Question 01

You've been provided with a dataset containing information about crops, including their nutrient levels (N, P, K), environmental factors (temperature, humidity, pH, rainfall), and corresponding labels. Your task is to create a predictive model that recommends the best three crops based on the provided conditions. Using machine learning techniques, build a model that takes into account the input features and predicts the most suitable crops for cultivation.

Find the data set here

Tasks:

1. **Data Exploration and Preprocessing:**
   - Explore the dataset to understand its structure, features, and distributions.
   - Perform any necessary preprocessing steps such as handling missing values, encoding categorical variables, and scaling numerical features.
2. **Model Training:**
   - Choose an appropriate machine learning algorithm (e.g., Decision Trees, Random Forests, Support Vector Machines) for building the predictive model.
   - Split the dataset into training and testing sets.
   - Train the model using the training data.
3. **Model Evaluation:**
   - Evaluate the trained model's accuracy in predicting the crop labels using the testing dataset.
   - Provide insights into how well the model performs in suggesting appropriate crops based on the given environmental conditions.
4. **Joblib Model Creation and Prediction:**
   - Create a joblib model (.joblib) from the trained model.
   - Use the created joblib model to make predictions on new environmental conditions.
   - Calculate the accuracy of the predictions.

Submission Requirements:

1. Submit your Python code implementing the data preprocessing, model training, evaluation, and prediction.
2. Include a brief report discussing the approach taken, challenges faced, insights gained from model evaluation, and suggestions for improving the model's performance.
3. Provide instructions for running your code and reproducing the results.

Note: You may use any relevant libraries and techniques for this task, ensuring clear documentation and organization of your code.