“Bean Care.”: Design and Implementation of Diseases Diagnosis System

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Project Proposal Report

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Declaration of the candidate & Supervisor

To the best of our knowledge and belief, this proposal does not contain any previously published or written by another person material, except where the acknowledgement is made in the text. We declare that this is our own work, and this proposal does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any other university or Institute of higher learning.

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The supervisor/s should certify the proposal report with the following declaration.

The above candidates are carrying out research for the undergraduate Dissertation under my supervision.

……. 2023/08/23

Signature of the supervisor: Date:

Abstract

This project proposal outlines the development of a predictive model aimed at assessing the quality of bean pods based on images uploaded by users. The proposed system seeks to provide bean farmers and stakeholders with an automated and accurate method to evaluate the quality of their bean pods, leading to improved decision-making and enhanced crop yield.

Keywords: Machine Learning, Image Recognition

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1. Introduction

The quality of bean pods is a critical determinant of market value and consumer satisfaction. The proposed system focuses on leveraging image analysis and machine learning techniques to predict the quality of bean pods non-invasively, reducing the reliance on manual assessment and enhancing efficiency in the bean production process.

1.1. Motivation

The motivation behind this project is to address the challenges associated with manual quality assessment of bean pods. Manual assessment is time-consuming, subjective, and can lead to inconsistencies in judgment. By automating this process through a predictive model, farmers can achieve consistent and objective quality evaluations, thereby enhancing the overall value of their produce

Figure 1.1.1

1.2 Importance of using a web application

The utilization of a web application for this predictive model facilitates widespread accessibility and ease of use. Farmers can simply upload images of their bean pods through the application, and the system will provide them with quality predictions. This approach not only saves time but also encourages wider adoption due to its user-friendly nature.

2. Background and Literature Survey

2.1 Background

The quality assessment of agricultural produce has traditionally relied on human judgment, leading to potential inaccuracies. By adopting automated image analysis techniques, the proposed system aims to overcome these limitations and provide a more reliable means of quality prediction for bean pods.

2.2 Literature Review

Current literature highlights the application of image analysis and machine learning in various agricultural domains. However, the specific focus on bean pod quality assessment using predictive modeling remains relatively unexplored. This project aims to bridge this gap by developing a dedicated model for bean pod quality prediction.

1. Research Gap & Research Problem

1.1.Research Gap

Gap No.	Features to Be Expanded
1	Lack of automated systems for bean pod quality assessment based on images.
2	Limited research on utilizing machine learning for bean pod quality prediction.
3	Absence of user-friendly platforms for farmers to assess bean pod quality.
4	Insufficient integration of predictive models into agricultural practices.

Table 3.1.1 – Features to be Expand

3.2 Research Problem

The research problem is to develop a predictive model that can accurately assess the quality of bean pods based on images provided by users. This model should be user-friendly, accessible through a web application, and capable of enhancing decision-making in the agricultural sector.

4 Objectives

4.1 Main Objective

The main objective is to develop a predictive model that evaluates the quality of bean pods through image analysis and machine learning.

4.2 Specific Objectives

1. Collect and curate a dataset of bean pod images with corresponding quality labels.

2. Preprocess and augment the dataset to improve model performance.

3. Design and train a machine learning model capable of quality prediction.

4. Develop a web application interface for users to upload images and receive quality predictions.

5. Validate the model's accuracy and effectiveness through testing and comparison with manual assessments.

5. Methodology

5.1.Functional Requirements

5.1.1. Overall System Overview

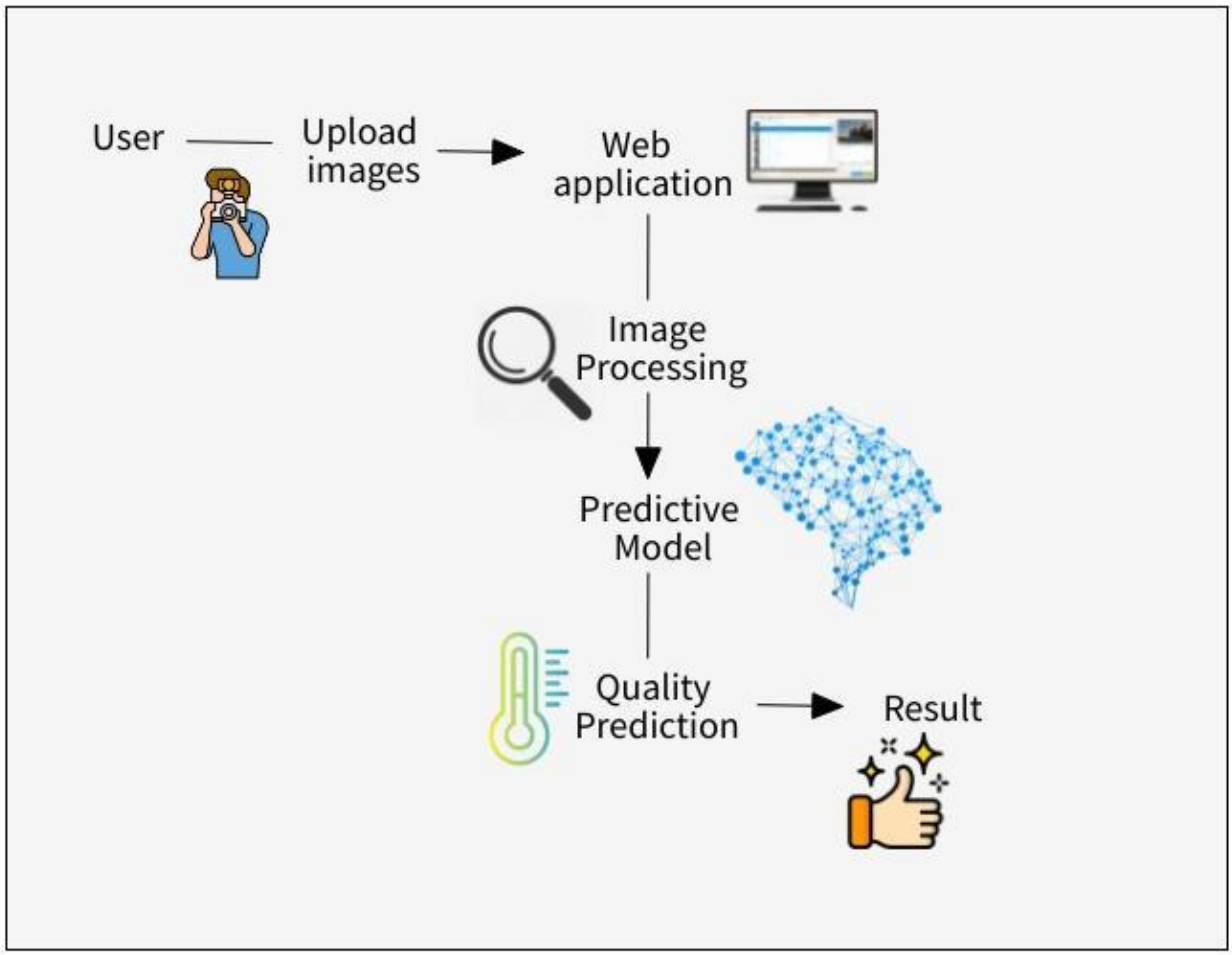

Figure 5.1.1.1 System Overview

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1. User Represents the end-user or farmer who interacts with the system.

2. Web Application is the user interface that allows users to upload images of bean pods. It's a web-based platform accessible through browsers.

3.Image Processing : Once the user uploads the images, they undergo image processing. This step involves various operations such as resizing, normalization, and noise reduction to prepare the images for analysis.

4. Predictive Model is where the heart of the analysis happens. The predictive model, which has been trained on a dataset of bean pod images, uses machine learning algorithms to assess the quality of the uploaded bean pods based on the processed images.

5. Quality Prediction : The predictive model evaluates the processed images and predicts the quality of the bean pods. The prediction could include factors such as size, color, texture, and other attributes related to quality.

6. Result : The quality prediction results are then presented to the user. This could be in the form of a simple report or a visual representation indicating the quality level of the uploaded bean pods.

where users upload images of bean pods, which are then processed and analyzed by a predictive model to provide quality predictions. The web application serves as the interface for users to interact with the system, and the outcome is valuable information about the quality of their bean pods.

5.1.2 System Overview for Instruction / Treatments Releasing.

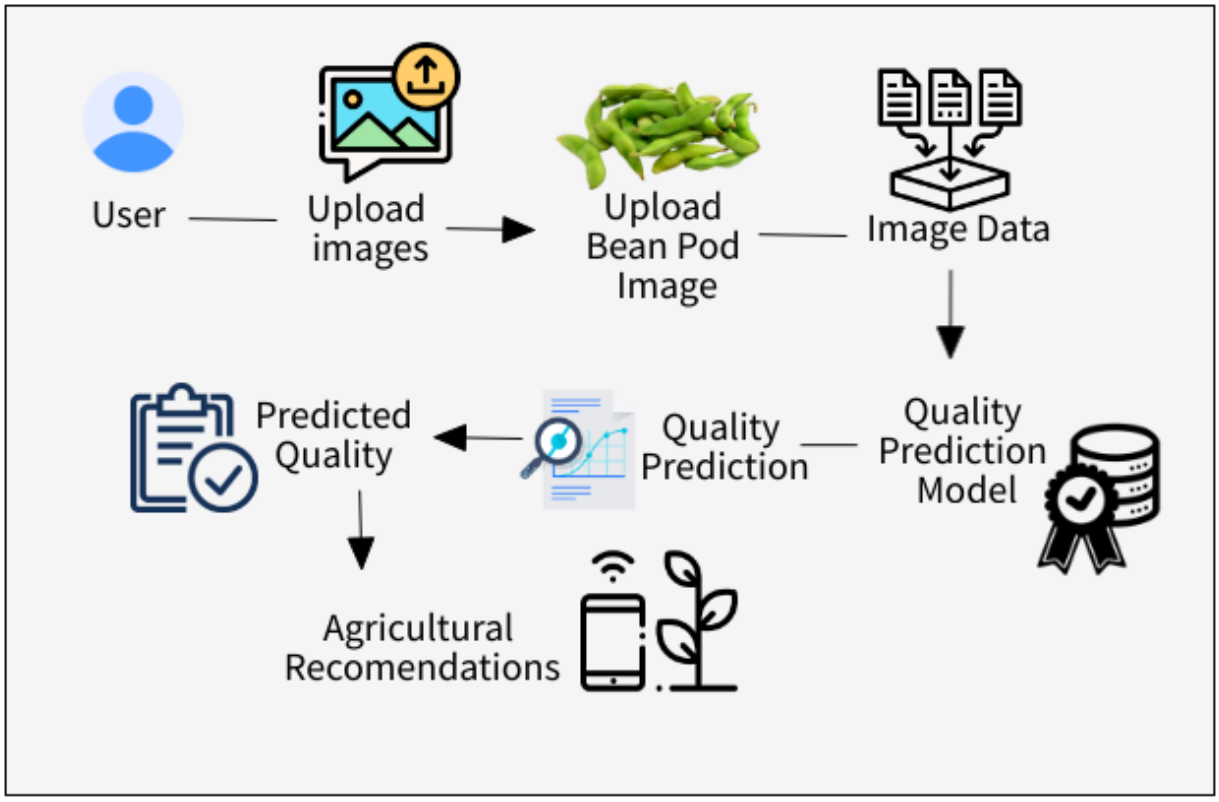

Figure 5.1.2.1 System Overview for Instruction / Treatments Releasing

5.2 Application of Key Pillars

The application of key pillars involves data collection, preprocessing, model development, web application design, and accuracy validation.**5.3 Tools and Technologies**

Tools	**Technologies**	**Explanation**
Python	TensorFlow	Programming language and ML framework
OpenCV	HTML/CSS/JavaScript	Image preprocessing and web application development
Flask		Web application framework
Jupyter Notebook		Model development and analysis

Table 5.3.1 Tools and Technologies chart

6. Evaluation Criteria

6.1.Gantt Chart

Figure 6.1.1 Gantt chart

6.2 Work Breakdown Structure

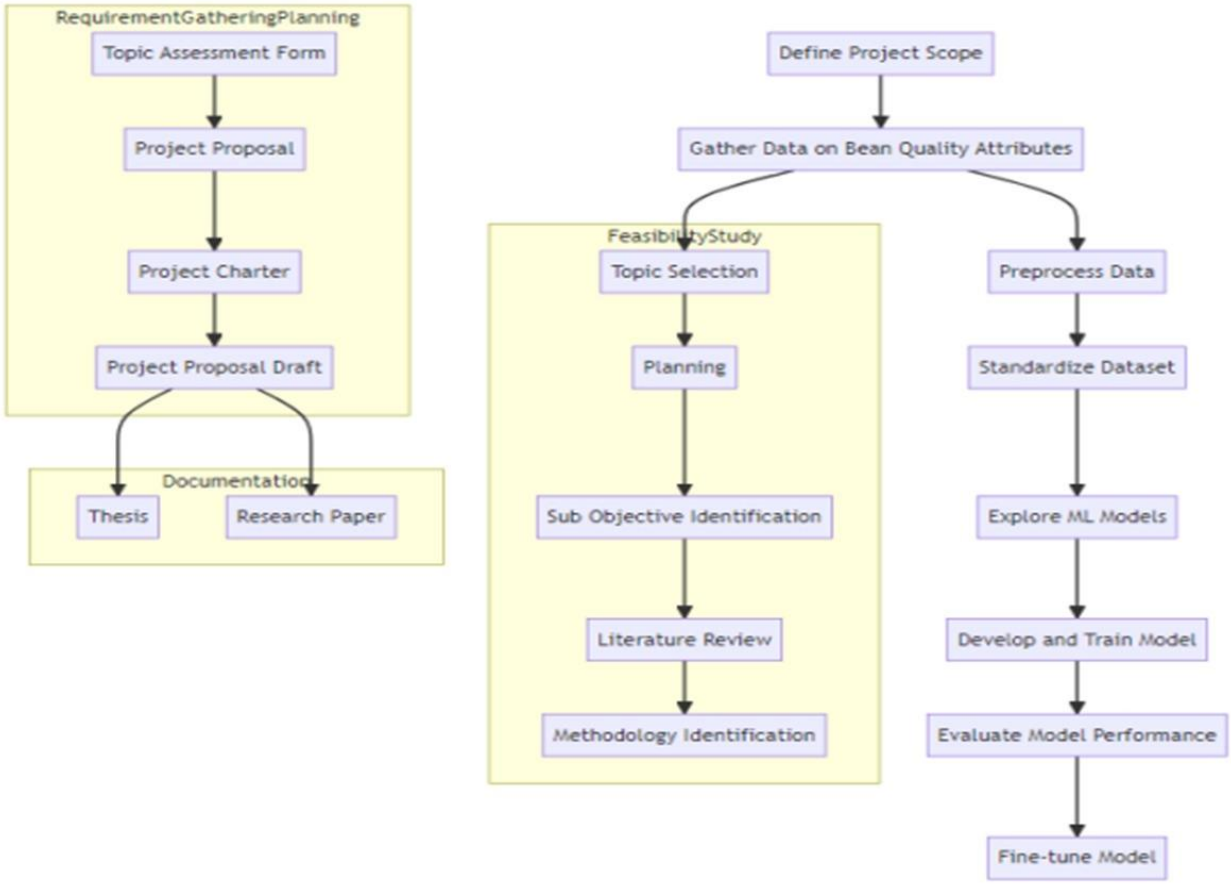

Figure 6.2.1 Work Breakdown Structure

7. Commercialization

the commercialization strategy involves offering subscriptions to the Quality Prediction System. Different subscription tiers will grant varying levels of image uploads, prediction accuracy, and additional features.

8. Description of Personal and Facilities

IT Number	Member	task
IT20647100	Perera M.T.G.E	Develop a predictive model for bean pod quality

Table 8.1: Description of personal and facilities

8.1 User Requirements

User-friendly web application interface.

- Quick and accurate quality predictions for uploaded bean pod images.
- Real-time results for timely decision-making. **8.2 Software Requirements**

8.2 **software requirements**

Python, TensorFlow, OpenCV, Flask, and Jupyter Notebook.

8.3.Functional Requirement

- Accurate quality predictions based on uploaded images.
- Secure image storage and retrieval.
- Efficient model inference for rapid results

7.4.Non-Functional requirement

- User-friendly and intuitive interface.
- Fast response times for image processing and prediction.

9. Budget and Budget Justification

Activities	Amount (Rs)
Development Resources	5000.00
Data Acquisition	4500.00
Infrastructure	4000.00
Marketing	3500.00
Maintenance	10000.00
Miscellaneos	2000.00

Table 9.1: Estimate Budget

References

1. *Zhao, D., Wang, J., Huang, W., Liao, B., & Xiong, H. (2020). An Efficient Multi-Label Classification Model for Image Annotation. IEEE Transactions on Image Processing, 29, 4557-4570.*

This paper discusses an efficient approach for multi-label image classification, which can be relevant for developing the quality prediction model for bean pods.

2. *Lecun, Y., Bengio, Y., & Hinton, G. (2015). Deep learning. Nature, 521(7553), 436-444.*

This seminal paper provides an overview of deep learning techniques, including convolutional neural networks (CNNs), which are fundamental for developing machine learning models for image analysis.

3. *Zhang, J., Zong, Y., & Zhang, Y. (2019). Quality Inspection of Agricultural Products Based on Convolutional Neural Network. In 2019 IEEE 3rd Information Technology, Networking, Electronic and Automation Control Conference (ITNEC) (pp. 476-480). IEEE.*

This paper specifically discusses quality inspection of agricultural products using CNNs, which can provide insights into similar approaches for bean pod quality prediction.

4. *Gidudu, A., Basamba, T. A., Mohamed, A. K., & Grünwald, N. J. (2019). Predicting Bean Quality Using Deep Learning. In African Crop Science Conference Proceedings (Vol. 12, pp. 69-74).*

This conference paper explores the prediction of bean quality using deep learning techniques, which aligns with the objective of predicting bean pod quality

5. *Zhang, C., Bengio, S., Hardt, M., Recht, B., & Vinyals, O. (2017). Understanding deep learning requires rethinking generalization. arXiv preprint arXiv:1611.03530.*

This paper provides insights into the generalization properties of deep learning models, which could be valuable in understanding how the developed quality prediction model generalizes to new data.