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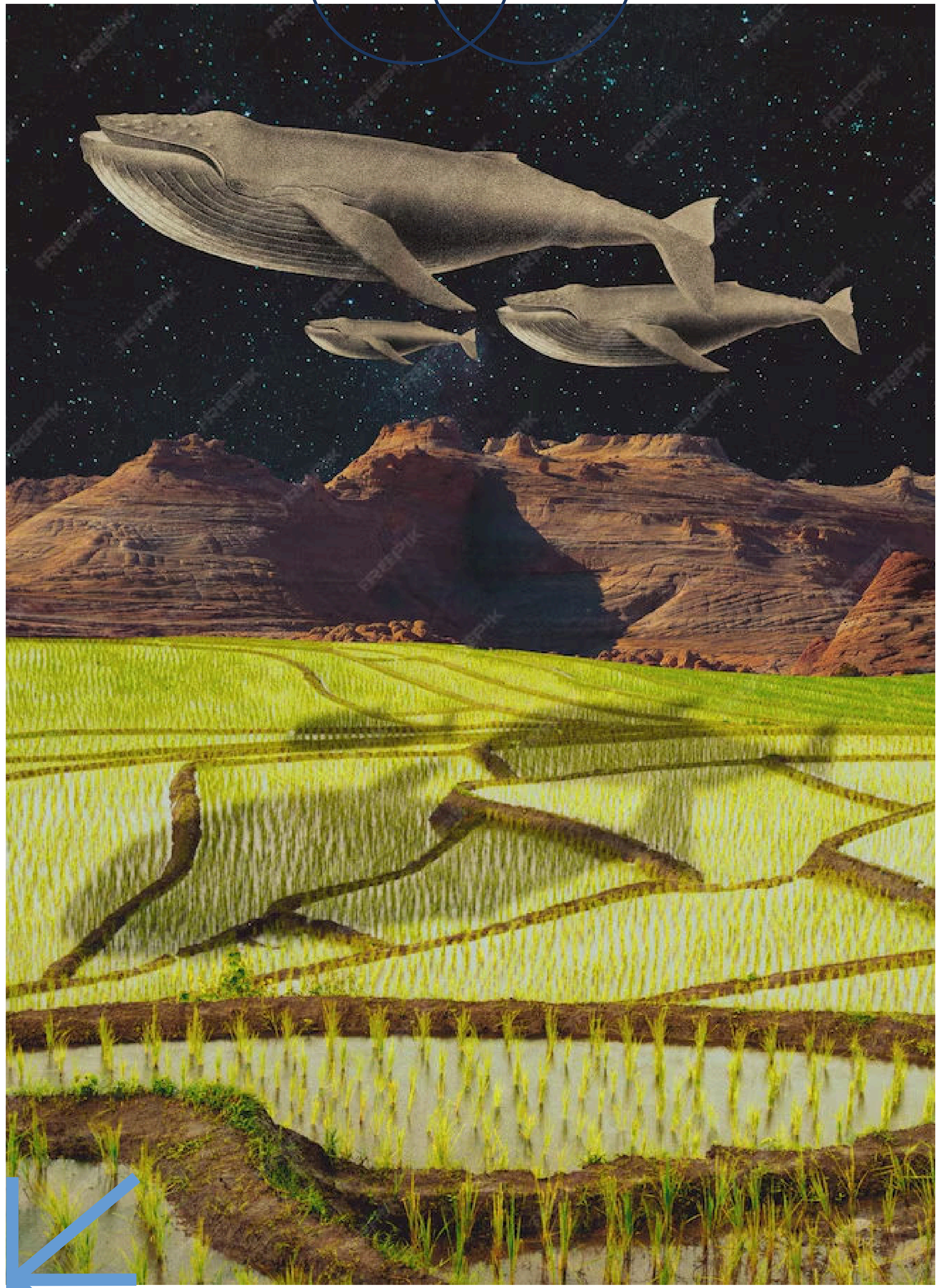
Final Project



Project Title

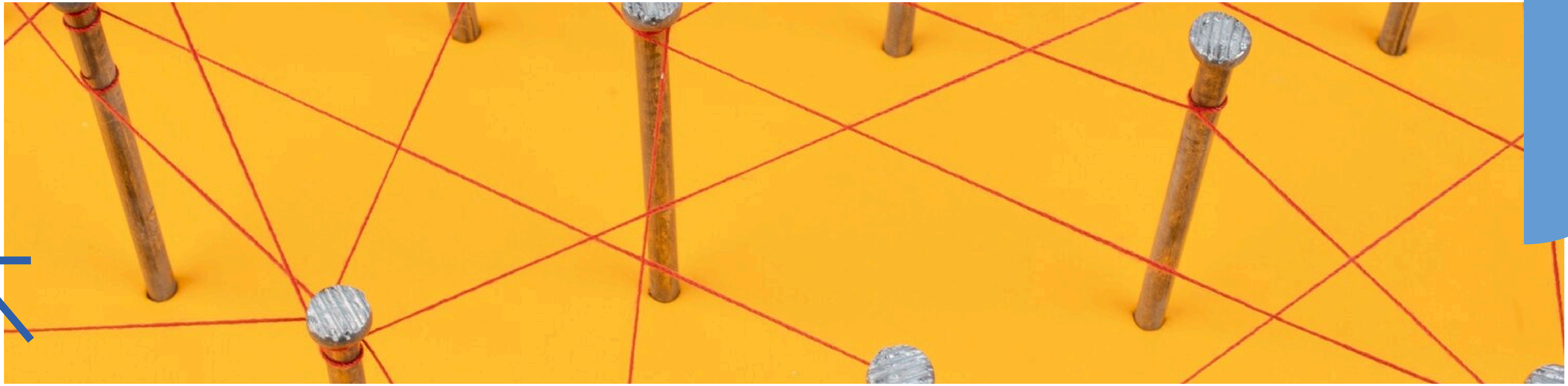
In this presentation, we will explore how *Convolutional Neural Networks* can enhance the accuracy of **rice classification**. We will discuss the challenges in traditional methods and the potential of CNNs in improving classification results.

Rice Classification

Rice classification is crucial for ensuring **quality control** and meeting market demands. Traditional methods often face challenges in accurately distinguishing between different rice varieties. We will delve into the significance of accurate rice classification and the need for advanced techniques.

Convolutional Neural Networks

Convolutional Neural Networks, or **CNNs**, have revolutionized image classification tasks. Their ability to automatically learn features from data makes them ideal for complex tasks like rice classification. CNN architecture and its applications in agricultural image analysis has been very helpful in indentifyinh different crops and products



Challenges in Rice Classification

Accurately classifying rice varieties from images poses several challenges, including **variations in lighting**, **grain size**, and **external factors**. This slide will highlight the limitations of traditional methods and the potential for CNNs to address these challenges.

There are usually features such as texture, shape, and color. With these features that distinguish rice varieties, it is possible to classify and evaluate the quality of seeds. In this study, Arborio, Basmati, Ipsala, Jasmine and Karacadag, which are five different varieties of rice often grown in Turkey, were used. A total of 75,000 grain images, 15,000 from each of these varieties, are included in the dataset.

Training Data Preparation

Preparing a robust training dataset is crucial for the success of CNN models. The process of **data collection**, **labeling**, and **preprocessing** to ensure the CNN is trained on diverse and representative rice images.

The dataset must be free from any irrelevant data, outliers that may change the accuracy of the data and any other invalid or missing data values are also filled out or removed based on the important or need of that data value.

CNN Model Training

Models were created by using Artificial Neural Network (ANN) and Deep Neural Network (DNN) algorithms for the feature dataset and by using the Convolutional Neural Network (CNN) algorithm for the image dataset, and classification processes were performed. Statistical results of sensitivity, specificity, prediction, F1 score, accuracy, false positive rate and false negative rate were calculated using the confusion matrix values of the models and the results of each model were given in tables.

Results and Evaluation

The application of CNNs in rice classification yields promising results, with improved **accuracy** and **efficiency**. This slide will showcase the performance metrics and evaluation of the CNN model in accurately classifying rice varieties from diverse images.

Classification successes from the models were achieved as 99.87% for ANN, 99.95% for DNN and 100% for CNN. With the results, it is seen that the models used in the study in the classification of rice varieties can be applied successfully in this field.

Conclusion

In conclusion, leveraging Convolutional Neural Networks for rice classification offers a significant advancement in accuracy and efficiency. By addressing the challenges of traditional methods, CNNs pave the way for enhanced **agricultural productivity** and **quality assurance** in rice production.