

Vita

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Masters of Science

Multiplicative Binary Mixed Models with Application to Spatial Analysis of Atlantic Cod Data

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by

Ruixi Zhao

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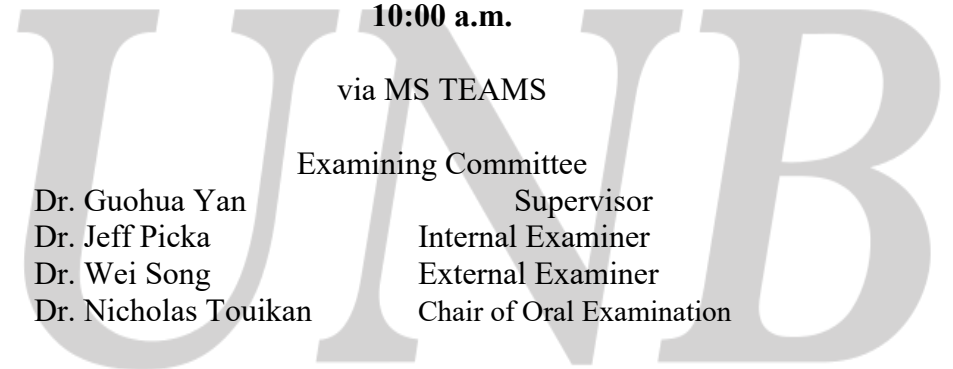
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Abstract

In many subject areas, various phenomena can be characterized by a binary variable that describes two opposing outcomes. Examples may include the outcome of an exam (pass or fail) or voters' political preference in a bipartite government. Such phenomena often follow a natural hierarchical data structure, where units of analysis at a lower level are nested within units of analysis at a higher level. The appropriate method for analyzing such data is therefore based on nested sources of variability that come from different levels of the hierarchy. In this thesis, we propose a nested binary regression model with multiplicative random effects for clustered binary outcomes.

The orthodox best linear unbiased predictor (BLUP) approach is adopted for the prediction of random effects. One important feature of our method is that only the first and second moments of the random effects need to be specified. The application of this model is illustrated with the analysis of a spatiotemporal fishery data set. In addition, a simulation study is also conducted to evaluate model performance.