

High Level Design (HLD)

Mushroom Classification

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Abstract

Mushroom is one of the fungi types foods that has the most potent nutrients on the planet. Mushrooms have major medicinal advantages such as killing cancer cells. This study aims to find the most appropriate technique for mushroom classification, and mushroom will be classified into two categories, poisonous and nonpoisonous. The proposed approach will implement a different techniques and algorithms like Decision Tree, Random Forest and Boosting Techniques where the dataset contains different features of the mushrooms.

1. Introduction

1.1 Why this High-Level Design Document?

The purpose of this High-Level Design (HLD) Document is to add the necessary detail to the current project description to represent a suitable model for coding. This document is also intended to help detect contradictions prior to coding, and can be used as a reference manual for how the modules interact at a higher level.

Details on HLD:

- Present all of the design aspects and define them in detail
- Describes the user interface being implemented
- Describes the Hardware and software interfaces
- Describes the performance requirements
- Include design features and the architecture of the project
- List and describes the non-functional attributes like as mentioned below
 - Security
 - Reliability
 - Maintainability
 - Portability
 - Reusability
 - Application compatibility
 - Resource utilization
 - Serviceability

1.2 Scope

The HLD documentation presents the structure of the system, such as database architecture, application architecture (layers), application flow (Navigation), and technology architecture. The HLD uses non-technical to technical terms which should be understandable to the administration of the system.

1.3 Definitions

Terms	Description
IDE	Integrated Development Environment
HTML	Hypertext Markup Language
CSS	Cascading Style Sheet

2. General Description

2.1 Problem Statement

This dataset includes descriptions of hypothetical samples corresponding to 23 species of gilled mushrooms in the Agaricus and Lepiota Family Mushroom drawn from The Audubon Society Field Guide to North American Mushrooms (1981). Each species is identified as definitely edible, definitely poisonous, or of unknown edibility and not recommended. This latter class was combined with the poisonous one. The Guide clearly states that there is no simple rule for determining the edibility of a mushroom; no rule like "leaflets three, let it be" for Poisonous Oak and Ivy.



Agaricus Mushroom



Lepiota Mushroom

2.2 Objective

The main objective is to predict which mushroom is poisonous & which is edible.

2.3 Approach

The classical machine learning tasks like Data Exploration, Data Cleaning, Feature Engineering, Model Building and Model Testing. Applied different machine learning algorithms that best fit for the above case.

2.4 Tools Used

Python programming language and frameworks such as NumPy, Pandas, Scikit-learn are used to build model.

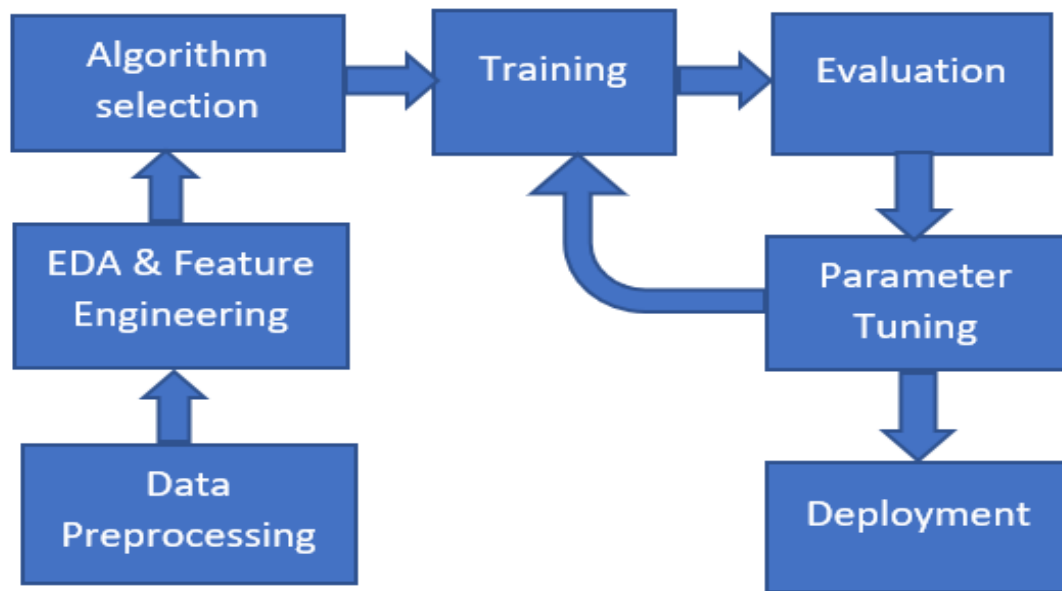


- Jupyter notebook and Spyder is used as IDE.
- Seaborn and Matplotlib are used for visualization.
- Heroku is used for deployment of the model.
- Front end development is done using HTML/CSS.
- Flask is used for backend development.
- GitHub is used as version control system.

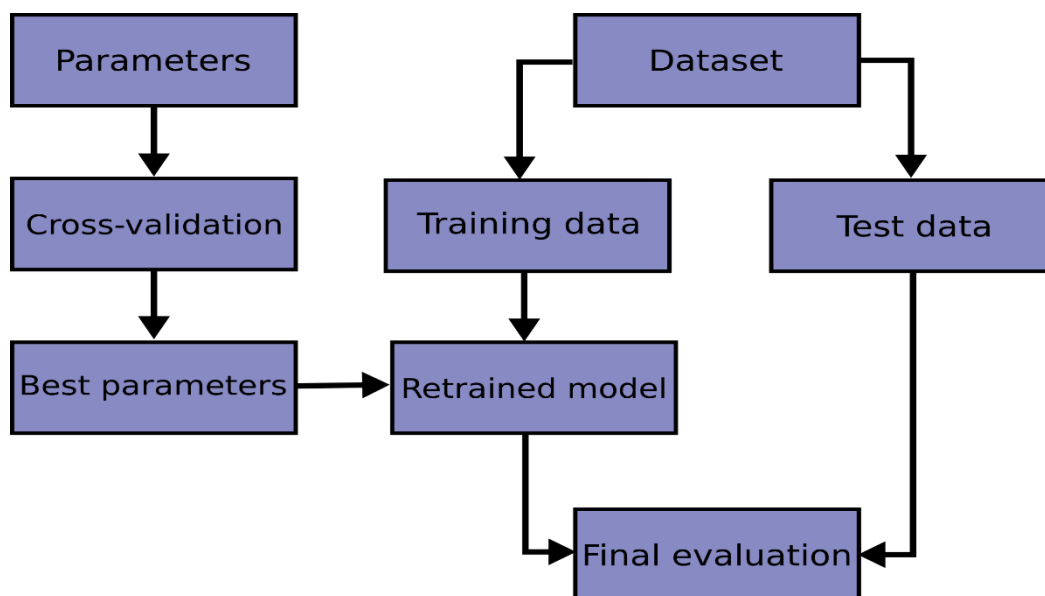
3. Design Details

3.1 Process Flow

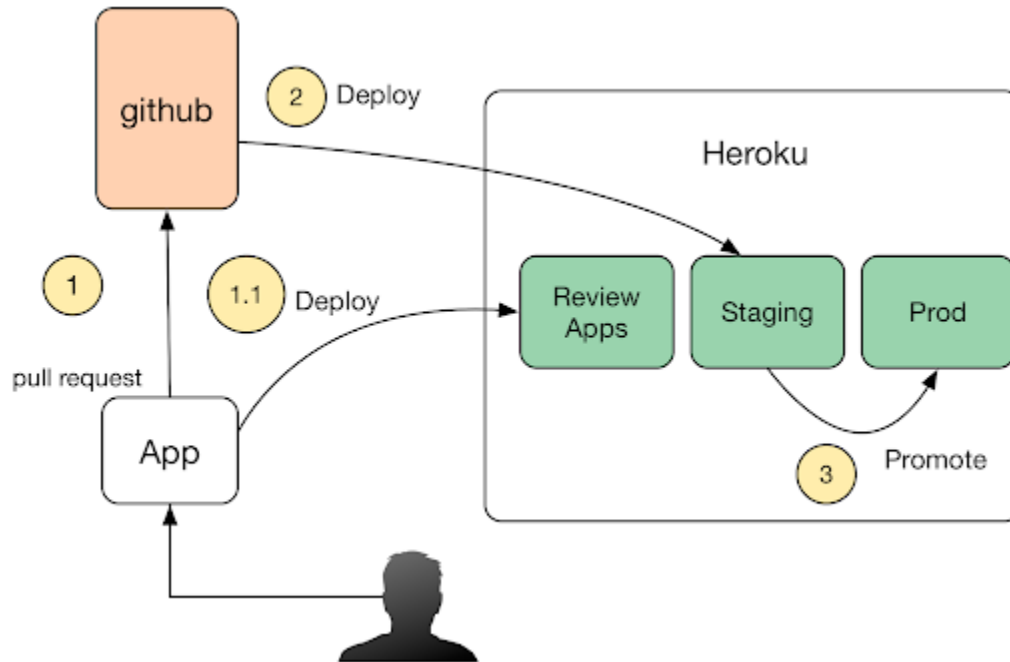
For classifying the Edible and Poisonous Mushroom we build Machine Learning model, following is the process for building the machine learning model.



3.2 Model Training and Evaluation



3.3 Deployment Process



3.4 Error Handling

Should errors can be encountered. An error will be defined as anything that falls outside the normal intended usage.

4. Performance

The Mushroom Classification is used to identify that which type of mushroom is edible and poisonous based on their features (cap shape and color, odor, stalk shape and color, habitat, etc...), so it should be as accurate as possible. The retraining of the model is also important to improve the performance.

4.1 Reusability

The code written and the component used should have the ability to be reused without any problem.

4.2 Application Compatibility

The different components for this project will be using Python as an interface between them. Each component will have its own task to perform, and it is the job of Python to ensure proper transformation of information.

4.3 Resource Utilization

When any task is performed, it will likely use all the processing power available until that function is finished.

4.4 Deployment

The cloud application platform Heroku is used to deploy the model.



5. Key Performance Indicators

1. To identify mushroom is edible or poisonous based on their features.
2. Time and work load can be reduced.

6. Conclusion

This mushroom classification project will help us to identify which mushroom is good for health or not, based on the different features of the mushroom. Anyone can know about the mushroom is edible or not without having deep knowledge about it.