**Smart-Agri Advisor: Data-Driven Crop Recommendations for Enhanced Productivity and Sustainability**

**PROJECT SYNOPSIS**

**BACHELOR OF ENGINEERING**

**ARTIFICIAL INTELLIGENCE AND DATA SCIENCE**

SUBMITTED BY

1. Sase Vedant [24155]

2. Somesh Chaudhari [24133]

3. Sunny Gangurde [24159]

4. Prasad Patil [24152]

**Under the Guidance of**

Mrs. Asmeeta Mali



**Department of Artificial Intelligence and Data Science**

**Dr. D. Y. Patil College of Engineering and Innovation, Varale, Talegoan, Pune.**

**Academic Year: 2024-2025**

# INDEX

|  |  |  |
| --- | --- | --- |
| Sr. No. | Content | Page No. |
|  | Title of the Project …………………………………………………………... | 3 |
|  | Domain ……………………………………………………………………... | 3 |
|  | Keywords …………………………………………………………………… | 3 |
|  | Team ………………………………………………………………………... | 3 |
|  | Literature Survey …………………………………………………………… | 4 |
|  | Objective and Scope of the Project ………………………………………….. | 6 |
|  | Problem Statement ………………………………………………………….. | 6 |
|  | System Architecture ………………………………………………………… | 7 |
|  | Technical Details ……………………………………………………………. | 7 |
|  | Probable Date of Completion ……………………………………………….. | 8 |
|  | References …………………………………………………………………... | 8 |

# Title of the Project

Smart-Agri Advisor: Data-Driven Crop Recommendations for Enhanced Productivity and

Sustainability.

# Domain

Web Development, Data Science, Data Analytics, Machine Learning etc.

# Keywords

Machine Learning , NumPy, scikit-Learn, TensorFlow, Keras, etc.

# Team

* **Group Id :** G11

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sr. No** | **Name of Student** | **Roll No.** | **Roles** | **Mob. no** |
| 1. | Sase Vedant | 24155 | Leader | 9307952128 |
| 2. | Chaudhari Somesh | 24133 | Member | 9145223212 |
| 3. | Patil Prasad | 24152 | Member | 8483985699 |
| 4. | Gangurde Sunny | 24159 | Member | 9322616471 |

# Literature survey

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sr. No.** | **Paper Details** | **Problem Discussion** | **Algorithm /Technique used** | **Parameter Consider** | **Result** |
| 1 | IoT Based Smart Plant Irrigation System with Enhanced learning    *By Kemal Cagri Serdaroglu, Cem Onel* | Static Models, Inefficiency in Water Use, Lack of Learning Mechanisms, Environmental Variability | Gradient Boosting Regression Trees (GBRT), Random Forest Regression, Support Vector Regression (SVR), Artificial Neural Networks (ANNs) | Environmental Parameters, Plant-Specific Parameters, System Parameters, Machine Learning Parameter | This study presents a smart plant irrigation IoT system designed to autonomously adapt to specific irrigation habits by leveraging dynamic environmental data. |
| 2 | IoT-Based smart irrigation system using artificial intelligence  *By N. Rahul, S. Sumathi, S. Rajaprabu, J. Prawin Kumar* | Inefficiencies in Traditional Irrigation Practices, Water Scarcity and Resource Management, Lack of Real-Time Monitoring and Decision-Making | Data Collection and Preprocessing, Predictive Modeling, Decision-Making Algorithms | IoT Sensor Parameters, AI and Predictive Analytics Parameters, System Performance Metrics, Deployment and Scalability Parameters, Economic and Environmental Impact | In modern agriculture, networking technology has become vital for efficient farm management. The advent of the Internet of Things (IoT) has transformed traditional farming practices, allowing for real-time data collection and remote control of agricultural activities. |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sr. No.** | **Paper Details** | **Problem Discussion** | **Algorithm /Technique used** | **Parameter Consider** | **Result** |
| 3 | Robust Smart Irrigation System using Hydroponic Farming based on Data Science and IoT  *By Punya Prabha , Sarala S , Sharmila Suttur* | Manual Labor Dependence, Water Inefficiency, Space Requirements, Lack of Technological Integration, Inefficient Resource Management, Climate Dependency | IoT Architecture, Hydroponic System Design, Sensor Integration, Raspberry Pi and IoT Communication, Machine Learning for Plant Growth Prediction, Web-Based User Interface | Predictive plant health, Predictive Analytics Parameters, Environmental Parameters | Based on your description, it seems like your study is centered around developing a smart, AI-based irrigation system that leverages the Internet of Things (IoT) to optimize water usage in agriculture. |
| 4 | Crop Recommendation using Machine Learning with Challenges and Future Ideas.  *By Devendra Dahiphale, Pratik Shinde, Koninika Patil, and Vijay Dahiphale.*  *In 12-06-2023 / 14-06-2023* | The traditional process of crop recommendation relied heavily on expert knowledge, which was time-consuming and labor-intensive. With the global population expected to reach 9.7 billion by 2050. | Logistic Regression, Decision Tree, Random Forest, K-Nearest Neighbors, Naive Bayes, Support Vector Machine (SVM), Neural Network | Preprocessing the data (removing null and duplicate records, feature engineering).  Choosing a machine learning algorithm and iterating through preprocessing to testing/validating the model.  Configuring model parameters like activation functions, | The proposed system achieved near-perfect accuracy, consistently over 95% across all models. The comprehensive approach and feature engineering contribute significantly to the effectiveness of the crop recommendation system, |

# Objective

* 1. **To Predict Crop Recommendations:** To Develop a model that integrates soil, weather, and market data to provide tailored crop suggestions for maximizing yield and profit.
  2. **To Improve Resource Efficiency:** To Utilize data analytics to guide the efficient use of water, fertilizers, and other inputs, reducing costs and environmental impact.

# Scope

Market Trend Analysis Integration: Integrate real-time agricultural market trends and pricing data into the system. This feature will allow farmers to align their crop choices and planting schedules with current market demands and potential future trends, optimizing profitability and market responsiveness.

# Problem Statement

Modern agriculture requires precise crop recommendations to maximize yield and promote sustainability. The Smart-Agri Advisor leverages extensive data on soil and environmental variables like nutrient levels and weather conditions to help farmers enhance productivity, manage resources efficiently, and maintain crop health effectively.

# System Architecture:

**Inputs**

# 

# 

Market Scenarios Dataset

Weather Dataset

Crop Dataset

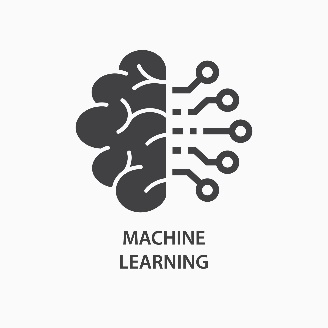
# Processamento de dados - ícones de computador grátis

Data Preprocessing

Machine Learning

Data Analysis

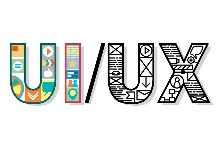
Operations





NumPy

Seaborn



**Outputs**

Crop Recommendation

Future Market Condition

Statistical Data

**Fig. 1 Roadmap**

This work-flow includes soil conditions, Crop data set from Agriculture Universities, weather data of that particular region, Market Scenarios are taken as input for different analytical and Machine learning models which provides a clean and clear data representation in form of statistical data. It mainly focuses on recommending crop and future market scenarios about yield cost and available stock.

# Technical Details

* **Software Requirements:**
* Windows OS
* Python3 and suitable IDE, Google Colab, etc.
* Flask, TensorFlow Library
* Database: MySQL, MS-SQL, MongoDB, Apache Kafka.
* Programming Languages: Python, Java Script / Node.js.
* **Hardware Requirements:**
* i5 Processor
* 512 GB SSD
* 8GB RAM

# Probable Date of Completion:

# March 2025

# References

[1] Ahmed, Md Ahmed, Ezaz Ahmmed, Kazi, “Automated irrigation control and security system

with wireless messaging”, International Conference on Informatics, Electronics and Vision,

ICIEV, 2013

[2] J. Kwok, S. Yu. “A smart IoT based irrigation system with automated plant recognition

using deep learning”, In Proc. 10th International Conference on Computer Modeling and

Simulation, 2018.

[3] A. Vij, S. Vijendra, A. Jain, S. Bajaj, A. Bassi, A. Sharma, “IoT and Machine Learning

Approaches for Automation of Farm Irrigation System”, Procedia Computer Science,

vol. 167, pp. 1250 - 1257, 2020.

[4] https://www.techrxiv.org/doi/full/10.36227/techrxiv.23504496.v1