

UNIVERSITY OF CALIFORNIA

Los Angeles

Low-Complexity Decoding of Low-Density Parity Check Codes
Through Optimal Quantization and Machine Learning
and Optimal Modulation and Coding for Short Block-Length Transmissions

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

by

Linfang Wang

2023

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ABSTRACT OF THE DISSERTATION

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Linfang Wang

Doctor of Philosophy in Electrical Engineering

University of California, Los Angeles, 2023

Professor Christina Fragouli, Chair

(Abstract omitted for brevity)

The dissertation of Linfang Wang is approved.

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University of California, Los Angeles

2023

*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

1	Introduction	1
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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