ARCHITECTURE DESIGN

MUSHROOM CLASSIFICATION

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28/01/2023	1	Basic Formatting
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29/01/2023	1.2	Architecture

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Abstract

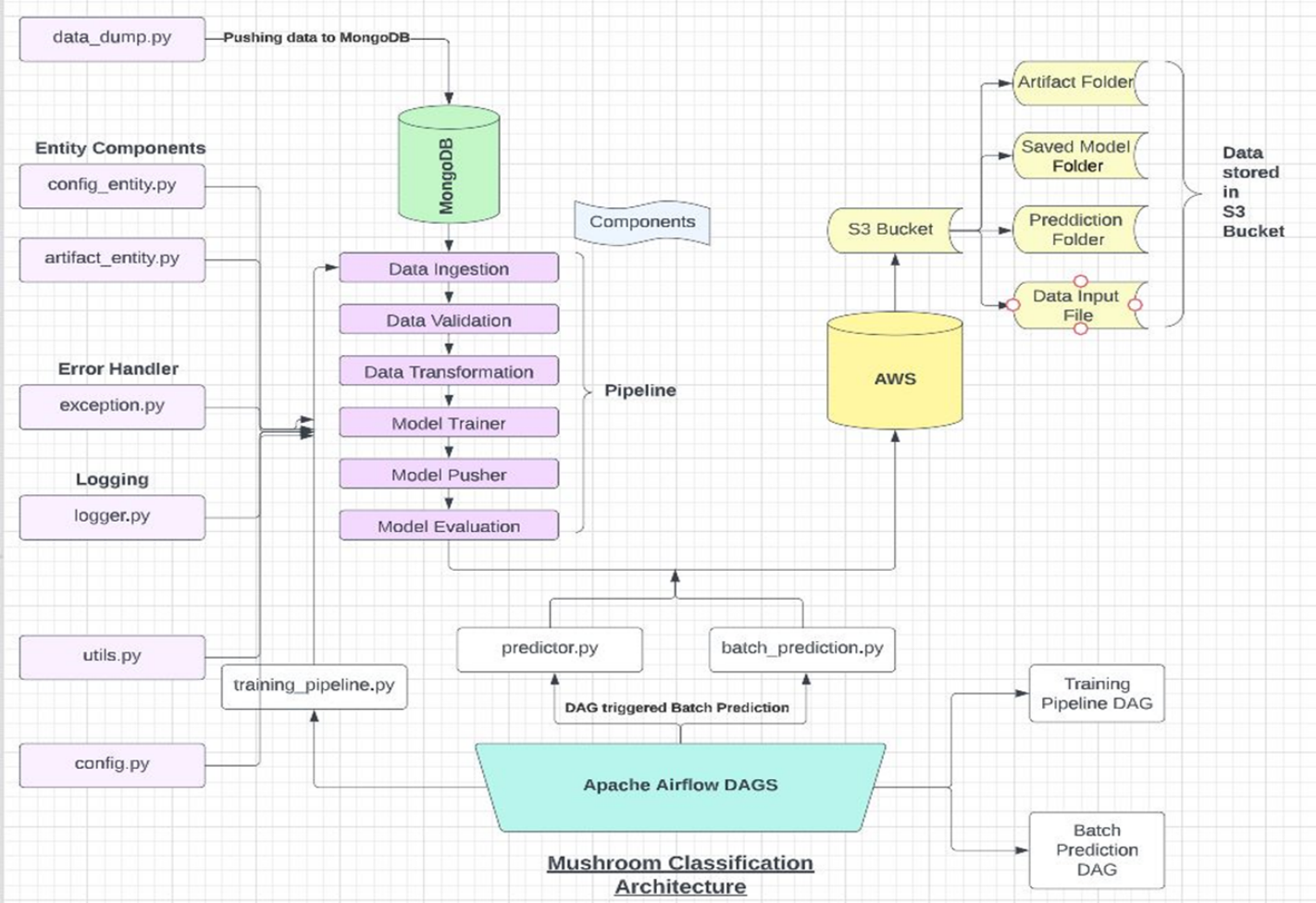
Mushrooms have been consumed since earliest history. The word Mushroom is derived from the French word for Fungi and Mold. Now-a-days, Mushroom are popular valuable food because they are low in calories, carbohydrate, Fat, sodium and also cholesterol free. Besides this, Mushroom provides important nutrients, including selenium, potassium, riboflavin, niacin, Vitamin D, proteins and fiber. All together with a long history as food source. Mushroom are important for their healing capacity and properties in traditional medicine. It has reported beneficial effects for health and treatment of some disease. Many nutraceutical properties are described in Mushroom like cancer and antitumor attributes. Mushroom act as antibacterial, immune system enhancer and cholesterol lowering Agent. Additionally, they are important source of bio-active compounds. This work is a machine learning model that classifies mushrooms into 2 classes: Poisonous and Edible depending on the features of the mushroom. During this machine learning implementation, we are going to see which features are important to predict whether a mushroom is poisonous or edible.

1. Introduction

1.1 What is Architecture Design Document?

The architecture design document is a technical document describing the components and specifications required to support the solution and ensure that the specific business and technical requirements of the design are satisfied. The main objective of the Architecture design documentation is to provide the internal logic understanding of the Mushroom Classification code. The Architecture design documentation is designed in such a way that the programmer can directly code after reading each module description in the documentation.

2. Architecture



3. Architecture Description

This project is designed to make an interface for the user to predict whether a mushroom is poisonous or edible.

3.1 Data Collection

The data for this project is collected from the Kaggle Dataset, the URL for the dataset is given below:

Dataset: https://www.kaggle.com/datasets/uciml/mushroom-classification

3.2 Data Description

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.

3.3 Exploratory Data Analysis

The dataset is a csv file. There are 8124 rows and 23 columns in this data. All the columns are of categorical type. There are two classes present in our target column which are 'p' - poisonous and 'e' - edible. Also, we have nearly equal counts for poisonous and edible classes in our data. Hence, we can say that our data is balanced.

3.4 Handling Missing Data

The particular dataset has no missing/null values in the dataset. However, if you go through the data description (check the link) you will find that the missing values in one column is replaced with "?". Hence the special characters were replaced by na . There are 2480 missing values in First, we will replace these values 'stalk-root' column. with np.nan so that we can handle missing data. we will impute the missing values in 'stalk-root' column using sklearn SimpleImputer .

3.5 Data Visualization

For data visualization, we have used only those columns which we found most relevant to the target column in the feature selection stage. We analyzed various count plots and gathered as much insights as we can about the target column. Data visualization was used for visualizing data distribution , frequency , class distribution etc.

3.6 Data Preprocessing

In this step, first we have dropped the column 'veil-type' as it has only one value throughout the data. So, it won't give us much information regarding the class of the mushroom. Next, we mapped our target column to 0 (poisonous) & 1 (edible) values. We used Label Encoder to convert categorical values to numerical then we scaled our data to bring them to same class.

3.7 Feature Selection

After splitting the data into train and test set, we used SelectKBest method with score_func=chi2 to find out which features are most relevant to target column and we found that there are 12 columns out of 21 which we needed for training our model.

3.8 Model Training & Evaluation

We used XGBClassifier as a model for model training it was very fast compared to the other models and it produced 99.89% accuracy on train data as well as on test data which is a very good for our project.

3.9 Model Deployment

The project is deployed on AWS using EC2 machine and S3 bucket for storage . The model is has image over ECR and can be triggered using Apache Airflow DAGS or Apache API ' s using postman . The project uses both AWS and Apache airflow which makes it easy to run pipeline.