RV College of Engineering®

(An autonomous institution affiliated to VTU, Belagavi)

Department of Master of Computer Applications

Date:

III SEMESTER – MCA461P Minor Project

Food Security and Nutritional Support Prediction

Synopsis

The project titled **"Food Security and Nutritional Support Prediction"** addresses critical challenges in agriculture by predicting nutrient deficiencies and ensuring sustainable crop production. This project leverages data analytics and machine learning techniques to provide actionable insights for policymakers and farmers, enhancing agricultural productivity and nutritional support. The domain areas include **agriculture, data analytics, and machine learning**. The importance of this domain lies in its potential to improve food security and nutritional outcomes, particularly in regions with diverse agro-climatic zones like Karnataka. Key developments in this domain include advancements in predictive analytics and nutrient management strategies. Unresolved issues include the need for more precise and scalable nutrient management systems. Emerging opportunities involve integrating real-time IoT sensor data for live nutrient monitoring and using advanced machine learning algorithms to improve prediction accuracy. The project aims to address these challenges by analyzing district-level crop production data to identify nutrient deficiencies and devise actionable solutions. The primary machine learning algorithm implemented is **Linear Regression (LR)**, chosen for its simplicity and effectiveness in analyzing trends over time.

The methodology followed in this project includes **Iterative Development Methodology** to ensure continuous improvement and adaptability. The project begins with requirements gathering to identify user needs, including supported data sources and predictive modeling techniques. The design phase defines the system architecture, incorporating data preprocessing, predictive modeling, and visualization modules using libraries like **Pandas, Scikit-learn, and Matplotlib**. The implementation phase involves coding the system to analyze historical crop production data, predict nutrient deficiencies using linear regression, and provide recommendations for nutrient redistribution. The testing phase conducts functional, performance, and accuracy tests to validate data integrity and model reliability. The tools and technologies used include **Python** for development, **Pandas** for data manipulation, **Scikit-learn** for machine learning, and **Matplotlib** and **Seaborn** for data visualization. These tools are necessary for their robustness, flexibility, and efficiency in handling large datasets and providing actionable insights. The project is divided into various modules, including data collection and preprocessing, predictive modeling, nutrient deficiency analysis, visualization, and recommendations, each linked with the respective tools used.

The expected outcome of the project is a comprehensive framework for identifying and mitigating nutrient deficiencies in agricultural regions, enhancing agricultural productivity and food security. Key findings include accurate identification of nutrient deficiencies, reliable production forecasts, and actionable recommendations for nutrient redistribution. The project aims to provide a practical, scalable, and data-driven solution for sustainable agricultural planning. Experimental data of the outcome includes the percentage of nutrient deficiencies identified and the efficiency of the developed system in providing accurate predictions and recommendations. The system's working efficiency is measured in terms of its ability to process large datasets, generate reliable forecasts, and provide actionable insights, contributing to the advancement of sustainable agriculture and food security.

Student(s)

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