

Enhancing Tikhonov Solutions with NSGA-III for Photoacoustic Image Reconstruction

by

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Author Qualifications

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Master of Science

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Abstract

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Finishing a PhD is like moving a mountain. Luckily, you only have to move one rock at a time.

(Reddit somewhere: pg. ??)

Acknowledgements

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Contribution statement

Declaration by author

(this section is presently incomplete)

Supervisors

Title. Supervisor One¹, Title. Supervisor Two², Title. Supervisor Three¹, and Title. Supervisor Four^{3,4}

¹A *long* affiliation (e.g., School)
allows for three (e.g., Faculty)
lines to be specified (e.g., Institution)

²A *short* affiliation (e.g., Department)
only has two (e.g., Company)

³A supervisor may have
multiple affiliations

⁴An affiliation may be used by
multiple supervisors

List of publications

(this section is presently incomplete)

Publications included in this thesis

(to be completed)

Submitted manuscripts included in this thesis

(to be completed)

Other publications during candidature

(to be completed)

Contents

1	Introduction	2
1.1	Research Questions and Contributions	3
1.1.1	Research Questions	3
1.1.2	Contributions	3
1.2	Structure of the Thesis	4
2	Literature review	5
2.1	Photoacoustic Imaging	5
2.1.1	Fundamentals of Photoacoustic Imaging Reconstruction	5
2.1.2	Linear State Space Model for Photoacoustic Imaging Reconstruction	5
2.2	Regression Methods	5
2.2.1	Least Squares Regression	5
2.2.2	Ridge Regression	5
2.2.3	Regularization	5
2.3	Multi-Objective Optimization for Image Reconstruction	5
2.3.1	Introduction to Multi-Objective Optimization	5
2.3.2	NSGA-III	5
2.4	Limitations and Challenges in Photoacoustic Imaging Reconstruction	5
3	This is the full title of my first paper	6
3.1	Explanation of the text	6
3.2	Introduction	6
4	This is where I would put my second paper if I had any	7
4.1	Explanation of the text	7
5	Paper three is basically the Thursday of your thesis	9
5.1	Explanation of the text	9
5.1.1	Motivation	9

6 Congratulations, Doctor. 10

6.1 Explanation of the text 10

6.1.1 Motivation 10

7 Okay, nobody likes a show-off 11

7.1 Explanation of the text 11

7.1.1 Motivation 11

8 Summary, discussion, and future directions 12

List of Figures

3.1	A Table	6
4.1	A very serious short caption	8

List of Tables

Chapter 1

Introduction

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

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1.1 Research Questions and Contributions

1.1.1 Research Questions

This research will investigate Lorem ipsum dolor sit amet, consectetur adipiscing elit.. Specifically, this research will provide a foundation for Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis.. From this foundation, Curabitur dictum gravida mauris..

The research question is as follows:

Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna.

Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. As such, this research has been discretised as to be addressed in the following sub-questions:

RQ1: *Lorem ipsum dolor sit amet, consectetur adipiscing elit.*

RQ2: *Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis.*

RQ3: *Curabitur dictum gravida mauris.*

RQ4: *Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna.*

Fusce mauris. Vestibulum luctus nibh at lectus. Sed bibendum, nulla a faucibus semper, leo velit ultricies tellus, ac venenatis arcu wisi vel nisl. Vestibulum diam. Aliquam pellentesque, augue quis sagittis posuere, turpis lacus congue quam, in hendrerit risus eros eget felis. Maecenas eget erat in sapien mattis porttitor. Vestibulum porttitor. Nulla facilisi. Sed a turpis eu lacus commodo facilisis. Morbi fringilla, wisi in dignissim interdum, justo lectus sagittis dui, et vehicula libero dui cursus dui. Mauris tempor ligula sed lacus. Duis cursus enim ut augue. Cras ac magna. Cras nulla. Nulla egestas. Curabitur a leo. Quisque egestas wisi eget nunc. Nam feugiat lacus vel est. Curabitur consectetur.

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1.1.2 Contributions

This research provides the following contributions to knowledge:

C1: Lorem ipsum dolor sit amet, consectetur adipiscing elit..

C2: Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis..

C3: Curabitur dictum gravida mauris..

C4: Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna..

C5: Donec vehicula augue eu neque..

C6: Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas..

1.2 Structure of the Thesis

The format of this thesis is by publication, so I will be also attempting to publish this research as the following papers:

P1: This is the full title of my first paper (RQ1; C1)

P2: This is where I would put my second paper *if I had any* (RQ2; C2, C3)

P3: You get the idea (RQ3; C4, C5)

P4: ... (RQ4; C6)

Chapter 2

Literature review

2.1 Photoacoustic Imaging

2.1.1 Fundamentals of Photoacoustic Imaging Reconstruction

2.1.2 Linear State Space Model for Photoacoustic Imaging Reconstruction

2.2 Regression Methods

2.2.1 Least Squares Regression

2.2.2 Ridge Regression

2.2.3 Regularization

Lasso

Tikhonov Regularization

2.3 Multi-Objective Optimization for Image Reconstruction

2.3.1 Introduction to Multi-Objective Optimization

2.3.2 NSGA-III

2.4 Limitations and Challenges in Photoacoustic Imaging Reconstruction

Chapter 3

This is the full title of my first paper

3.1 Explanation of the text

The chapter provides an exegesis for the first paper included in this research: let's get started.

3.2 Introduction

What goes nicely with a table?

Here are
visuals
to include

some				interesting			
you		might		maybe		like	
Y	N	Y	N	Y	N	Y	N

Figure 3.1: Here is something about the table

A chair!

Chapter 4

**This is where I would put my second paper
*if I had any***

4.1 Explanation of the text

The chapter provides an exegesis for the second paper included in this research: or it would, if I had one.



Figure 4.1: Just as genes propagate themselves in the gene pool by leaping from body to body via sperms or eggs, so memes propagate themselves in the meme pool by leaping from brain to brain via a process which, in the broad sense, can be called imitation. (Quote by Richard Dawkins, *The Selfish Gene*)

Chapter 5

Paper three is basically the Thursday of your thesis

Note: Here I could write something to provide some meta-information for an annual review, if I wanted to.

5.1 Explanation of the text

The chapter provides an exegesis for the third paper included in this research: soft mid-afternoon sun, filtering through lace curtains.

5.1.1 Motivation

The third part of this research is the...

Chapter 6

Congratulations, Doctor.

Note: Here I could write something to provide some meta-information for an annual review, if I wanted to.

6.1 Explanation of the text

The chapter provides an exegesis for the fourth paper included in this research: good work.

6.1.1 Motivation

The fourth part of this research concerns...

Chapter 7

Okay, nobody likes a show-off

Note: Here I could write something to provide some meta-information for an annual review, if I wanted to.

7.1 Explanation of the text

The chapter provides an exegesis for the fifth paper included in this research: something really useful, I'm sure.

7.1.1 Motivation

The fifth part of this research involves...

Chapter 8

Summary, discussion, and future directions

(this section is presently blank)

Bibliography