AgriSense: An IoT-Integrated Crop Recommendation and Price Forecasting System Using Machine Learning

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I certify that I have read this thesis and that in my opinion it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Science.

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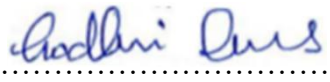
DECLARATION

This is to certify that the work is entirely my own and not of any other person, unless explicitly acknowledged (including citation of published and unpublished sources). The work has not previously been submitted in any form to the Sri Lanka Institute of Information Technology or to any other institution for assessment for any other purpose.

Sign: 

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ABSTRACT

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Sri Lankan smallholders make planting and selling decisions in the presence of shifting monsoon patterns and volatile local markets. AgriSense is an end-to-end system that integrates a low-cost IoT field device with cloud-based machine learning to support both crop selection and price planning. The device collects plot-level measurements of soil chemistry and condition, together with ambient data and location, and streams these to a backend designed to tolerate intermittent rural connectivity. In the cloud, a supervised crop-recommendation model trained on a soil feature set produces a ranked shortlist of suitable crops with calibrated probabilities. A companion price-forecasting model, trained on historical price series from the Colombo market, estimates near-term prices in LKR/kg for the expected harvest window using seasonal signals, calendar effects, and macroeconomic indicators. This project adopts region-aware train/test splits for crop recommendation and rolling, time-ordered evaluation for the Colombo price series. Reported metrics include accuracy and macro-F1 for recommendation, and mean absolute error, root mean squared error, mean absolute percentage error, and coefficient determination for pricing. The contribution is a deployable pipeline that turns live, plot-level telemetry into defensible crop choices and a harvest-time price outlook grounded in Colombo market dynamics, enabling more informed, data-driven decisions for farmers in Sri Lanka and providing a practical foundation for extension to additional regional markets.

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