ANALYZING NEPAL'S WEATHER, URBANIZATION TRENDS, AND THEIR IMPACTS ON AGRICULTURE USING MACHINE LEARNING

Presentation

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Overview

- Introduction
- Objectives
- Motivation
- Design and Implementation
- Achievements
- Comparative Analysis
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- Future Enhancement
- System Requirements
- References

Introduction

- Used datasets of 10 districts of Nepal
- Predicted yield by training them on 4 machine learning algorithms and a neural network
- Used 5 majorly grown crops in these regions.
- Parameters like temperature, rainfall, humidity.

Objectives

- Analyze and identify the key variables that significantly impact crop yields

- Create a predictive model for crop yields of major crops in different districts

- Offer district-specific recommendations and highlight regional disparities.

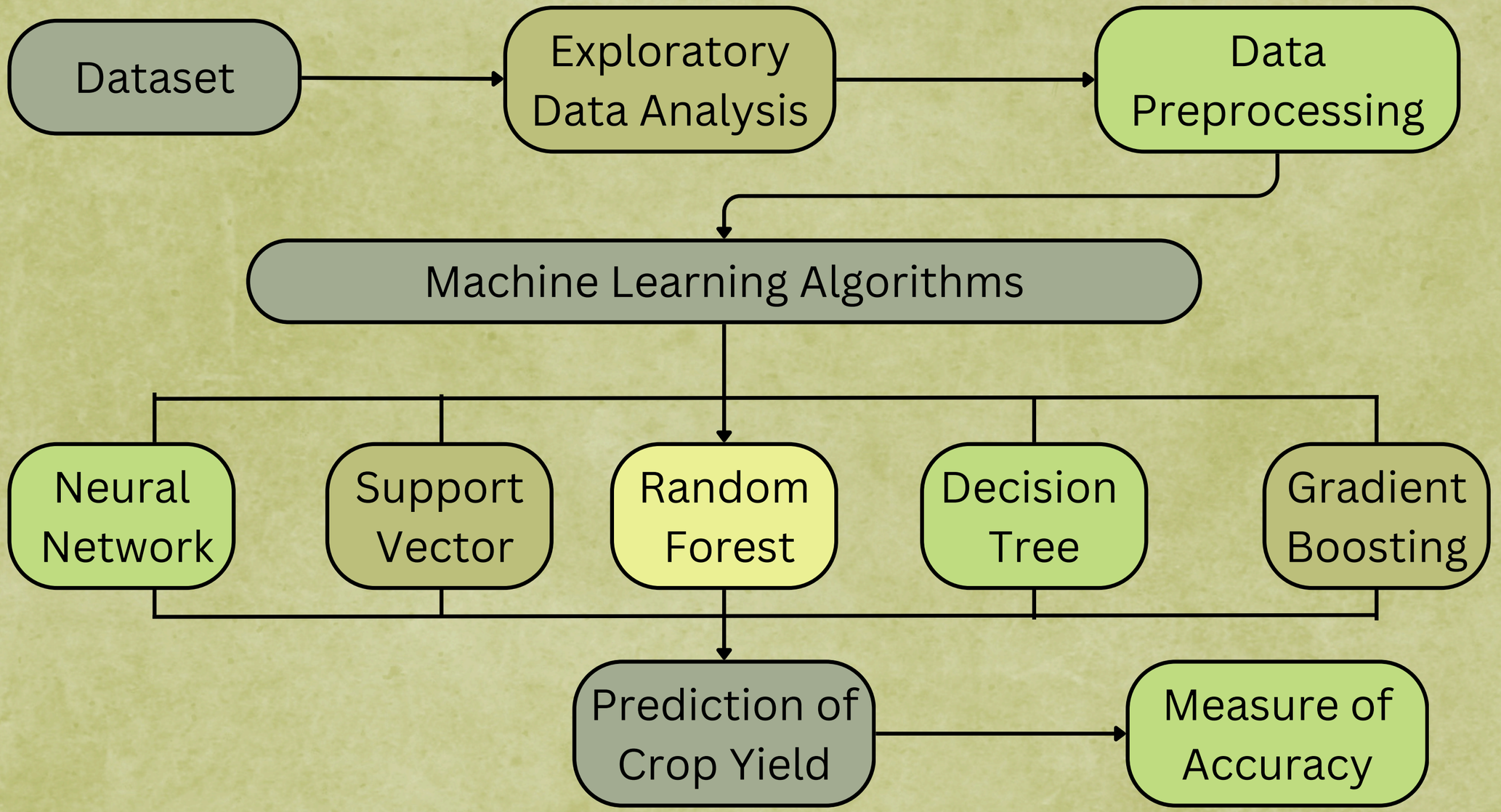
Motivation and Significance

1. Need to enhance agricultural productivity and ensure food security in a country

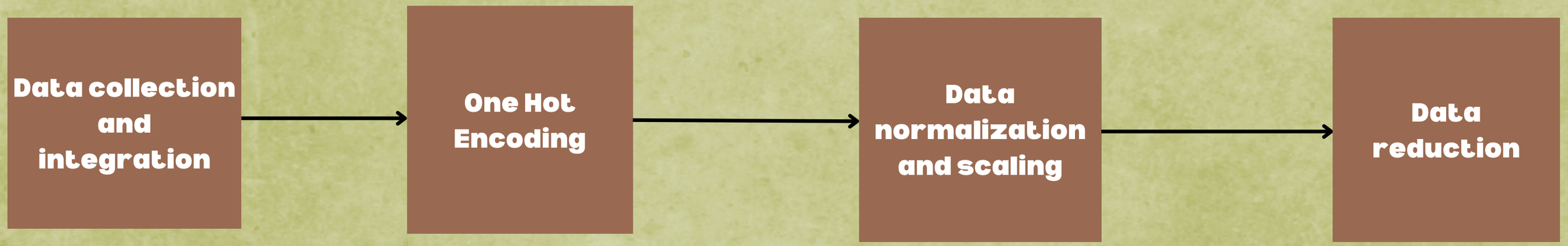
2. Significant impact of climate variability, resource limitations, and diverse topographical challenges

3. Need for precise, data-driven insights to support farmers and policymakers

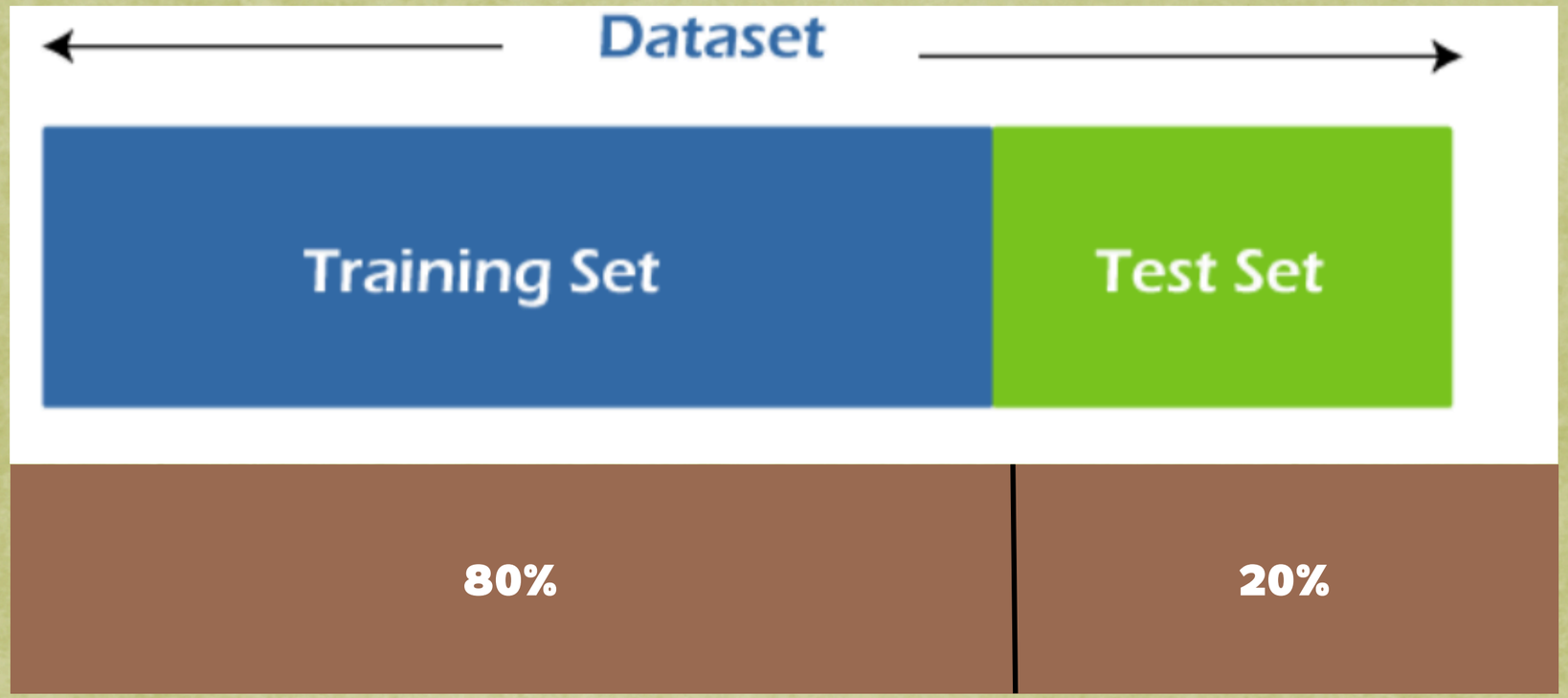
Design and Implementation

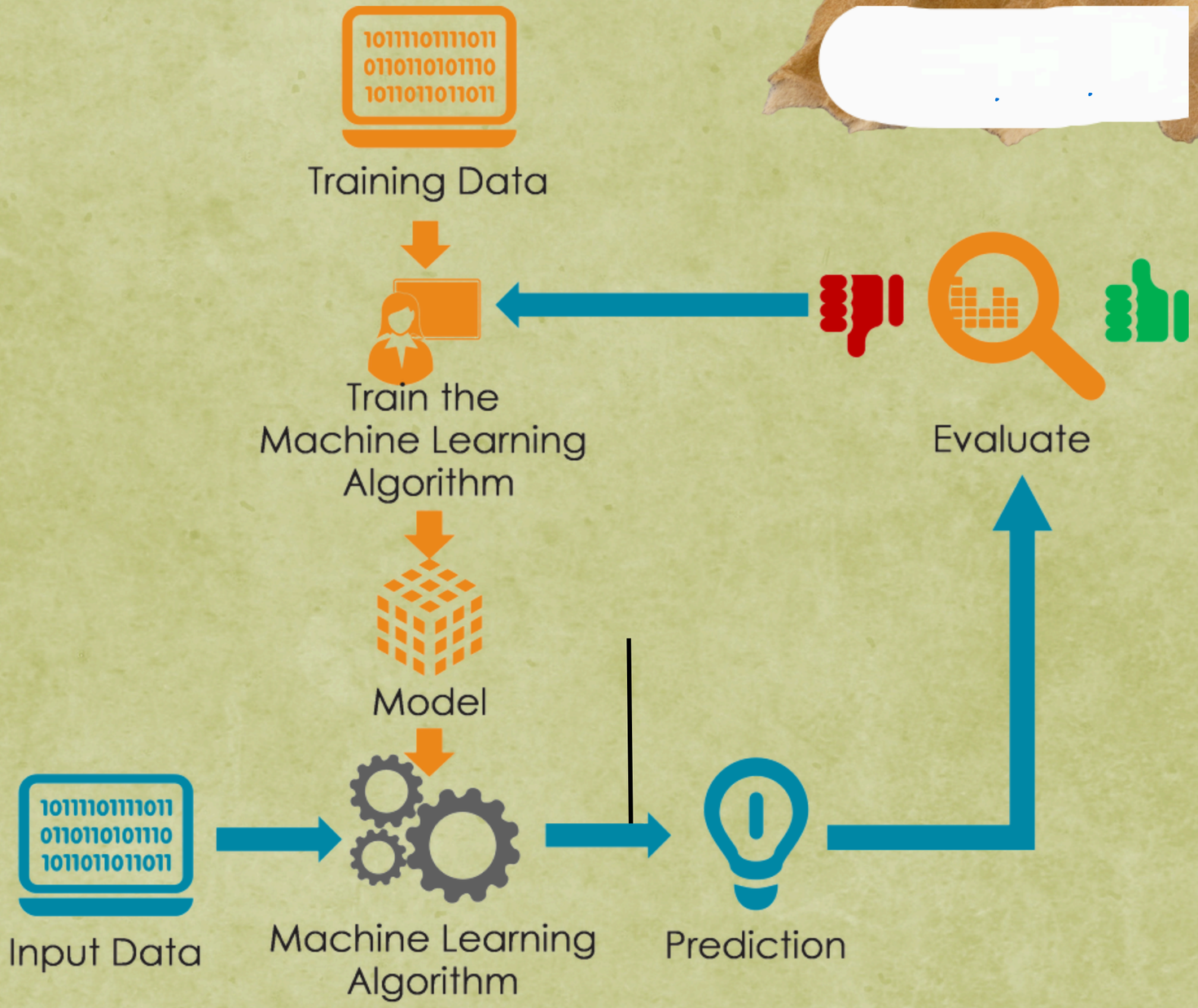


Data Pre-Processing



Data Train Test Split




Training Data
Train the Machine Learning Algorithm
Evaluate
Model
Input Data
Machine Learning Algorithm
Prediction

Achievements

1

Created a proper CSV dataset from 1980-2022

2

Created immersive EDA where user can input different features

3

Gradient Boosting Regressor, Random Forest Regressor, Support Vector Regressor, Decision Tree, ARIMA Model and Neural Networks used.

Achievements

Performance of algorithms

S.N	Model Name	R2-Score
1.	Gradient Boosting Regressor	0.88
2.	Random Forest Regressor	0.74
3.	Support Vector Regressor	0.077
4.	Decision Tree Regressor	0.50
5.	Neural Network	0.76

Comparative analysis

We compared the performance of our models with other similar studies, and looked for the novelties and uniqueness.

Limitations

- Excludes economic and social factors that can impact crop yield.
- Incomplete or inconsistent historical data may affect.
- Machine learning models used are less interpretable compared to simpler statistical models.

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Future Enhancements

01

Advanced Modeling Techniques

02

Interactive Visualization and UI

03

Incorporate satellite

System Requirements

Software

Jupyter Notebook

Python

ARIMA models

Libraries for Visualization

Hardware

RAM: 8 GB or Higher

System memory: Sufficient Storage space

intel core i5

NVIDIA GeForce or AMD Radeon

References

• GeeksforGeeks. (n.d.). Python ARIMA Model for Time Series Forecasting. https://www.geeksforgeeks.org/python-arima-model-for-time-series-forecasting/

·Khaki, S., & Wang, L. (2019). Crop Yield Prediction Using Deep Neural Networks. Frontiers in Plant Science. https://www.frontiersin.org/articles/10.3389/fpls.2019.00621/full

·Jha, K., Doshi, A., Patel, P., & Shah, M. (2019). Crop yield prediction using machine learning: A systematic literature review. Computers and Electronics in Agriculture, 163,https://www.researchgate.net/publication/332514891_Crop_yield_prediction_using_machine_learning_A_systematic_literature_review

Thank You

For Your Attention