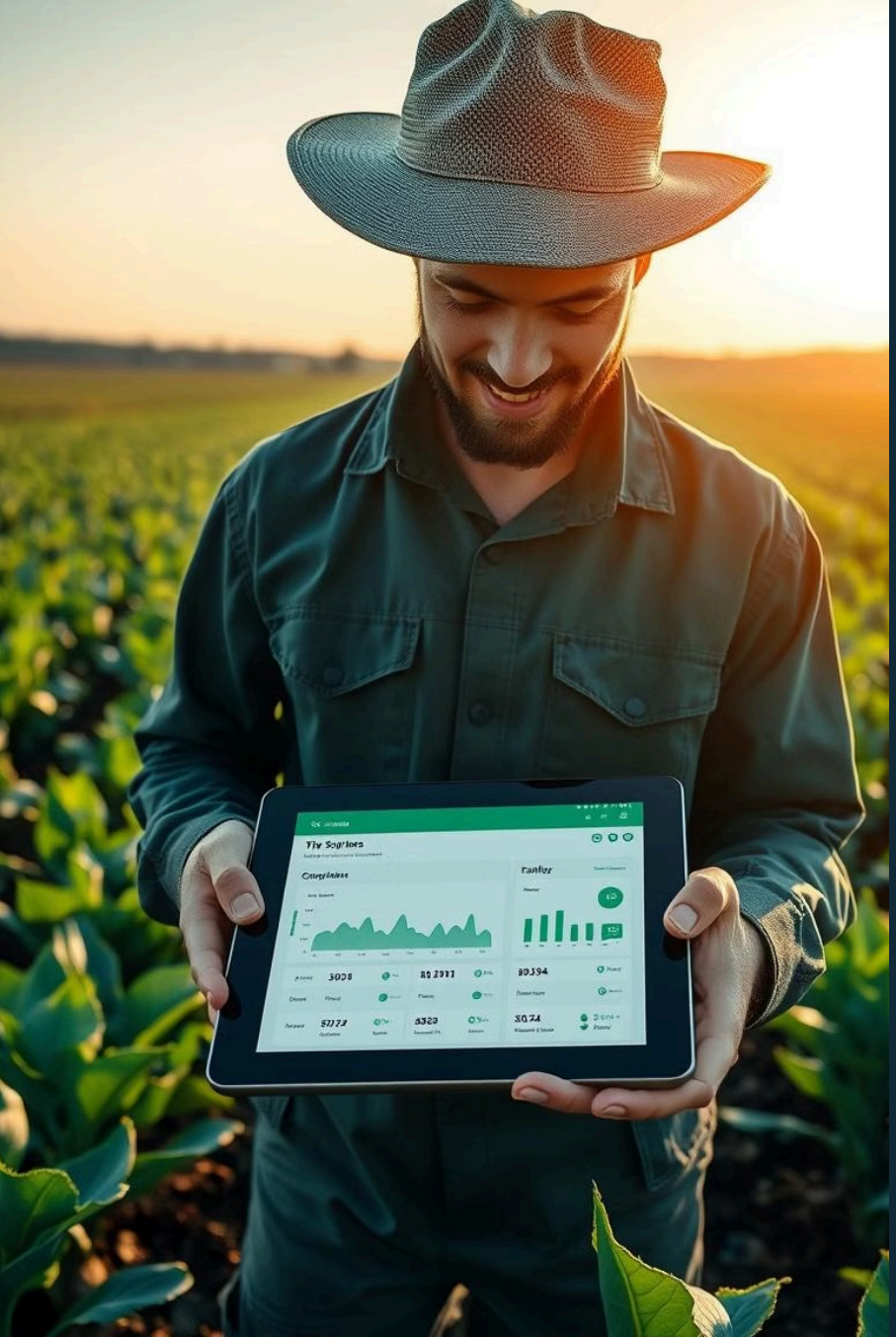

Crop Recommendation System: Enhancing Agricultural Productivity

This presentation outlines the development of a Crop Recommendation System using machine learning to assist farmers in making informed crop selection decisions.

The system, based on an Artificial Neural Network (ANN), leverages seven key features – soil pH, nitrogen, phosphorus, potassium, temperature, humidity, and rainfall – to accurately predict the most suitable crop for a given environment.

Related Research & Success

Previous research utilizing machine learning models has shown promising results in crop recommendation.

99.31%

Accuracy

Studies employing decision trees, random forests, and XGBoost have achieved accuracies up to 99.31%.

3

Models

Commonly used algorithms include Decision Trees, Random Forests, and XGBoost.

Dataset & Preprocessing

- The dataset, obtained from Kaggle, includes crucial crop-related factors like soil N-P-K levels, temperature, humidity, and rainfall.
- The dataset was carefully cleaned to ensure accuracy by removing outliers, which are data points that significantly deviate from the typical values.
- Label encoding was applied to the target variable, "Crop," converting it from text to numerical values, making it suitable for the machine learning model.
- The dataset was split into training and testing sets to evaluate the model's performance on unseen data.
- Data scaling was implemented to prevent features with large ranges from dominating others, leading to more accurate and efficient training.

Methodology

- Data Collection: The Crop Recommendation Dataset, obtained from Kaggle, was utilized.
- Data Preprocessing: Techniques like encoding, outlier detection, and scaling were applied to prepare the data for model training.
- Model Architecture: The classic ANN/MLP model was chosen, featuring four input layers to process the input features.
- Training Process: The dataset was divided into training (80%) and testing (20%) sets.
- Evaluation: The model was evaluated using metrics such as accuracy, confusion matrix, and classification reports.

Results and Analysis

- The ANN model achieved high accuracy (98%) and precision in classifying 20 different crops.
- The confusion matrix shows a low number of misclassifications, indicating the model's robust performance.
- The model's average precision (98.5%), recall (98.3%), and F1-score (98.3%) demonstrate its ability to accurately identify and classify crops.

Conclusions and Future Works

- The project successfully demonstrated the potential of deep learning for a Crop Recommendation System.
- The ANN architecture achieved high accuracy (98%) across 20 crop classes.
- Future works include expanding the dataset, exploring advanced techniques, and deploying the model for real-time crop prediction.
- Addressing misclassification errors will ensure its effectiveness in real-world agricultural applications.