TNSDC-GENERATIVE AI FOR ENGINEERING

FINAL PROJECT

Submitted by

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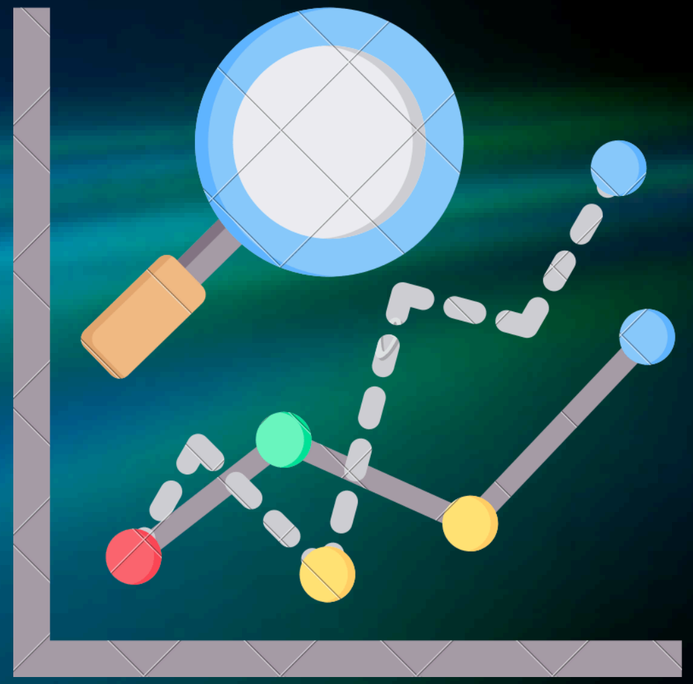
PROJECT TITLE

Rock Papaer Scissor Using CNN (Prediction Task Using CNN)



Rock Papaer Scissor Using CNN (Prediction Task Using CNN)

This project focuses on using Convolutional Neural Networks (CNNs) to predict hand gestures in the game "Rock, Paper, Scissors." With CNNs offering a promising solution to gesture recognition, we aim to demonstrate their effectiveness in this scenario. By training a CNN architecture on a dataset of hand gesture images, our goal is to create a model capable of accurately predicting gestures in real-time. Through this project, we explore CNN intricacies, including architecture, training, and optimization techniques, aiming to advance AI-powered gesture recognition systems for practical applications in gaming and human-computer interaction

Agenda

- PROBLEM STATEMENT
- PROJECT OVERVIEW
- END USERS
- SOLUTION AND ITS PROPORTION
- MODELLING
- RESULTS

PROBLEM STATEMENT

Within the realm of human-computer interaction, automating the recognition of hand gestures in the game of Rock Paper Scissors (RPS) poses a significant challenge. Identifying gestures like rock, paper, and scissors manually proves impractical, particularly in contexts demanding swift decision-making, such as gaming interfaces and educational tools. Current automated solutions often grapple with accuracy shortcomings, undermining their dependability and user-friendliness. Hence, there arises a critical necessity for a reliable and efficient system adept at precisely classifying RPS hand gestures to cater to diverse application needs.

PROJECT OVERVIEW

To tackle this challenge, the project endeavors to create a robust Convolutional Neural Network (CNN) model proficient in precisely categorizing hand gestures in Rock Paper Scissors (RPS). Utilizing a dataset enriched with labeled images depicting rock, paper, or scissors gestures, the project embarks on training and evaluating the CNN model. Through the adoption of a CNN-based methodology, the project aspires to furnish a scalable and effective solution for automated gesture recognition not only within the RPS game but also extending its utility to various domains. This holistic approach aims to accommodate a wide spectrum of end users spanning diverse fields and applications.

END USERS

- Automated gesture recognition in gaming interfaces revolutionizes user experience, particularly in virtual and augmented reality environments. Enhances immersion and interaction, leading to more engaging gameplay experiences.
- Educational tools leveraging gesture recognition technology offer novel approaches to teaching complex concepts like computer vision. Facilitates hands-on learning and encourages active student participation.

- Gesture-based interfaces hold promise for improving accessibility in various domains, including communication and accessibility aids. Enables individuals with diverse needs to interact with technology more seamlessly.
- Research in HCI explores innovative applications of gesture recognition beyond traditional gaming interfaces. Opens avenues for enhancing human-computer interaction in fields such as healthcare, rehabilitation, and entertainment.

SOLUTION AND ITS PROPORTION

The proposed solution revolves around the utilization of a CNN architecture tailored for image classification tasks. This CNN model is trained on the labeled hand gesture dataset, enabling it to accurately classify gestures as rock, paper, or scissors in real-time. The value proposition of the solution lies in its efficiency, accuracy, and scalability. By automating gesture recognition, the solution facilitates rapid decision-making in various applications, enhancing user experience and efficiency. Furthermore, the scalability of the solution allows for its adaptation to different environments and applications, making it versatile and adaptable to diverse user needs.

MODELLING

- Data preprocessing involves resizing, normalization, and augmentation to prepare the dataset for training.
- Ensures uniformity and enhances the diversity of the dataset, improving model robustness.
- The CNN model undergoes training using optimization techniques like gradient descent and regularization.
- Adjusts model parameters to minimize loss and enhance overall performance.

- Evaluation of the model entails measuring performance metrics such as accuracy, precision, recall, and F1-score.
- Provides insights into the model's effectiveness in accurately classifying hand gestures.

RESULTS

The results of the project demonstrate the performance of the trained CNN model in classifying hand gestures in RPS. Performance metrics such as accuracy, precision, recall, and F1-score provide insights into the model's effectiveness and generalization capability. Visualization of sample predictions and confusion matrix analysis further elucidate the model's performance across different classes. The discussion of results includes interpretation, analysis of common errors, and potential areas for improvement, paving the way for future enhancements and applications of the proposed solution.