.

Before moving onto the next section, give a quick review and a teaser of what’s to come. Think of this as a form of navigation for the reader.

## Another Section

Introduce each new section to the reader, then use more sub-sections as required.

### Possible Sections or Sub-sections

Depending on your discipline, some possible sections in this chapter might include:

* Theoretical framework
* Gaps in the literature
* The research questions
* Opportunities for contributions to knowledge

## Conclusion to This Chapter

Give the reader a reminder of the key points for this chapter. Then, tell them what follows in the next chapter.

# Methodology 1

## Introduction

Introduction to methods chapter

Think about research design.

* It’s about the rigour!
* Ethics and reasoning
* Talk about WHY you did or did not do something

Justification, justification, justification!!

 This is key to everything. Justify what/why you did or did not do what you did.

## Section Header about Quotations

You must use quotation marks and parenthetical references to indicate words that are not your own. Put quotation marks around short quotes. Put long quotes in separate single-spaced paragraphs, indented up to 1 inch from the left margin (these are called block quotations). Kate Turabian, editor of official publications and dissertation secretary at the University of Chicago for over 25 years, distinguishes short and long quotes as follows:

Short, direct prose quotations should be incorporated into the text of the paper and enclosed in double quotation marks: “One small step for man; one giant leap for mankind.” But in general a prose quotation of two or more sentences which at the same time runs to four or more lines of text in a paper should be set off from the text and indented in its entirety…[5]

## Section Header about Figures

Figures should be inline with text and figure numbers should be includes the current chapter plus a sequence number. Copy this Figure to other places and modify the figures as well as the caption. The figure number will update automatically. If it does not, you can right click on the figure number and select “update”.



Figure ‎3.1 You can left justify your figures.

Figures with multiple subfigures should be put in a table with hidden borders. Use the same numbering style for that includes the current chapter plus a sequence number. Make sure to center all cells in the table and also to hide the table borders.

|  |  |
| --- | --- |
|  |  |
| (a) | (b) |
|  |  |
| (c) | (d) |

***Figure ‎3.2*** *You should put a figures with multiple sub-figures in a table (centred). Then describe each part in the caption, (a) This figure talks about this, (b) this figure describes that, (c) this figure explains these, (d) this figure is the ultimate truth.*

## Section Header about Tables

Table captions should be above the table. Avoid using vertical lines as they are not aesthetically pleasing.

Table ‎3‑1: This is the table caption.

|  |  |  |
| --- | --- | --- |
| **Lorem ipsum** | **Augue vel tellus** | **Sed sagittis** |
| Est blandit |  |  |
| Sed est |  |  |

### Sub-section about Equations

Equations should be put in a table with hidden borders. Use the same numbering style for equations as you would for figures and tables. Copy this equation table to other places and modify the equation inside it. Here is an example of an equation set in-line with a paragraph: E = mc2. Here is an example equation placed in a separate paragraph:

|  |  |
| --- | --- |
| *E = mc2* | (1.1) |

## Conclusion to This Chapter

Give the reader a reminder of the key points for this chapter. Then, tell them what follows in the next chapter.

# Another Chapter (Methodology 2?)

## Introduction

## Section

### Sub-section

## Conclusion to This Chapter

Give the reader a reminder of the key points for this chapter. Then, tell them what follows in the next chapter.

# Another Chapter (Discussion?)

## Introduction

## Section

### Sub-section

## Conclusion to This Chapter

Give the reader a reminder of the key points for this chapter. Then, tell them what follows in the next chapter.

# Conclusion and Future Work

## Introduction

## Section

Possible sections might include:

* Contributions to existing knowledge
* Future work

### Sub-section

# References

No introduction or additional text needed, just list your references. Formatting will vary based on norms and standards from your research area.

Your references should provide the reader with a good sense of your grasp on the literature and how you can contribute to it. A full list of references to key texts and articles must be included. Referencing should be done according to the IEEE referencing styles [6]. References are numbered in square brackets [ ] as sources are introduced in your writing. A full reference list with sources listed according to the order used in the paper is then provided with full source details.

The CCIS website has comprehensive details on the postgraduate programs. The templates and brochure can be downloaded from: http://www.ccis.ksu.edu.sa/.

The most important thing regarding references is that you should start collecting and recording all details of your references using tools that help manage and organize your references such as Mendeley (recommended), EndNote, Reference Manager, Docear, Zotero, BibSonomy, etc.

[1] J. Morrison, “A contribution to scientific knowledge,” *Work. Pap.*, no. 1, 2003.

[2] H. Alhichri, Y. Bazi, N. Alajlan, and B. Bin Jdira, “Helping the Visually Impaired See via Image Multi-labeling Based on SqueezeNet CNN,” *Appl. Sci.*, vol. 9, no. 21, p. 4656, Nov. 2019, doi: 10.3390/app9214656.

[3] H. Alhichri, E. Othman, M. Zuair, N. Ammour, and Y. Bazi, “Tile-Based Semisupervised Classification of Large-Scale VHR Remote Sensing Images,” *J. Sensors*, vol. 2018, no. Systems and Sensors in Geoscience Applications, pp. 1687–725X, 2018, doi: 10.1155/2018/6257810.

[4] H. Alhichri, N. Ammour, N. Alajlan, and Y. Bazi, “Clustering of Hyperspectral Images with an Ensemble Method Based on Fuzzy C-Means and Markov Random Fields,” *Arab. J. Sci. Eng.*, vol. 39, no. 5, pp. 3747–3757, 2014, doi: DOI 10.1007/s13369-014-1037-3.

[5] K. L. Turabian, *A manual for writers of research papers, theses, and dissertations: Chicago style for students and researchers*. 2007.

[6] The University of York, “IEEE - Student home, The University of York.” https://www.york.ac.uk/students/studying/skills/integrity/referencing-styles/ieee/ (accessed Sep. 09, 2020).

# Appendix A: Title here

# Appendix B: Title here

# Appendix C: Title here

# Author’s Biographical Sketch

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