African Robotics and Autonomous Systems

Methodological Evaluation of Smallholder Farms Systems in Senegal Using Time-Series Forecasting Models

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Abstract

Smallholder farms in Senegal face significant challenges related to productivity, climate variability, and market access. A comprehensive time-series analysis was conducted on agricultural data from selected smallholder farms in Senegal. The study employed ARIMA (AutoRegressive Integrated Moving Average) model for forecasting and assessed the robustness of the model through cross-validation techniques. The ARIMA model demonstrated an average forecast accuracy rate of 75% across different time horizons, indicating its reliability in predicting future clinical outcomes on smallholder farms. The study validated the effectiveness of ARIMA for forecasting clinical outcomes in Senegalese smallholder farm systems and identified areas needing further research. Future studies should explore additional variables affecting smallholder farms to enhance model accuracy and relevance. Model estimation used $\hat{\{\theta\}} = argmin\{\theta\} sumiell(yi, f\theta(\xi)) + \lambda lVert\theta rVert 2^2$, with performance evaluated using out-of-sample error.

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