

Ensemble of Deep CNN Architecture for Classifying the Source and Quality of Teff Cereal

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Abstract : The study focuses on addressing the challenges in classifying and ensuring the quality of Eragrostis Teff, a small and round grain that is the smallest cereal grain. Employing a traditional classification method is challenging because of its small size and the similarity of its environmental characteristics. To overcome this, this study employs a machine learning approach to develop a source and quality classification system for Teff cereal. Data is collected from various production areas in the Amhara regions, considering two types of cereal (high and low quality) across eight classes. A total of 5,920 images are collected, with 740 images for each class. Image enhancement techniques, including scaling, data augmentation, histogram equalization, and noise removal, are applied to preprocess the data. Convolutional Neural Network (CNN) is then used to extract relevant features and reduce dimensionality. The dataset is split into 80% for training and 20% for testing. Different classifiers, including FVGG16, FINCV3, QSCTC, EMQSCTC, SVM, and RF, are employed for classification, achieving accuracy rates ranging from 86.91% to 97.72%. The ensemble of FVGG16, FINCV3, and QSCTC using the Max-Voting approach outperforms individual algorithms.

Keywords : Teff, ensemble learning, max-voting, CNN, SVM, RF

Conference Title : ICCSCIT 2024 : International Conference on Computer Science, Cybersecurity and Information Technology

Conference Location : Amsterdam, Netherlands

Conference Dates : December 02-03, 2024