A Project Synopsis On
PLANT GROWTH PREDICT MODEL IN HYDROPONICS SYSTEM

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Computer Science and Engineering

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Introduction

About project: A hydroponic system is a method of growing plants without soil, using a nutrient-rich water solution instead. Hydroponic systems work by allowing minute control over environmental conditions like temperature and pH balance and maximized exposure to nutrients and water. Hydroponics operates under a very simple principle: to provide plants with exactly what they need when they need it. Hydroponics administer nutrient solutions tailored to the needs of the particular plant being grown. They allow you to control exactly how much light the plants receive and for how long. pH levels can be monitored and adjusted. In a highly customized and controlled environment, plant growth accelerates. However, like with any good thing, hydroponic farming also has some drawbacks. It also affects the plant growth on the basis of some feed input.

Technology used: A machine learning model can be used to predict the growth of plants in a hydroponic system by analyzing various factors that affect the plant development, such as light, temperature, humidity, pH, nutrient concentration, etc.

Field of project: The field of machine learning model to predict plant growth in hydroponic system is a very interesting and relevant topic for the future of agriculture and food security. Machine learning models can help to optimize these factors and predict plant growth and yield based on data collected from sensors and cameras.

Technical terms: Technical terms related to machine learning model to predict plant growth in hydroponic system are- 1). SVR 2). RF 3). SVM 4). Decision Tree

RATIONALE

Hydroponic farming, when compared to conventional agriculture, is easier and more effective. However, like with any good thing, hydroponic farming also has some drawbacks. It also affects the plant growth on the basis of some feed input. Hydroponics requires a higher level of monitoring and micro-managing than growing plants traditionally. To maintain a carefully controlled growing environment, all system components need constant vigilance- lights, temperature, and many aspects of the nutrient solution such as pH and electrical conductivity. The nutrient solution also needs to be flushed and replaced regularly, and the system parts cleaned often to prevent buildup and clogging.

REDUCING HUMAN LABOR

Increase Crop Production

Cost reduction
vector illustration

Machine learning models can help optimize the growing conditions for enhanced crop production and quality, as well as increase resource use efficiency and reduce costs.

Objectives

Our Major objectives of project are:

1. The objective of this project is to develop a machine learning model that can effectively monitor and predict the plant growth in hydroponics.

2. The model will utilize sensor data and environmental parameter to provide insights and early warnings about the plant's health and growth progress, enabling growers to optimize their hydroponic operations and ensures optimal plant development.

3. to optimize the crop yield and quality by using data from sources and various machine learning model.

Literature Review

Journal	Year	Findings
IoT based hydroponics system using deep neural networks	2018	How to control various factors affecting the growth of crops in the hydroponics system
https://www.researchgate.net/publication/280235408_Hydroponics	2013	Learn about the various nutrients present in nutrient solution which affect or responsible for plant growth
https://books.google.com/books?hl=en&lr=&id=otCcDwAAQBAJ&oi=fnd&pg=PA1&dq=Hydroponic&ots=BfDgOCb0WP&sig=qDbq-dpW9E3RjCgmq4dDdVDcGwA	2012	Again, deep learning about composition of nutrients solution how they use in better way to achieve the outcome for plants

Feasibility Study

Technical Feasibility: This included the study of function, performance and constraints that may affect the ability to achieve an acceptable system. For this feasibility study, we studied complete functionality to be provided in the system, as described in the System Requirement Specification (SRS) And checked if everything was possible using a different type of frontend and backend platforms.

Operational Feasibility: No doubt the proposed system is fully GUI Based that is very user friendly and all inputs to be taken all self-Explanatory even to a layman. Besides, a proper tutorial guide will be Provided to let the users know the essence of the system to the users, so that they feel comfortable with the new system. As far as our study is Concerned the users will be comfortable and happy as the system will be user friendly.

Methodology

GUI Module: Our project has a Graphical User interface module based upon a web portal where the user can interact with the model and can request the diagnosis from the model.

Regressor Module: There is a regressor module that will work on labeled data which is based upon user data entered, have predicted the plant growth and efficiency of different machine learning regressor model. This module comprises a machine learning model as well as a deep learning model.

Database Module: The project's database module will handle the storing of user data as well as all the data which will be used to train the regressor module.

Technology / Languages: We use different technology to achieve the objective of our project as: 1). Machine learning technology

2). HTML

3). CSS

4). JAVASCRIPT

Our Portal will take numerical data or pictorial data from the user and will use machine learning algorithms to predict the plant growth in hydroponics and talk about the efficiency of various applied regressor modules.

Facilities Required

HARDWARE / SOFTWARE REQUIREMENTS

Name of component	Specification
Operating System	Windows 10, Linux
Languages	Python, Html, CSS, JavaScript
Database	MySQL or MongoDB
Browser	Mozilla, Opera, Chrome etc.
Framework	TensorFlow, PyTorch, Scikit
Data Analysis tool	Pandas, Numpy, Matplotlib
RAM	Minimum 4GB

Expected Outcomes

The expected outcomes of a machine learning model to predict the plant growth in hydroponics depend on the type of model, the input variables, and the performance metrics used. However, some general outcomes that can be expected are:

- A machine learning model can provide a quantitative estimate of the fresh weight, dry weight, leaf number, stem length, stem diameter, or water consumption of the plants grown in hydroponics based on the data collected from sensors and actuators.
- A machine learning model can help optimize the growing conditions and nutrient solutions for the plants grown in hydroponics by learning from the feedback loop and adjusting the parameters accordingly.

References

* [Frontiers Using Machine Learning Models to PredictHydroponically Grown Lettuce Yield (frontiersin.org)](#)

* [JETIR1811352.pdf](#)

*https://www.sciencedirect.com/science/article/pii/S0168169918311839