University of Ottawa

Doctoral Thesis

A doctoral thesis title

Author:
Lona Frießner

Supervisor:
Dr. Ashok Kunil

A thesis submitted in fulfillment of the requirements for the degree of Doctor of Philosophy

in the

Informatics Program
Department of Mathematics

December 15, 2023

Declaration of Authorship

I, Lona Frießner, declare that this thesis titled, A doctoral thesis titleand the work presented in it are my own. I confirm that:

- This work was done wholly or mainly while in candidature for a research degree at this University.
- Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated.
- Where I have consulted the published work of others, this is always clearly attributed.
- Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work.
- I have acknowledged all main sources of help.
- Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself.

Signed:

Date:

"*Thanks to my solid academic training, today I can write hundreds of words on virtually any topic without possessing a shred of information, which is how I got a good job in journalism.*"

Dave Barry

UNIVERSITY OF OTTAWA

Abstract

Applied Math Group

Department of Mathematics

Doctor of Philosophy

A doctoral thesis title

by Lona Frießner

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aliquam quis accumsan ante. Quisque lorem metus, varius id urna eget, lacinia dapibus sem. Etiam laoreet, quam ac mollis congue, arcu leo dictum neque, nec euismod sem enim luctus odio. Donec condimentum tortor sit amet mollis volutpat. Donec ornare libero vel velit malesuada consectetur. Vestibulum in sem non justo dignissim congue at quis erat. Integer quis erat vitae mi maximus fringilla tristique nec odio. Morbi non ipsum sapien. Vestibulum tortor est, ultricies in eros et, bibendum iaculis justo. Cras pellentesque enim quam, id pretium lacus lacinia non. Integer velit neque, ultrices a malesuada vel, imperdiet quis enim. Quisque eu facilisis urna, ut faucibus lorem. Donec mollis turpis sed arcu venenatis interdum. Nulla facilisis tortor ac scelerisque consequat.

Acknowledgements

Integer id risus vel lorem laoreet commodo lobortis quis purus. Cras cursus leo vel dui laoreet pulvinar. Nunc tincidunt metus et ante fermentum lacinia. Proin quam magna, tristique ut viverra at, dapibus eget elit. Quisque eu leo id nisi semper laoreet at ac nulla. Fusce volutpat, metus sed dictum mattis, nisl elit dapibus velit, non porttitor urna urna vel diam. Praesent tortor nulla, rutrum ac magna a, tempor sagittis enim. Praesent pharetra ipsum libero, eu malesuada libero blandit ut. Sed sed venenatis ligula, nec convallis turpis. Nulla iaculis felis eros, eget pharetra lorem cursus quis. Nunc iaculis lobortis magna at malesuada. Nullam elementum elit at urna congue aliquam.

Table of contents

List of Figures

List of Tables

List of Abbreviations

LAH **L**ist **A**bbreviations **H**ere
WSF **W**hat (it) **S**tands **F**or

List of Symbols

a	distance	m
P	power	W (J s^1)
ω	angular frequency	rad

For Elsa

Chapter 1

Introduction

Chapter 2

Methods

2.1 Data generation

A simulation study was conducted to compare the methods of missing data handling. (erklären, was eine Simulationsstudie ist)

Data was generated from a parametric model with known parameters.

2.2 Data-generating model

The data-generating model was a two-level random intercept model:

$$Y_i j = \tag{2.1}$$

First,

2.3 Missing data generation

2.4 Factors and simulation conditions

2.4.1 Constants

2.4.2 Level-2 sample size

As the small-sample performance of the methods is of interest, three different group sizes are used: - N2 = 15 - N2 = 30 - N2 = 60 These sizes are chosen to reflect McNeish´s (2017) summary, that group sizes below 25 almost certainly face issues and below 50 there is a susceptibility to small sample biases. These ranges should therefore cover problematic, likely problematic and not problematic level-2 sample sizes. ### Effect size of the group-level effect { 01} The effect size of the group-level effect of X is varied between 0.0 and 0.30. This is to investigate the performance both with a null effect of the parameter of interest as well as a substantive effect.

2.4.3 ICC of X and residual Y

2.4.4 Missing data mechanism

Missing data mechanism is set to either MCAR or MAR. For MAR, the strength of relationship between W and missing of X is set to 0.4, which corresponds to 0.4^2 % 100% explanation of variance in missingness through W.

Chapter 3

Methods

3.1 Estimands

3.2 Performance measures

3.3 Execution of simulation