CricJudge: An AI-BASED CRICKET UMPIRE FOR DETECTING FAIR AND WIDE DELIVERIES

Muhammad Raees Shujaan Azhar

Muhammad Umar

Uswah Akhund

Muhammad Sabeeh ***(Supervisor)***

Abstract: Umpire decisions in cricket play a pivotal role in determining the outcome of matches. However, human errors can occasionally impact the accuracy of these decisions. To address this concern, we present "CricJudge," an AI Cricket Umpire prototype designed to identify fair and wide cricket balls. CricJudge utilizes a diverse dataset of specific images depicting wide and fair deliveries to train its model, enabling accurate detection on video clips. This research outlines the methodology employed, from dataset collection and preprocessing to the AI model architecture and training process. The chosen model, TensorFlow ResNet50, is enhanced with additional layers to ensure optimal performance. The obtained results demonstrate a high training accuracy of 96%, showcasing the potential of CricJudge in aiding umpires and enhancing decision-making in cricket matches.

1. Introduction

The pivotal role of umpire decisions in cricket and the potential for human errors necessitate the development of robust AI solutions. "CricJudge" is an AI Cricket Umpire prototype designed to detect fair and wide deliveries with enhanced accuracy. This paper outlines the methodology, AI model architecture, and training process of CricJudge.

2. Dataset Collection

To construct a comprehensive dataset, extensive efforts were made to manually collect cricket match videos from various sources, including YouTube. The compiled dataset was subsequently uploaded to Kaggle for public access (https://www.kaggle.com/datasets/shujaanazhar/cricket-videos-of-legal-wide-lbw-and-no-balls).

3. Data Preprocessing

Before training the AI model, data preprocessing played a crucial role in optimizing the dataset. Augmentation techniques were applied to increase the dataset's diversity and improve model generalization. OpenCV was employed to extract frames from the collected videos, and the resulting images were divided into training and validation batches with a batch size of 32. The images were resized to dimensions of 224 x 224 x 3 to facilitate model compatibility.

4. AI Model Architecture

The AI model utilized in CricJudge is based on TensorFlow's ResNet50 architecture. To tailor the model for the specific task of detecting fair and wide deliveries, additional layers were introduced. The initial model architecture remained unchanged, ensuring a solid foundation for further enhancement. The added layers consisted of a Flatten layer, reshaping the dimensions to 1D, followed by two Dense layers with 512 and 2 nodes, employing the "relu" and "sigmoid" activation functions, respectively.

5. Training

CricJudge's AI model was trained using the Adam optimizer, and the loss function employed was "sparse_categorical_loss." The training process encompassed 10 epochs on both training and validation data. The achieved training accuracy was an impressive 96%, underscoring the effectiveness of CricJudge in identifying fair and wide deliveries.

6. Conclusion

The development of CricJudge, an AI Cricket Umpire prototype, represents a significant step forward in addressing potential human errors in umpiring decisions. The comprehensive dataset and optimized AI model architecture, combined with rigorous training, have resulted in a highly accurate system. CricJudge's potential to assist umpires and enhance decision-making in cricket matches is promising and warrants further exploration and refinement.