AI-Enhanced Rice Variety Classification

INFSCI 2240 AI

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Problem

Arborio

Jasmine

Karacadage

Basmati

Ipsala

Description:

Rice stands as one of the most extensively cultivated grains globally, showcasing a multitude of genetic variations. These variations are distinguished by characteristics such as texture, shape, and color. Utilizing these distinguishing traits allows for the classification and assessment of rice seed quality.

The rice image dataset from Kaggle comprises images of five distinct rice varieties: *Arborio from Italy, Basmati from India, Ipsala and Karacadag from Turkey, and Jasmine from Thailand*. **Each** variety is represented by **15,000 images**.

Solution & Resource

The aim of our project is to develop a machine learning model capable of classifying rice varieties using image data. Utilizing the rice image dataset from Kaggle, we will try to implement convolutional neural networks (CNNs/DNNs, ***TensorFlow*** and ***Keras*** libraries in python) as well as Random Forests (***scikit-learn*** library in python) to analyze the visual features that distinguish different types of rice grains. This endeavor will not only contribute to agricultural research by providing insights into rice phenotypes but also aid in automating the quality control process within the food industry.

Koklu, M., Cinar, I., & Taspinar, Y. S. (2021). Classification of rice varieties with deep learning methods. Computers and Electronics in Agriculture, 187, 106285. https://doi.org/10.1016/j.compag.2021.106285

Cinar, I., & Koklu, M. (2021). Determination of Effective and Specific Physical Features of Rice Varieties by Computer Vision In Exterior Quality Inspection. Selcuk Journal of Agriculture and Food Sciences, 35(3), 229-243. https://doi.org/10.15316/SJAFS.2021.252

Cinar, I., & Koklu, M. (2022). Identification of Rice Varieties Using Machine Learning Algorithms. Journal of Agricultural Sciences https://doi.org/10.15832/ankutbd.862482

Cinar, I., & Koklu, M. (2019). Classification of Rice Varieties Using Artificial Intelligence Methods. International Journal of Intelligent Systems and Applications in Engineering, 7(3), 188-194. https://doi.org/10.18201/ijisae.2019355381

Schedule

Task	Period
Data Collection/Literature Reading	Week 6 - Week 10
Data Exploratory Analysis	Week 9
Training CNN/DNN & Random Forest Models	Week 10 - Week 11
Performance Evaluation & Algorithm Tuning	Week 11 - Week 13
Final Model Selection & Testing	Week 13
Presentation Preparation	Week 13 - Week 14