

UNIVERSITY OF CALIFORNIA

Los Angeles

Discovering Data-Driven Actionable Intelligence  
for Clinical Decision Support

A dissertation submitted in partial satisfaction  
of the requirements for the degree  
Doctor of Philosophy in Electrical and Computer Engineering

by

Ahmed M. Alaa Ibrahim

2019

© Copyright by  
Ahmed M. Alaa Ibrahim  
2019

ABSTRACT OF THE DISSERTATION

Discovering Data-Driven Actionable Intelligence  
for Clinical Decision Support

by

Ahmed M. Alaa Ibrahim

Doctor of Philosophy in Electrical and Computer Engineering

University of California, Los Angeles, 2019

Professor Mihaela van der Schaar, Chair

(Abstract omitted for brevity)

The dissertation of Ahmed M. Alaa Ibrahim is approved.

Robert M. Stevenson

Richard L. Baker

David G. Cantor

Mario Gerla

Mihaela van der Schaar, Committee Chair

University of California, Los Angeles

2019

*To my mother . . .  
who—among so many other things—  
saw to it that I learned to touch-type  
while I was still in elementary school*

## TABLE OF CONTENTS

<b>1</b>	<b>Introduction . . . . .</b>	<b>1</b>
----------	-------------------------------	----------

## LIST OF FIGURES

## LIST OF TABLES



## ACKNOWLEDGMENTS

(Acknowledgments omitted for brevity.)

## VITA

- 1974–1975    Campus computer center “User Services” programmer and consultant, Stanford Center for Information Processing, Stanford University, Stanford, California.
- 1974–1975    Programmer, Housing Office, Stanford University. Designed a major software system for assigning students to on-campus housing. With some later improvements, it is still in use.
- 1975         B.S. (Mathematics) and A.B. (Music), Stanford University.
- 1977         M.A. (Music), UCLA, Los Angeles, California.
- 1977–1979    Teaching Assistant, Computer Science Department, UCLA. Taught sections of Engineering 10 (beginning computer programming course) under direction of Professor Leon Levine. During summer 1979, taught a beginning programming course as part of the Freshman Summer Program.
- 1979         M.S. (Computer Science), UCLA.
- 1979–1980    Teaching Assistant, Computer Science Department, UCLA.
- 1980–1981    Research Assistant, Computer Science Department, UCLA.
- 1981–present Programmer/Analyst, Computer Science Department, UCLA.

## PUBLICATIONS

*MADHOUS Reference Manual.* Stanford University, Dean of Student Affairs (Residential

Education Division), 1978. Technical documentation for the MADHOUS software system used to assign students to on-campus housing.

# CHAPTER 1

## Introduction

For text, let's use the first words out of the ispell dictionary.

aback abaft abandon abandoned abandoning abandonment abandons abase abased abase-  
ment abasements abases abash abashed abashes abashing abasing abate abated abatement  
abatements abater abates abating abbe abbey abbey's abbeys abbot abbot's abbots abbre-  
viate abbreviated abbreviates abbreviating abbreviation abbreviations abdomen abdomen's  
abdomens abdominal abduct abducted abduction abduction's abductions abductor abduc-  
tor's abductors abducts abed aberrant aberration aberrations abet abets abetted abetter  
abetting abeyance abhor abhorred abhorrent abhorrer abhorring abhors abide abided abides  
abiding abilities ability ability's abject abjection abjections abjectly abjectness abjure ab-  
jured abjures abjuring ablate ablated ablates ablating ablation ablative ablaze able abler  
ablest ablute ably abnormal abnormalities abnormality abnormally aboard abode abode's  
abodes abolish abolished abolisher abolishers abolishes abolishing abolishment abolishment's  
abolishments abolition abolitionist abolitionists abominable aboriginal aborigine aborigine's  
aborigines abort aborted aborting abortion abortion's abortions abortive abortively aborts  
abound abounded abounding abounds about above aboveground abrade abraded abrades  
abrading abrasion abrasion's abrasions abreaction abreactions abreast abridge abridged abridges  
abridging abridgment abroad abrogate abrogated abrogates abrogating abrupt abruptly  
abruptness