ANALYZING SOIL REPORTS FOR FARMLAND AND CROP RECOMMENDATIONS

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LITERATURE SURVEY

Sr. No	Paper Title	Authors & Publication Date	Methodology
1	AI Based IoT Framework for Soil Analysis and Fertilization Recommendation for Smart Coconut Farming	G. Lekshmi and P. Rekha	In this paper, we have developed analytical models for predicting the fertilizer requirements based on the soil analysis and macronutrients present in the soil. This research work predicting fertilizer recommendations based on the crop's current fertilization requirements, weather forecasts, and environmental conditions. Based on this analysis an efficient ML model is derived that helps in predicting fertilization requirements based on soil parameters. A model called Linear Regression is built to predict the amount of fertilizer needed using the values of soil parameters such as soil pH, potassium, nitrogen, phosphorus, boron, zinc, soil carbon, manganese.This model demonstrates accuracy of 93.5% in predicting the fertilizer and can be used by farmers as a tool for scientific farming for enhancing crop

2	Implementation and Identification of Crop based on Soil Texture using AI		Mittal and A. Bhanja	The Aim is to build a machine learning model that recommends the most suitable crop for a given region based on a variety of factors such as soil type, climate, precipitation, and available resources. The model will be trained using NLP techniques to analyze and extract useful information from text data on various crops, including their characteristics, growth conditions, and yield potential. A machine learning model trained using the extracted features and may be capable of predicting the most suitable crop for a given region based on the input data. The proposed model is used as a web service to facilitate faster development
3	Application of Deep Learning to Improve the Accuracy of Soil Nutrient Classification		Rathore and P. Nath Singh	Soil test reports are used to classify the significant soil features by indices of Phosphorus, Potassium, Organic carbon, and Boron for parameter soil reaction (pH). Improved accuracy in prediction of the soil parameter will aid to reduce expenditure on fertilizers will increase farmer's profit.Deep Learning mostly uses CNN (Convolutional Neural Network) which is an extended and inspired architecture to make classification and predictions with more percentage of accuracy. In this paper accuracy of classification for soil nutrients are analyzed and improved using deep learning methods such as CNN, which gives better accuracy results. Image classification can be done using regression and SVM (support Vector Machine) also but CNN from Deep Learning model is more effective in learning patterns in 3-dimensional data of colour images and by automatic feature learning capability in the proposed CNN model.

PROBLEM STATEMENT

The agriculture industry faces challenges in optimizing crop yield while minimizing environmental impact. Manual soil analysis is time-consuming and imprecise. A solution is needed to leverage AI and ML for efficient, precise soil analysis and crop recommendations, accommodating changing conditions and ensuring accessibility, data security, and regulatory compliance.

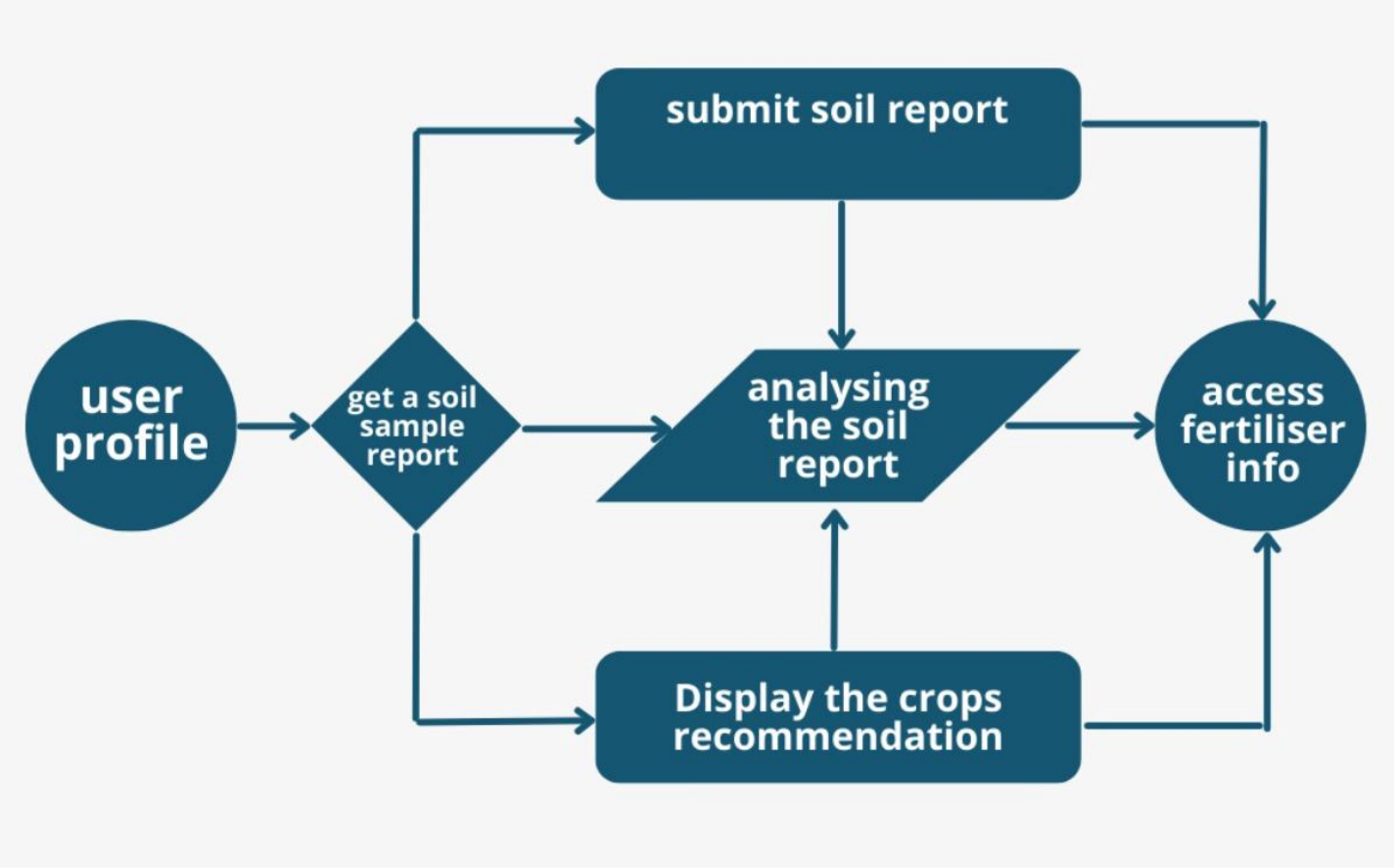
OBJECTIVE

The primary objective is to develop an AI and ML-based system for efficient soil analysis and precise crop recommendations, aiming to enhance crop productivity, promote sustainable farming, and facilitate user-friendly, secure, and compliant agricultural practices.

HARDWARE & SOFTWARE REQUIREMENTS

- System Processors : Core2Duo
- Speed : 2.4 GHz
- Hard Disk : 500 GB
- Operating system : 64 bit Windows 10.
- Coding Language : Python
- Design constraints : Regulatory Compliance

SYSTEM ARCHITECTURE



ADVANTAGES

- Improved Crop Yields:

  AI and ML models can provide precise recommendations for crop selection, planting schedules, and optimal growing conditions, leading to increased crop yields.

- Resource Efficiency:

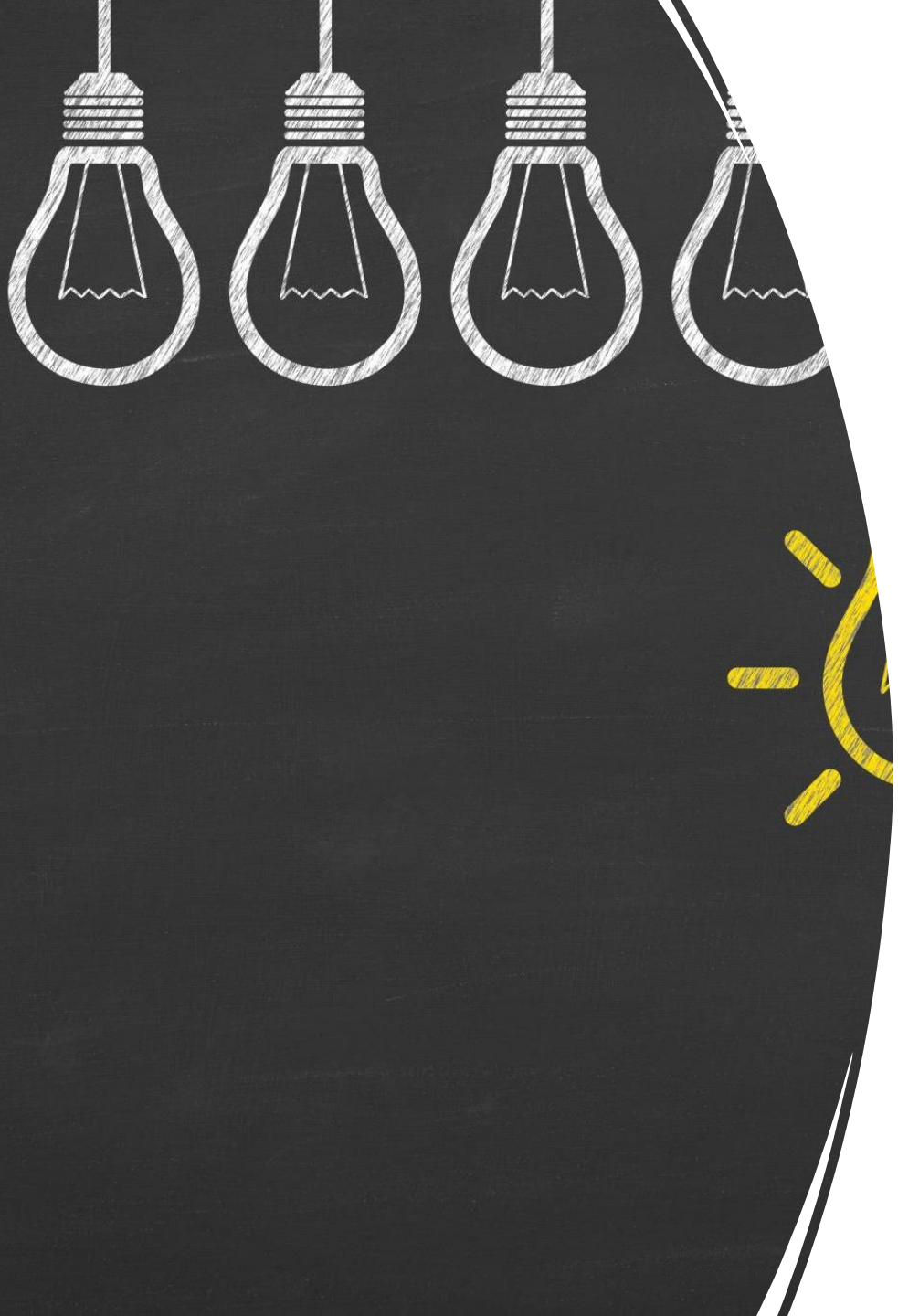
  AI-powered systems optimize resource usage, such as water, fertilizers, and pesticides, resulting in reduced waste and cost savings.

- Environmental Sustainability:

  By minimizing resource use and reducing the environmental impact of farming practices, AI-driven agriculture can promote sustainability and eco-friendly farming.

- Time Savings:

  Automation of data analysis and recommendations saves farmers time and effort, allowing them to focus on other critical tasks.



FUTURE SCOPE

- Advanced Predictive Models:

  Continuous improvements in machine learning algorithms and data availability will lead to more accurate and sophisticated predictive models for crop recommendations.

- Precision Agriculture:

  AI will play a central role in precision agriculture, enabling farmers to optimize their farming practices on a per-plant or per-plot basis, improving resource utilization.

- Disease and Pest Management:

  AI will provide early detection of diseases and pests, allowing for proactive management strategies and reduced crop damage.

- Global Food Security:

  AI-driven agriculture will play a pivotal role in addressing global food security by maximizing crop yields and making agriculture more sustainable.

CONCLUSION

- The use of AI and ML in soil analysis and crop recommendations promises to revolutionize agriculture. It offers precise insights, resource efficiency, and sustainability. The future scope includes advanced models, precision agriculture, and technology integration, paving the way for a more resilient and sustainable food production system. AI's role in agriculture is on an upward trajectory, offering a brighter and more efficient future.

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