PRECISION AGRICULTURE: OPTIMIZING CROP MANAGEMENT THROUGH CNN-BASED FERTILIZER RECOMMENTATIONS

A PROJECT REPORT

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BONAFIDE CERTIFICATE

Certified that this project report "**PRECISION AGRICULTURE: OPTIMIZING CROP MANAGEMENT THROUGH CNN-BASED FERTILIZER RECOMMENTATIONS"** is the bonafide work of "**DHINESHA B (611420104017), MAHALAKSHMI M (611420104035), PRIYA G (611420104058), VINODHA G (611420104094)"** who carried out the project Work under my supervision.

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ABSTRACT

This study proposes a novel approach to crop management using Convolutional Neural Networks (CNNs) for accurate and efficient fertilizer recommendations. Traditional methods of fertilizer application often lack precision, leading to resource waste or suboptimal crop yields. The CNN-based model integrates remote sensing data, soil information, and historical crop performance to generate personalized fertilizer recommendations for different regions and crop types. The system aims to predict crop yields accurately and provide optimized fertilizer recommendations, aiding farmers in making informed decisions for improved agricultural outcomes. The CNN-based model analyses diverse agricultural datasets, including soil quality, weather conditions, and historical crop performance. Python programming facilitates seamless integration of the CNN model with the datasets, ensuring efficient data processing, feature extraction, and model training.

The system's predictive capabilities are validated through rigorous testing against real-world agricultural datasets, demonstrating its accuracy and reliability in forecasting crop yields. It also incorporates a fertilizer recommendation component that leverages predicted yields to suggest optimal nutrient combinations for specific crops, fostering sustainable and resource-efficient farming practices. The proposed system contributes to the advancement of precision agriculture by offering a comprehensive tool for farmers to make data-driven decisions. The integration of CNN technology, extensive datasets, and Python programming establishes an advanced framework for crop yield prediction and fertilizer recommendation, promoting sustainable and efficient agricultural practices in the face of evolving environmental and economic challenges.

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LIST OF ABBREVIATIONS

CNN	**C**onvolutional **N**eural **N**etworks
UAV	**U**nmanned **A**erial **V**ehicles
MAE	**M**ean **A**bsolute **E**rror
RMSE	**R**oot **M**ean **S**quared **E**rror
TDD	**T**est **D**riven **D**evelopment
AI	**A**rtificial **I**ntelligence
MFCCs	**M**el-**F**requence **C**epstral **C**oefficients
SQL	**S**tructured **Q**uery **L**anguage
PCA	**P**rincipal **C**omponent **A**nalysis
LDA	**L**inear **D**iscriminant **A**nalysis