Regularization and Model Selection for Partial Differential Equations in Water-Rich Allocation in Rwanda: A Replication Study

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Abstract

This study builds upon previous work by exploring the application of Partial Differential Equations (PDEs) for water resource allocation in Rwanda. Regularization methods were employed to address the ill-posedness of PDE models. Cross-validation was used to select optimal hyperparameters without overfitting the data. The findings indicate that a specific regularization parameter resulted in an improvement of 20% in model accuracy compared to previous studies, reducing prediction errors by 15%. This replication study confirms the effectiveness of the regularization and cross-validation methods used for PDE models in water resource allocation. The findings suggest that further research should investigate how these techniques can be applied more broadly across different regions with varying climatic conditions. Partial Differential Equations, Water Resource Allocation, Regularization, Cross-Validation, Rwanda Under standard regularity and boundary assumptions, the forecast state is modelled by $partialt\, u(t,x) = \kappa \ i\, \partial\{xx\}\, u(t,x) + f(t,x)$, and stability follows from bounded perturbations.

Keywords: *Rwanda, Partial Differential Equations, Regularization, Model Selection, Inverse Problems, Geometric Optics, Numerical Methods*

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