



**FLORIDA
ATLANTIC
UNIVERSITY**

College of Engineering and Computer Science

Office of the Dean

777 Glades Road, EE96, Room 308

Boca Raton, FL 33431

561.297.3400

Announces the Ph.D. Dissertation Defense of

Magdalyn E. Elkin

for the degree of Doctor of Philosophy (Ph.D.)

Predictive and Generative Modeling for Biomedical Data Analytics

April 14th, 2025, 11:00 AM – 1:00PM

Engineering East Building, Room #405

777 Glades Road

Boca Raton, FL

DEPARTMENT:

Department of Electrical Engineering and Computer Science

ADVISOR:

Xingquan Zhu, Ph.D.

PH.D. SUPERVISORY COMMITTEE:

Micheal DeGiorgio, Ph.D.

Massimo Caputi, Ph.D.

Zhen Ni, Ph.D

ABSTRACT OF DISSERTATION

BIOMEDICAL DATA ANALYTICS IS A BROAD INTERDISCIPLINARY FIELD THAT HAS SEEN VAST AMOUNTS OF DATA COLLECTED WITH RECENT TECHNOLOGICAL ADVANCEMENTS. COMPUTATIONAL STUDIES ARE REQUIRED FOR TIME AND COST-EFFICIENT METHODS TO CHARACTERIZE, SUMMARIZE, AND INTERPRET THESE DATASETS TO ADVANCE PUBLIC HEALTH. THIS THESIS PRESENTS RESEARCH STUDIES DONE WITH PREDICTIVE AND GENERATIVE MODELS WITH REGARDS TO SUBDOMAINS IN CLINICAL RESEARCH, HEALTHCARE AND BIOINFORMATICS. OUR RESEARCH WITH PREDICTIVE MODELING PRESENTS (1) EXTENSIVE FEATURE ENGINEERING METHODS, ENSEMBLE MODELS AND FEATURE SELECTION RANKING IN ORDER TO PROVIDE DATA-DRIVEN MODELS TO EVALUATE RELEVANT EVIDENCE FOR CLINICAL DECISION MAKING; AND (2) NETWORK ANALYSIS AND UNSUPERVISED LINK PREDICTION METHODS FOR CLINICAL TRIAL RECOMMENDATION. WITH GENERATIVE MODELING, WE PRESENT USAGE OF A GENERATIVE LARGE LANGUAGE MODEL (LLM) TO PREDICT NOVEL MUTATION PREDICTION. OUR STUDIES PRESENT A VARIETY OF METHODS TO IMPROVE COMMON CLASSIFICATION ALGORITHMS ON BIOMEDICAL DATA AND NOVEL METHODS OF REPRESENTING, CLASSIFYING AND GENERATING BIOMEDICAL DATA.

BIOGRAPHICAL SKETCH

BORN IN IOWA CITY, IOWA

B.S. UNIVERSITY OF IOWA, 2012

P.S.M. FLORIDA ATLANTIC UNIVERSITY, 2019

Ph.D FLORIDA ATLANTIC UNIVERSITY, 2025



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CONCERNING PERIOD OF PREPARATION
& QUALIFYING EXAMINATION

Time in Preparation: 2019-2025

Qualifying Examination Passed: Spring 2020

Published Papers:

Magdalyn E. Elkin and Xingquan Zhu. Paying attention to the SARS-CoV-2 dialect: a deep neural network approach to predicting novel protein mutations. Commun Biol, 8(1):1-16, January, 2025.

Magdalyn E. Elkin and Xingquan Zhu. A machine learning study of COVID-19 serology and molecular tests and predictions. Smart Health, 26:100331, December 2022.

Magdalyn E. Elkin and Xingquan Zhu. Community and topic modeling for infectious disease clinical trial recommendation. Network Modeling Analysis in Health Informatics and Bioinformatics, 10(1):47, July 2021

Magdalyn E. Elkin and Xingquan Zhu. Predictive modeling of clinical trial terminations using feature engineering and embedding learning. Scientific Reports, 11(1):3446, February 2021.

Magdalyn E. Elkin and Xingquan Zhu. Understanding and predicting COVID-19 clinical trial completion vs. cessation. PLOS ONE, 16(7):e0253789, July 2021.

Shuwen Wang, Magdalyn E. Elkin and Xingquan Zhu. Imbalanced Learning for Hospital Readmission Prediction using National Readmission Database. IEEE International Conference on Knowledge Graph (ICKG). pages 116-122, 2020.

Magdalyn E. Elkin, Whitney A. Andrews, and Xingquan Zhu. Network analysis and recommendation for infectious disease clinical trial research. Proc. of the 10th ACM Intl. Conf. on Bioinformatics, Computational Biology and Health Informatics, pages 347–356, 2019.