INFORMATICS INSTITUTE OF TECHNOLOGY

In Collaboration with

UNIVERSITY OF WESTMINSTER

Automate the third umpire decisions in Cricket

A dissertation by

Mr. Osura Perera

Supervised by

Mrs. Theja Perera

Submitted in partial fulfillment of the requirements for the BEng (Hons) Software Engineering degree at the University of Westminster.

May 2023

ABSTRACT

Cricket is a sport that has always relied on human decision-making, which sometimes leads to controversy due to errors or bias. Automating the third umpire decision-making system is a promising solution to improve the accuracy and fairness of decision-making in cricket. In this thesis, the author proposes a Convolutional Neural Network (CNN) model to identify different cricket bowlers based on their bowling actions using transfer learning. The model is trained on a dataset of 8100 images of eighteen different bowlers, and after trying different strategies, the best approach achieved an overall average accuracy of 93.3% on the test set. The system allows users to upload camera footage and receive automated decisions based on the identified bowlers, thus reducing the need for human intervention.

The proposed CNN model leverages transfer learning by using the pre-trained VGG16 model with ImageNet weights and adding a few layers on top of it. The model's performance is improved by freezing the weights for the first 14 layers and training the rest of the layers. The model's accuracy is further enhanced by data augmentation techniques such as rotation, zooming, and flipping. The model's architecture and training process are described in detail in the thesis.

The proposed system's test results show that the automated decision-making process is reliable and accurate. The system's performance is evaluated using metrics such as accuracy, precision, recall, and F1 score, and it outperforms existing manual decision-making processes. The proposed system can reduce errors and bias in decision-making, making cricket matches fairer and more transparent.

Keywords: cricket, third umpire decision-making, Convolutional Neural Network, accuracy.