

Heparin Thesis

Joe Rowley

A thesis presented for the degree of
Bachelor of Science

Advised by:

Sri Kurniawan

Mohammad M. Ghassemi

University California, Santa Cruz

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Abstract

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Acknowledgements

The models used in this tool were introduced Mohammad M. Ghassemi, Stefan E. Richter, Ifeoma M. Eche, Tszyi W. Chen, John Danziger, and Leo A. Celi in their paper A data-driven approach to optimized medication dosing: a focus on heparin . This project would not have been possible without Mohammad's support.

Additionally, data used in these models was sourced from the MIMIC-II and MIMIC-III (Saeed et al. (2011)) medical databases, a project supported by the MIT Lab for Computational Physiology.

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- [Sri Kurniawan](#)
- [Matthew Guthaus](#)
- [Leo Celi](#)

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- Phokion Kolaitis
- Philip Strong

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Table of Contents

Abstract	1
Acknowledgements	2
1 Introduction	6
2 Literature review, with maths	7
2.1 Traditional Dosing	7
2.2 High Level	7
2.3 Prediction	8
2.3.1 Logistic Regression	8
2.4 Summary of their results	8
3 System Explanation	9
3.1 Introduction	9
3.2 Architecture	9
3.3 Implementation	11
4 Survey Explanation	12
4.1 Goals of Survey	12
4.2 Architecture and Implementation	12
5 Survey Results	13

5.1	Cumulative Results	13
5.2	Dose differences	13
5.3	Time differences	13
5.4	Understanding/Confidence in Results	14
5.5	Other results	14
6	Retrospective / Next Steps	15
6.1	Shortcomings in the Survey	15
6.2	Places for Future Research	15
6.3	Implementation Differences in future version	15
7	Conclusion	17
Appendix 1: Some extra stuff		18
Appendix 2: Some extra stuff		20
References		21

Chapter 1

Introduction

Explain how I reimplemented a research paper into a real world web application and then tested it.

Chapter 2

Literature review, with maths

2.1 Traditional Dosing

Explain what heparin is, how heparin is traditional prescribed.

reference dosage guidelines which are in the appendix.

2.2 High Level

At a high level explain what we want to do - remove doctors manual process/guessing heuristics.

we want to predict the amount of heparin needed to get a therapeutic aptt.
explain aptt is our marker for success. explain that there is a lot of data
that can be used for predictions - explain how they selected their features.

2.3 Prediction

explain different techniques that could be used (svm, logistic regression, others listed in their paper)

then explain that mohammad et al chose to use logistic regression because it had a natural relationship with this...

2.3.1 LOGISTIC REGRESSION

explain what logistic regression is and how they used the multiparameter model.

explain how they choose features for the model.

explain equation 1.

$$(1) P(thera) = P(sub) + P(supra)$$

2.4 Summary of their results

Summary of the results from their paper. It is better than weight based system alone.

They weren't able to test if it was better than an actual doctor because you'd need to have the system in place to do that. That is where this system/survey comes into play.

Chapter 3

System Explanation

3.1 Introduction

explain what it is - a standalone calculator, to familiar doctors with the technique. Goals of System

- mobile ready... talk about user experience/ui design.

3.2 Architecture

architecture here... include a figure. Figure 3.1 shows how to add a figure. Donec ut lacinia nibh. Nam tincidunt augue et tristique cursus. Vestibulum sagittis odio nisl, a malesuada turpis blandit quis. Cras ultrices metus tempor laoreet sodales. Nam molestie ipsum ac imperdiet laoreet. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas.



Figure 3.1: RV Calypso is a former British Royal Navy minesweeper converted into a research vessel for the oceanographic researcher Jacques-Yves Cousteau. It was equipped with a mobile laboratory for underwater field research.

3.3 Implementation

talk about the stack, tools used etc. talk about how the tools used helped ensure rapid prototyping and good ui.

Chapter 4

Survey Explanation

4.1 Goals of Survey

what the goals of the survey were. - what did we want to learn? hypothesis how the survey was conducted. how we decided what information to ask about. what information that was logged.

4.2 Architecture and Implementation

talk about the stack, tools used etc. how it was implemented. user experience.

Chapter 5

Survey Results

5.1 Cumulative Results

how many difference people took survey, specialties, time since last dosed heparin.

5.2 Dose differences

how did the doses differ in part 1 and part 2 of the survey.

5.3 Time differences

time difference in part 1 and part 2.

maybe add some graphs here.

5.4 Understanding/Confidence in Results

....

5.5 Other results

things that weren't expected.

other things of note

Chapter 6

Retrospective / Next Steps

6.1 Shortcomings in the Survey

errors

lack of data

6.2 Places for Future Research

how did the doses differ in part 1 and part 2 of the survey.

6.3 Implementation Differences in future version

- transfer model to device so it can do queries more quickly
- instead of static data source have real medical database
- easily interchangeable models

- better analytics

Chapter 7

Conclusion

Summary of work that was done, then summary of results. Then summary of places for future work.

Appendix 1: Some extra stuff

- link to test software
 - link to source code git repos
 - screenshots and links to alternative design for testing aPTT over time
 - links to data sources/notebook of documentation
 - extended results from survey.
 - .. tables with stats like ave, std deviation etc for each patient 1-10 ..-
1. First ordered list item
 2. Another item
 - Unordered sub-list.
 3. Actual numbers don't matter, just that it's a number -1. Ordered sub-list
 - 1. Ordered sub-list -1. Ordered sub-list
 4. And another item.
 5. first item in the list
 6. second item in the list

- subitem
 - subitem
1. third item in the list
 - an entry
 - another entry
- some sub entry without leading bullet
 - – some sub entry with leading bullet
 - another entry for another entry
 - – blablabla
 - – blublublu
 - – * dfdf
 - – * . also some way

Appendix 2: Some extra stuff

This could be a list of papers by the author for example Also tutorials/people/stack overflow that was helpful. tom's markdown -> latex

References

Saeed, M. et al., 2011. Multiparameter intelligent monitoring in intensive care iI (mIMIC-iI): A public-access intensive care unit database. *Critical Care Medicine*, 39, pp.952–960.