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PROJECT TITLE

RICE CLASSIFICATION USING CNN

AGENDA

1.Problem Statement
2.Project Overview
3.End Users
4.Our Solution and Proposition
5.Key Features
6.Modelling Approach
7.Results and Evaluation
8.Conclusion

PROBLEMSTATEMENT

- **Cutting-edge Technology**: Employing advanced image recognition for swift and precise rice classification by quality and type.
- **Quality Assurance**: Ensuring top-tier rice reaches consumers, fostering trust and satisfaction.
- **Time Efficiency**: Automating sorting processes saves valuable time for farmers and processors, boosting overall productivity.

PROJECT OVERVIEW

- Deploying a sophisticated automated system for rice classification, employing state-of-the-art image recognition technologies.
- Harnessing convolutional neural networks (CNNs) to categorize rice according to its quality, type, and identifying defects, thereby enabling smooth and effective sorting operations.
- The objective is to simplify tasks for farmers and processors, guaranteeing a steady flow of premium rice to consumers while enhancing operational efficiency throughout the rice supply chain.

WHO ARE THE END USERS?

- Farmers: They have the opportunity to utilize the system for swift and precise sorting of their harvested rice, guaranteeing that only superior grains are dispatched to market.

- Rice Processors: Entities engaged in rice processing stand to gain from the system's automation of sorting procedures, leading to decreased labor expenses and heightened operational efficiency.

- Consumers: At the end of the chain, consumers enjoy the advantage of consistently receiving top-notch rice products, as the system guarantees that only the finest grains make their way to the market.

YOUR SOLUTION AND ITS VALUE PROPOSITION

- **Precision**: CNNs guarantee highly precise classification of rice varieties, quality levels, and identification of defects, surpassing traditional sorting methods in accuracy.
- **Productivity**: The automated functionality of CNNs expedites the sorting process, enabling swift classification of large rice volumes, thereby saving time and resources for farmers and processors.
- **Cost Savings**: By diminishing reliance on manual sorting, the CNN-driven solution reduces labor costs for rice processors, leading to improved financial viability.
- **Uniformity**: Consistent classification criteria are upheld, ensuring only top-quality rice reaches consumers, enhancing brand reputation and customer satisfaction.
- **Technological Innovation**: Embracing CNN technology showcases a commitment to modernization and advancement in agricultural practices, establishing businesses as pioneers in the rice industry.

THE WOW IN YOUR SOLUTION

- Instantaneous and accurate assessment of rice variety quality with precision and speed.
- High accuracy in detescting a object.
- Potential for integration with existing surveillance systems.
- By empowering stakeholders ranging from farmers to policymakers, it enhances the decision-making process.

MODELLING

Convolutional Neural Networks (CNNs) for Rice Classification:

- CNNs are well-suited for tasks such as rice classification because they possess the capability to autonomously learn and extract hierarchical features from images, making them highly effective in image classification scenarios..

Data Preprocessing for Rice Classification:

- Load the rice grain images from the dataset, making sure to pair each image with its corresponding rice type label for supervised learning.
- Standardize the image sizes to dimensions like 224x224 pixels, maintaining the aspect ratio to meet CNN input specifications and enhance model compatibility..
- Normalize the pixel intensities of the images to a scale between 0 and 1, promoting uniformity across data samples and assisting training algorithms in achieving better convergence and performance.

Training Process for Rice Classification:

- Train the CNN model using mini-batch stochastic gradient descent (SGD) or the Adam optimizer to optimize model parameters and minimize training loss.
- Evaluate the model's performance on the validation set to assess its ability to generalize to new data and detect any signs of overfitting or underfitting.

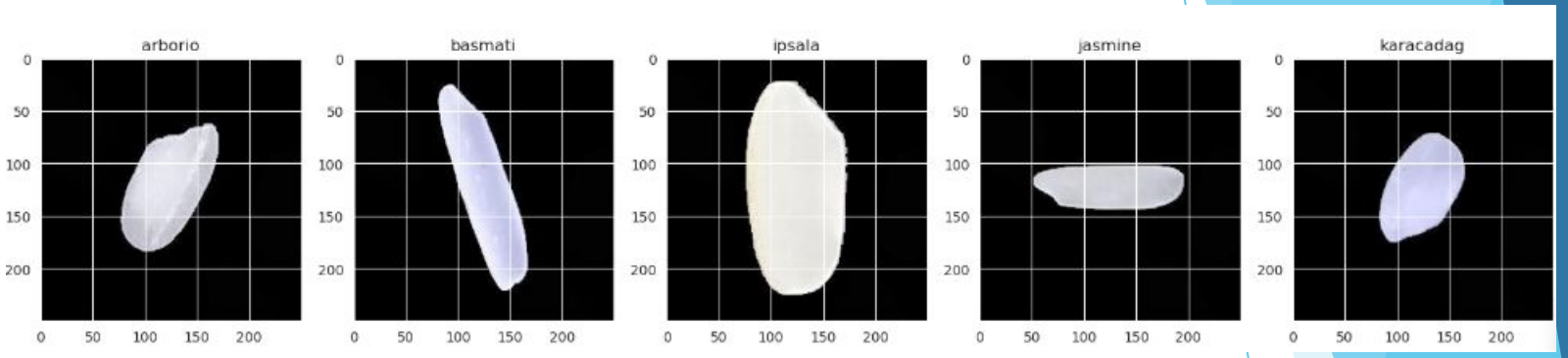
Fine-Tuning for Rice Classification:

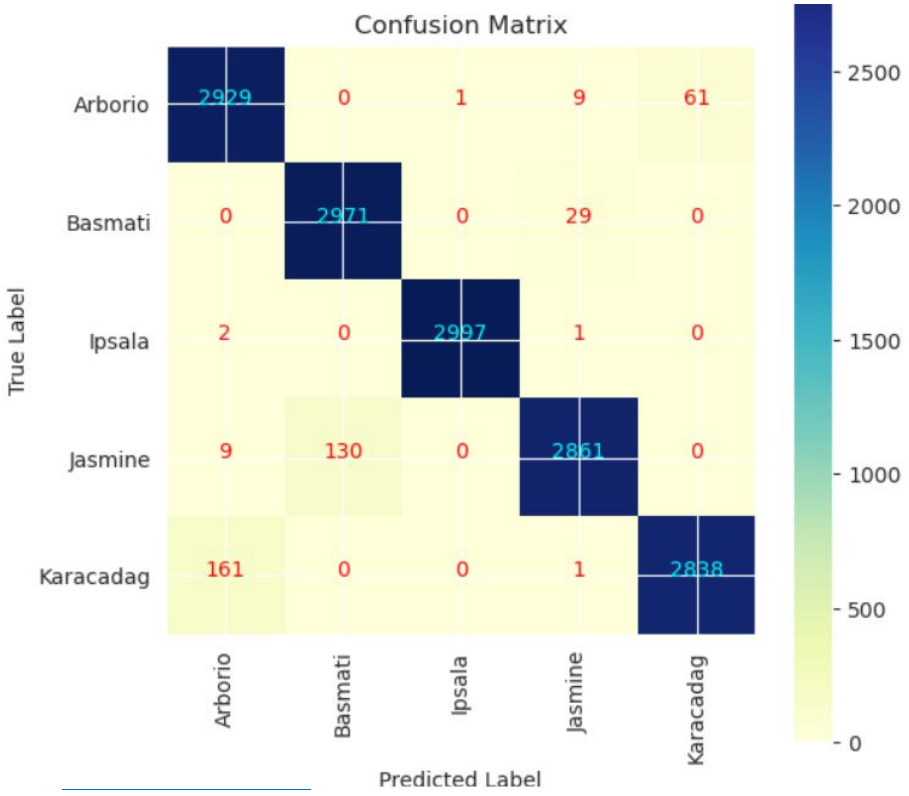
- Freeze the weights of the initial layers in the pre-trained CNN to retain the valuable learned features without further modification during training.
- Allow the top layers of the CNN to adapt to the rice classification task by unfreezing them, enabling weight updates during training to better capture rice-specific features.
- Fine-Tuning: Fine-tune the model on the rice dataset using a lower learning rate compared to the initial training to prevent drastic changes to the pre-learned features.

Model Evaluation for Rice Classification:

- Accuracy: Compute the classification accuracy of the trained model on the test set to measure its overall performance
- Precision, Recall, F1-Score: Calculate precision, recall, and F1-score for each class to assess the model's performance on individual rice types.
- Confusion Matrix: Generate a confusion matrix to visualize the model's performance in terms of true positive, false positive, true negative, and false negative predictions for each class.

RESULTS


arborio
basmati
ipsala
jasmine
karacadag


Confusion Matrix
Arborio
Basmati
Ipsala
Jasmine
Karacadag
True Label
Predicted Label
2929
0
1
9
61
0
2971
0
29
0
2
0
2997
1
0
9
130
0
2861
0
161
0
0
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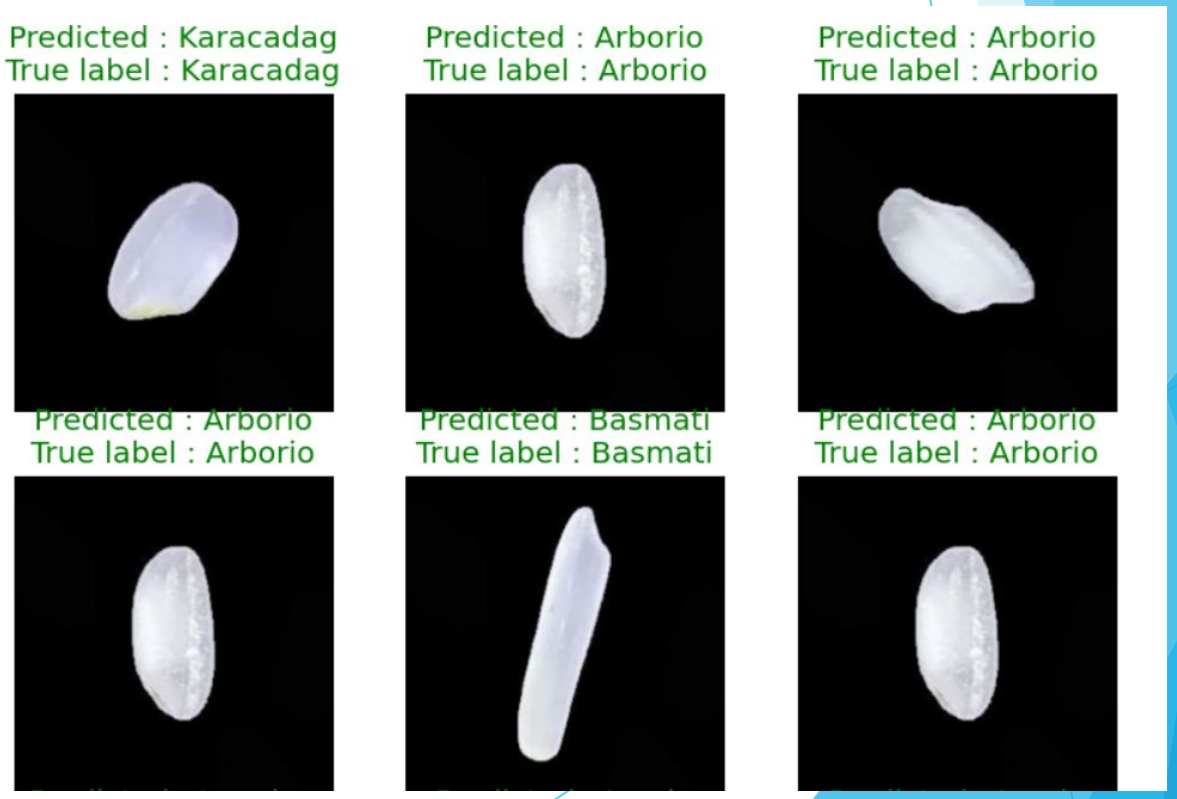
2838
2500
2000
1500
1000
500
0


Predicted : Karacadag
True label : Karacadag
Predicted : Arborio
True label : Arborio
Predicted : Arborio
True label : Arborio
Predicted : Arborio
True label : Arborio
Predicted : Basmati
True label : Basmati
Predicted : Arborio
True label : Arborio