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A Poisson mixed modeling approach to longitudinal multinomial data of varying cluster sizes

UNIVERSITY OF NEW BRUNSWICK

THESIS DEFENCE AND EXAMINATION

in Partial Fulfillment

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Master of Science

by

Zheng Fu

in the Department of Mathematics & Statistics

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Via TEAMS

Examining Committee

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Abstract

Longitudinal studies and categorical data analysis are commonly used in many areas, such as medicine, public health, and psychology. Researchers have developed many analytic methods for longitudinal data and categorical data separately. However, the methods for analysing data with both longitudinal and categorical properties are sparse. This thesis proposes a baseline-category model for nominal data and a continuation-ratio logit model for ordinal data, which are both constructed from a set of Poisson mixed models. Three levels of random effects are introduced to account for the effects of the subjects, the time and the categories. Since the models are rooted from Poisson mixed models, they can give both proportion and count inference. Additionally, the 3 levels of random effects are very flexible to handle different data sets and to fit different research interests.