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UNIVERSITY OF THE PHILIPPINES

Master of Science in Electrical Engineering

Student M. Name

Descriptive Thesis Title

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University of the Philippines Diliman

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Date of Submission

January 2022

Thesis Classification

F

This thesis is available to the public.

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36 This thesis, entitled **DESCRIPTIVE THESIS TITLE**, prepared and submitted by 36
37 **STUDENT M. NAME**, in partial fulfilment of the requirements for the degree of **MASTER** 37
38 **OF SCIENCE IN ELECTRICAL ENGINEERING** is hereby accepted. 38

39 39
40 **ADVISER M. NAME, PHD** 40
 Thesis Adviser

41 Accepted as partial fulfilment of the requirements for the degree of **MASTER OF** 41
42 **SCIENCE IN ELECTRICAL ENGINEERING.** 42

43 43
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 NGSE Director

44 44
 DEAN M. NAME, PHD 44
 Dean

45 Acknowledgments 45

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47 their valuable feedback during the oral defense. Thanks to ABC Foundation for funding my 47
48 studies. Thanks to the Filipino people for subsidizing my education. Thanks to my family. 48

49	Abstract of Thesis	49
50	Make a concise summary that will fit in half a page. Must answer the following:	50
51	1. What is the problem that I am solving and why does it matter?	51
52	2. What are the state-of-the-art (SOTA) solutions to this problem?	52
53	3. What is the gap in the current SOTA?	53
54	4. What is your idea to address this gap?	54
55	5. Why do you think your idea will work?	55
56	6. How will you execute your idea?	56
57	7. What is the empirical evidence that your idea works?	57
58	8. What can you conclude from the study that you have accomplished?	58

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List of Figures

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1. Introduction

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98

- At least 5 pages.

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99

- Summary of the whole thesis. Use previous studies, diagrams, and illustrations to emphasize the motivation behind this thesis.

99

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- Must answer the following:

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1. What is the problem that I am solving and why does it matter?

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2. What are the state-of-the-art (SOTA) solutions to this problem?

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3. What is the gap in the current SOTA?

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4. What is your idea to address this gap?

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5. Why do you think your idea will work?

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6. How will you execute your idea?

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7. What is the empirical evidence that your idea works?

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8. What can you conclude from the study that you have accomplished?

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9. What are the possible future works that will extend your study?

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- List the roadmap to the rest of the manuscript.

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Start Strong: For every chapter (except possibly the Problem Statement), make an introduction (2 or 3 paragraphs) on what the chapter is all about.

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Stay Strong: Explain ideas in the simplest and most direct way that many people in your field can understand. If a certain topic is a bit specialized or hard to remember, make a concise introduction. Point the reader to a reference for further understanding. Each chapter should be complete or stand-alone and concise.

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Finish Strong: At the end, make a summary (2 or 3 paragraphs) to re-emphasize the points discussed in the chapter.

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120	1.1 Scope and Limitations	120
121	What is the scope of your work? What are its limitations?	121
122	1.2 Structure	122
123	This thesis is organized as follows. In Chapter 2, the discussion on the body of work	123
124	contextualizes our approach. Chapter 3 discusses the problem statement of this thesis. In	124
125	Chapter 4, the methodology is discussed in more detail. Chapter 5 contains the evaluation	125
126	results, while Chapter 6 contains the analysis and discussion. The thesis is concluded in	126
127	Chapter 7.	127

128	2. Related Work	128
129	• Expound #2 (<i>What are the state-of-the-art (SOTA) solutions to this problem?</i>) and #3	129
130	(<i>What is the gap in the current SOTA?</i>) by rigorously enumerating related works and	130
131	analyzing these in the context of the problem that you are solving.	131
132	• Build a taxonomy or survey to narrow down the field of study of the problem and to	132
133	limit the scope of your thesis. If there is a recent survey paper in your problem, use it.	133
134	If none, use Google Scholar to build a tree diagram of related work.	134
135	• Build a table or graph with metrics to show what are available features and what are	135
136	lacking in the current SOTA.	136
137	• Using the table/graph, identify the gap to show what do you intend to solve.	137
138	• Introduce the idea on how to solve this gap.	138
139	2.1 Chapter Summary	139
140	Start Strong: For every chapter (except possibly the Problem Statement), make an	140
141	introduction (2 or 3 paragraphs) on what the chapter is all about.	141
142	Stay Strong: Explain ideas in the simplest and most direct way that many people in	142
143	your field can understand. If a certain topic is a bit specialized or hard to remember, make a	143
144	concise introduction. Point the reader to a reference for further understanding. Each chapter	144
145	should be complete or stand-alone and concise.	145
146	Finish Strong: At the end, make a summary (2 or 3 paragraphs) to re-emphasize the	146
147	points discussed in the chapter.	147

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3. Problem Statement

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- Following up from #3 (*What is the gap in the current SOTA?*), formalize the main problem and subproblems using a list.

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- Use math models and diagrams to clearly show the problem and subproblems being addressed (*e.g.* prior work uses $P(\mathbf{y}|\mathbf{y}_{<t}, \mathbf{x})$ as the model, while we use $P(\mathbf{y}|\mathbf{y}_{\neq t}, \mathbf{x})$).

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Start Strong: For every chapter (except possibly the Problem Statement), make an introduction (2 or 3 paragraphs) on what the chapter is all about.

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Stay Strong: Explain ideas in the simplest and most direct way that many people in your field can understand. If a certain topic is a bit specialized or hard to remember, make a concise introduction. Point the reader to a reference for further understanding. Each chapter should be complete or stand-alone and concise.

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Finish Strong: At the end, make a summary (2 or 3 paragraphs) to re-emphasize the points discussed in the chapter.

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3.1 Objectives

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The specific objectives of this thesis are:

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1. Propose a new method X to solve problem Y.

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2. Compare methods A, B, and C against our method X.

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4. Methodology

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- Expound #4 (*What is your idea to address this gap?*), #5 (*Why do you think your idea will work?*), and #10 (*Introduce the idea on how to solve this gap*).

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- Propose a solution. Use math models, diagrams, and algorithms to formalize your method.

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- Cite related literature of the building blocks used in the proposed method.

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- Justify every decision in your proposed method (*e.g.* we used batch normalization to stabilize the training)

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4.1 Style and Formatting

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4.1.1 Mathematics

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Please number all of your sections and displayed equations as in these examples:

175

$$E = m \cdot c^2 \quad (4.1)$$

176

and

176

$$v = a \cdot t. \quad (4.2)$$

177

It is important for readers to be able to refer to any particular equation. Just because you did not refer to it in the text does not mean some future reader might not need to refer to it. It is cumbersome to have to use circumlocutions like “the equation second from the top of page 3 column 1”. (Note that the ruler will not be present in the final copy, so is not an alternative to equation numbers). All authors will benefit from reading Mermin’s description of how to write mathematics: <http://www.pamitc.org/documents/mermin.pdf>.

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Figure 4.1: Example of caption. It is set in Roman so that mathematics (always set in Roman: $B \sin A = A \sin B$) may be included without an ugly clash.

4.1.2 Footnotes

Please use footnotes¹ sparingly. Indeed, try to avoid footnotes altogether and include necessary peripheral observations in the text (within parentheses, if you prefer, as in this sentence). If you wish to use a footnote, place it at the bottom of the page on which it is referenced. Use Times 10-point type, single-spaced.

4.1.3 Cross-references

For the benefit of author(s) and readers, please use the

`\cref{...}`

command for cross-referencing to figures, tables, equations, or sections. This will automatically insert the appropriate label alongside the cross-reference as in this example:

To see how our method outperforms previous work, please see Fig. 4.1 and Tab. 4.1. It is also possible to refer to multiple targets as once, *e.g.* to Figs. 4.1 and 4.2a. You may also return to Sec. 4.1 or look at Eq. (4.2).

If you do not wish to abbreviate the label, for example at the beginning of the sentence, you can use the

`\Cref{...}`

command. Here is an example:

Figure 4.1 is also quite important.

¹This is what a footnote looks like. It often distracts the reader from the main flow of the argument.

Method	Frobnability
Theirs	Frumpy
Yours	Frobbly
Ours	Makes one's heart Frob

Table 4.1: Results. Ours is better.

201 **4.1.4 References** 201

202 List and number all bibliographical references in 12-point Times, single-spaced, at 202
203 the end of your thesis. To make a reference in the text, use the 203

204 `\autocite{...}` 204

205 command instead of the plain `\cite{}`, for example [6]. Where appropriate, include 205
206 page numbers and the name(s) of editors of referenced books. When you cite multiple papers 206
207 at once, please make sure that you cite them in numerical order like this [1, 2, 4–6]. If you 207
208 use the template as advised, this will be taken care of automatically. 208

209 **4.1.5 Illustrations, graphs, and photographs** 209

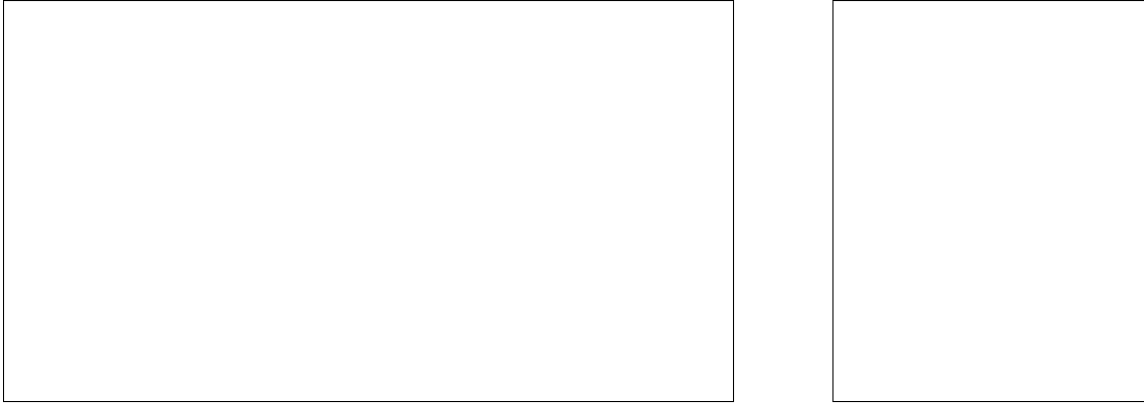
210 All graphics should be centered. In \LaTeX , avoid using the `center` environment for 210
211 this purpose, as this adds potentially unwanted whitespace. Instead use 211

212 `\centering` 212

213 at the beginning of your figure. Please ensure that any point you wish to make is 213
214 resolvable in a printed copy of the paper. Resize fonts in figures to match the font in the body 214
215 text, and choose line widths that render effectively in print. Readers (and reviewers), even of 215
216 an electronic copy, may choose to print your paper in order to read it. You cannot insist that 216
217 they do otherwise, and therefore must not assume that they can zoom in to see tiny details on 217
218 a graphic. 218

219 When placing figures in \LaTeX , it's almost always best to use `\includegraphics`, 219
220 and to specify the figure width as a multiple of the line width as in the example below 220

221 `\usepackage{graphicx} ...` 221
222 `\includegraphics[width=0.8\linewidth]` 222
223 `{myfile.pdf}` 223



(a) An example of a subfigure.

(b) Another subfigure.

Figure 4.2: Example of a short caption, which should be centered.

4.1.6 Color

If you use color in your plots, please keep in mind that a significant subset of reviewers and readers may have a color vision deficiency; red-green blindness is the most frequent kind. Hence avoid relying only on color as the discriminative feature in plots (such as red vs. green lines), but add a second discriminative feature to ease disambiguation.

4.1.7 Miscellaneous

Compare the following:

`$conf_a$` $conf_a$

`conf_a` conf_a

See The T_EXbook, p165.

The space after *e.g.*, meaning “for example”, should not be a sentence-ending space. So *e.g.* is correct, *e.g.* is not. The provided `\eg` macro takes care of this.

When citing a multi-author paper, you may save space by using “et alia”, shortened to “*et al.*” (not “*et. al.*” as “*et*” is a complete word). If you use the `\etal` macro provided, then you need not worry about double periods when used at the end of a sentence as in Alpher *et al.* However, use it only when there are three or more authors. Thus, the following is correct: “Frobnication has been trendy lately. It was introduced by Alpher [1], and subsequently developed by Alpher and Fotheringham-Smythe [2], and Alpher *et al.* [3].”

This is incorrect: “... subsequently developed by Alpher *et al.* [2] ...” because reference [2] has just two authors.

243	4.2 Chapter Summary	243
244	Start Strong: For every chapter (except possibly the Problem Statement), make an	244
245	introduction (2 or 3 paragraphs) on what the chapter is all about.	245
246	Stay Strong: Explain ideas in the simplest and most direct way that many people in	246
247	your field can understand. If a certain topic is a bit specialized or hard to remember, make a	247
248	concise introduction. Point the reader to a reference for further understanding. Each chapter	248
249	should be complete or stand-alone and concise.	249
250	Finish Strong: At the end, make a summary (2 or 3 paragraphs) to re-emphasize the	250
251	points discussed in the chapter.	251

252	5. Results	252
253	• Expound #6 (<i>How will you execute your idea?</i>) and #7 (<i>What is the empirical evidence</i>	253
254	<i>that your idea works?</i>).	254
255	• Make a complete description of your experimental setup (<i>e.g.</i> dataset, train and	255
256	test/validation configurations, hardware configurations, software framework).	256
257	• Describe the metrics (performance measures) that are used to benchmark the task.	257
258	These are the same metrics in the review of lit. Sometimes, you may need to introduce	258
259	new metrics. However, you have to have a strong justification on why there is a need	259
260	for a new metric and it is a good measure of performance in a task.	260
261	• Make sure the metrics are comprehensive (<i>e.g.</i> include model parameter count, FLOPS,	261
262	inference time, memory use, energy consumption, <i>etc.</i>).	262
263	• Use graphs and tables to summarize the quantitative results from your proposed	263
264	method vs SOTA.	264
265	• Illustrate sample outputs to qualitative describe the results of your experiments.	265
266	5.1 Chapter Summary	266
267	Start Strong: For every chapter (except possibly the Problem Statement), make an	267
268	introduction (2 or 3 paragraphs) on what the chapter is all about.	268
269	Stay Strong: Explain ideas in the simplest and most direct way that many people in	269
270	your field can understand. If a certain topic is a bit specialized or hard to remember, make a	270
271	concise introduction. Point the reader to a reference for further understanding. Each chapter	271
272	should be complete or stand-alone and concise.	272
273	Finish Strong: At the end, make a summary (2 or 3 paragraphs) to re-emphasize the	273
274	points discussed in the chapter.	274

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6. Analysis and Discussion

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- As a follow up of #7 (*What is the empirical evidence that your idea works?*), given the experimental results, make an in-depth analysis and discussion to argue and justify that your proposed method works.

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- Use further evidences (*e.g.* attention maps) to emphasize the strong points of your method.

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- Make an ablation study (*e.g.* what if we vary the depth of the network, what if we introduce data corruption, *etc.*) to further show strong/weak points of your proposed method.

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- No method is perfect. What are the failure cases of your method (*e.g.* method does not work on rotated text). Explain why your method fails in these cases.

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6.1 Chapter Summary

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Start Strong: For every chapter (except possibly the Problem Statement), make an introduction (2 or 3 paragraphs) on what the chapter is all about.

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Stay Strong: Explain ideas in the simplest and most direct way that many people in your field can understand. If a certain topic is a bit specialized or hard to remember, make a concise introduction. Point the reader to a reference for further understanding. Each chapter should be complete or stand-alone and concise.

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Finish Strong: At the end, make a summary (2 or 3 paragraphs) to re-emphasize the points discussed in the chapter.

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295	7. Conclusion	295
296	• Expound #8 (<i>What can you conclude from the study that you have accomplished?</i>)	296
297	and #9 (<i>What are the possible future works that will extend your study?</i>).	297
298	• Please summarize all important points of your thesis (<i>i.e.</i> from the beginning to end).	298
299	• What are the future unsolved issues in your thesis?	299
300	• How other researchers can take off from your outputs?	300
301	7.1 Limitations and Future Work	301
302	What are the limitations of your work? Given these, what are possible future research	302
303	directions?	303

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Bibliography

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[1] F. Alpher, “Frobnication,” *IEEE TPAMI*, vol. 12, no. 1, pp. 234–778, 2002 (cit. on pp. 7, 8).

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[2] F. Alpher and F. Fotheringham-Smythe, “Frobnication revisited,” *Journal of Foo*, vol. 13, no. 1, pp. 234–778, 2003 (cit. on pp. 7, 8).

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[3] F. Alpher, F. Fotheringham-Smythe, and F. Gamow, “Can a machine frobnicate?” *Journal of Foo*, vol. 14, no. 1, pp. 234–778, 2004 (cit. on p. 8).

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[4] F. Alpher and F. Gamow, “Can a computer frobnicate?” In *CVPR*, 2005, pp. 234–778 (cit. on p. 7).

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[5] F. LastName, *Frobnication tutorial*, Supplied as supplemental material `tr.pdf`, 2014 (cit. on p. 7).

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[6] F. LastName, *The frobnicatable foo filter*, Face and Gesture submission ID 324. Supplied as supplemental material `fg324.pdf`, 2014 (cit. on p. 7).

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316

A. Additional Results and Discussion

In this appendix, we present and discuss additional results.

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B. Background Material

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In this appendix, we discuss some background material and show the proof to our method X.

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