



Convex Optimization Techniques for Epidemic Spread Modelling in Ethiopia: Regularization and Model Selection Studies

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Abstract

Convex optimization techniques are increasingly used in various fields to model complex systems efficiently. The study employs convex optimization algorithms to develop and validate models of infectious disease transmission dynamics using epidemiological data from Ethiopia. A key finding is the improvement in accuracy by applying LASSO regularization to the epidemic spread model, reducing model complexity without compromising predictive power. Convex optimization techniques have been successfully utilised for modelling and predicting the spread of infectious diseases in a specific geographic context. Future research should explore the robustness of these models under different data sets and incorporate additional epidemiological factors to enhance model accuracy. epidemic spread, convex optimization, regularization, cross-validation, Ethiopia Model selection is formalised as $\hat{\theta} = \operatorname{argmin}_{\theta} L(\theta) + \lambda \omega(\theta)$ with consistency under mild identifiability assumptions.

Keywords: African Geography, Convex Optimization, Epidemic Modelling, Regularization, Model Selection, Spatiotemporal Analysis, Stochastic Processes

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