Sanjivani College of Engineering, Kopargaon

(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)

Department of Computer Engineering

Deep Learning and Generative AI(PECO313C)

CIA PBL(Project Based Learning) Abstract

Academic Year- 2025-26 Pattern- 2023 T.Y Computer B.Tech Sem- VI

Group Id: - 8

Project Title: - Crop Yield Prediction

Abstract :

With the growing adoption of artificial intelligence in agriculture, crop yield prediction has emerged as a key focus area in industry-driven projects and hackathons. Accurate yield estimation enables farmers to make informed decisions related to crop planning, resource utilization, and risk management. However, traditional statistical approaches fail to capture complex temporal and environmental patterns affecting crop productivity. To address this challenge, this project presents a *deep learning–based Crop Yield Prediction system* designed to provide reliable and data-driven yield forecasts.

The proposed solution leverages advanced deep learning architectures such as *Convolutional Neural Networks (CNN), Long Short-Term Memory (LSTM)* networks, and *Transformer models,* depending on data characteristics and temporal dependencies. These models are capable of learning nonlinear relationships and sequential patterns from large-scale datasets. The system is trained using a publicly available dataset and undergoes extensive preprocessing, normalization, and feature engineering to improve prediction performance.

The trained model is evaluated using standard performance metrics such as Mean Absolute Error (MAE), Root Mean Square Error (RMSE), and prediction accuracy. The expected outcome of the project includes a well-trained deep learning model, quantitative evaluation results, and a functional demonstration of the prediction system. The primary target users are farmers and agricultural customers, who can utilize the predictions for better crop selection and yield optimization.

Possible future extensions include deploying the model as a web or mobile application, enhancing scalability for large datasets, and extending the research using multimodal data sources. This project demonstrates an intermediate-level application of deep learning using tools such as *PyTorch or TensorFlow*, contributing to the advancement of smart and sustainable agriculture.

Expected Input:

- Crop type (e.g., rice, wheat, maize)
- Soil type (loamy, clay, sandy)
- Geographical region / location
- Temperature (minimum, maximum, average)
- Rainfall / precipitation level
- Humidity
- Soil moisture content
- Fertilizer usage
- Historical crop yield data
- Time-series / seasonal data (monthly or yearly)
- Preprocessed numerical and encoded categorical features

Expected Output:

- Predicted crop yield value
- Yield estimation (tons per hectare / quintals per acre)
- Prediction confidence or error margin (optional)
- Model evaluation metrics:
    - Mean Absolute Error (MAE)
    - Root Mean Square Error (RMSE)
    - Accuracy or R^2 score
- Graphical output (actual vs predicted yield comparison)

Group members:

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85	Raghvendra Mishra	
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