

# No More Third Umpires

Alex Joseph<sup>1</sup>, Alistar Fernandez<sup>2</sup>, Jasir Ahamed P.A<sup>3</sup>, Treesa Joseph<sup>4</sup>

<sup>123</sup> B.Tech Student, Dept. of Computer Science Engineering, Sahrdaya College of Engineering & Technology, Kerala, India

<sup>4</sup> Assistant Professor, Dept. of Computer Science Engineering, Sahrdaya College of Engineering & Technology, Kerala, India

\*\*\*

**Abstract** – Cricket is a sport that is contested between two teams of eleven players. Apart from the players, the match is controlled by a team of officials, consisting of two on-field umpires and a third umpire. A third umpire is a crucial figure in the game of cricket. Many decisions that could potentially define a match are undertaken by these officials. Technology has been widely used in various aspects of the game to improve accuracy and maintain the integrity of the game. The proposed system evaluates a potentially ambiguous situation and produces the right decision without any aid from a human. Various image processing techniques, along with real time visual feed data are to be used to achieve this feat, since most decisions are only a case of millimetres which the human eye cannot distinguish. Apart from the existing system the advantage of the proposed system includes reduction of human intervention and automation of the existing system. The proposed system can replace the existing third umpire which is a human being. In cricket there may arise several controversies in the decisions taken by the on field umpires, therefore the review of the third umpire is always taken into account. The proposed system uses the image and video processing techniques to identify the cases in the field and thus processes the exact decision. The on field umpires can use this system rather than referring to a third umpire. The most important aspect of the proposed system is that exact and essential details about the decisions to be taken in the game of cricket can be done much easily. The decision making and the time consumption to make decisions are simplified with this system. The review system that exists in cricket can be benefited from the proposed project; the review option used by the teams can give better and fast results using this system.

**Key Words:** automatic, cricket, third umpire, tensorflow, image detection, no ball detection.

## 1. INTRODUCTION

Cricket is a game played between two teams of eleven players each on a cricket field. Each period of play is called an innings. During each innings one of the team bats while the other fields.

Prior to a match starts, the two group chiefs meet on the pitch for the hurl (of a coin) to figure out which group will bat first. Two batsmen and eleven defenders at that point enter the field and play starts when an individual from the handling group, known as the bowler,

conveys (i.e., bowls) the ball from one end of the pitch towards the wicket at the flip side, which is protected by one of the batsmen, known as the striker. Notwithstanding the bowler, the handling group incorporates the wicket-guardian, an authority who remains behind the striker's wicket. The nine different defenders are strategically sent around the field by their skipper, normally in meeting with the bowler. The striker "takes watch" on a wrinkle drawn on the contribute four feet front of the wicket. His part is to keep the ball from hitting the stumps by utilizing his bat and, all the while, to strike it alright to score runs. The other batsman, known as the non-striker, holds up at the inverse end of the pitch close to the bowler. The bowler's targets are to keep the scoring of runs and to reject the batsman. An expelled batsman, who is pronounced to be "out", must leave the field to be supplanted by a partner. An over is an arrangement of six conveyances knocked down some pins by a similar bowler. The following over is rocked the bowling alley from the flip side of the pitch by an alternate bowler.

In this paper, we have proposed a novel technology for cricket, which automates the role of the third umpire. By applying it to a set of autonomously-filmed videos, we could easily determine the results taken by a third umpire.

## 2. SYSTEM DESIGN

Design & Development is a process with a series of intermediate stages, each one with its own significance towards a successful outcome.

### BLOCK DIAGRAM

As shown in the block diagram, the basic design is done. The videos where processed in the beginning for the training and the images extracted where also processed using tensorflow.

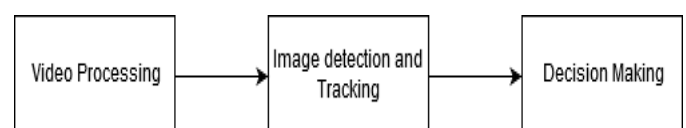


Figure 1. Block Diagram of proposed system

### 3. WORKING AND EXPERIMENTATION

#### a) Extraction of frames from videos

Different videos are collected which are fair deliveries and no balls. These videos need to be processed by the system. So these videos are converted into individual frames. The frames are generated per second. Each frame is then analysed and unwanted frames are removed. Images with actual importance to the system are only considered. The images are then sorted into fair deliveries and no balls and saved into folders.

#### b) Annotate the images to generate xml files.

The images generated from the previous step are annotated using the label-img software. A rectbox is created using the software and this rectbox is used to annotate the images. In this case the bowler along with the crease is annotated using the rectbox. Annotation of each image is carried out and xml files of each image is generated and stored in a location. In computing, Extensible Markup Language (XML) is a markup language that defines a set of rules for encoding documents in a format that is both human-readable and machine-readable. In our system the xml files consist of information such as name, x co-ordinates, y co-ordinates and other relevant information. The images along with the xml files are then sorted into train and test folders. The train folder contains 90 percent of the images and the xml files, whereas the test folder contains 10 percent of the images and the xml files. The xml files are then converted into csv files.

A CSV file is a comma separated values file. It is commonly used by spreadsheet programs such as Microsoft Excel or OpenOffice Calc. A CSV file contains plain text data sets separated by commas with each new line which represents a new database row and each database row consisting of one or more fields separated by a comma.

#### c) Generation of tfrecords

Tensorflow records is used to train the classifier by the tensorflow object detection api. The basic mechanism to create the tfrecord is as follows. To start an input pipeline, first define a source. For example, to construct a Dataset from some tensors in memory, we can use `tf.data.Dataset.from_tensors()` or `tf.data.Dataset.from_tensor_slices()`. Alternatively, if your input data are on disk in the recommended TFRecord format, you can construct a `tf.data.TFRecordDataset`.

#### d) Generation of the frozen model

The tfrecord generated from the previous step is used to finally generate the frozen model. Pascal label map text contains data and information such as item id and name. In this system two items are used so, an item for the

fair delivery and no ball is saved in the pascal label map text. This text along with the tfrecord is used to generate the frozen model. The frozen model inference graph is also generated along with this process.

#### e) Automated Decision Making System

The video to be tested is taken as input. The video is then analysed frame by frame which is then compared with the frozen model. The model then compares frame with the template frames and shows the result. The result is then displayed showing whether it's a no ball or a fair delivery.

### 4. RESULT

Our project has been successfully completed, with the following results, as shown in the screenshots .

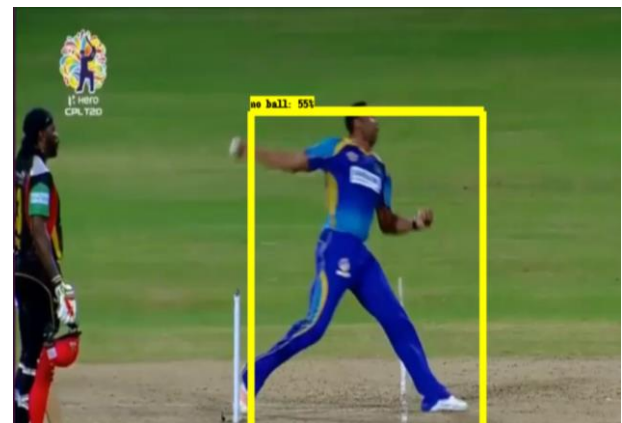


Figure 4. – Result showing identification of no ball



Figure 4. – Result showing identification of fail ball

### 5. CONCLUSION

Automation, or the more popular term, Artificial Intelligence seems to be the emerging field of study at this

moment. Everything's currently being automated, and everyone's trying to be a part of it. Sports are no exception to this, and they have also started to evolve with the blooming technological advancements that have taken place, especially in the last decade. The implementation of Goal-Line Technology in Football serves as a significant departure from the usual reluctance of sports authorities when it comes to making use of technology in sports. Everyone seems to be embracing this new and upcoming innovation, since it not only makes the game less error-prone but also helps in upholding the true integrity of the game. The "No More Third Umpires" could be yet another milestone in the international sports scene, as it would not only help the game of Cricket to be devoid of any form of corruption, while at the same time, encourage other sports to automate their functionalities.

## REFERENCES

- [1] Tariq Mahmood, Syed Obaid Ahmed , Muhmmad Hadi Swaleh ,Syed Hassan Nayyar , " An Eye: Automating the Role of Third Umpire in the Game of Cricket", Information science and Applications(ICISA), 2011 International Conference, South Korea.
- [2] Nikhil Batra, Harsh Gupta, Nakul Yadav, Anshika Gupta and Amita Yadav," Implementation of Augmented Reality in Cricketfor ball tracking and automated decision making for no ball", Avances in Computing, communication and Informatics (ICACCI), 2014 International Conference, New Delhi, India.
- [3] A Z M Ehtesham Chowdhary, Md Shamsur Rahim , Md Asif Ur Rahman , "Application of Computer Vision in Cricket: Foot overstep no-ball detection",ICEEICT, 2016 International Conference, Dhaka, Bangladesh .
- [4] Learning OpenCV: Computer Vision with the OpenCV Library By Gary Bradski, Adrian Kaehler
- [5] Core Python Programming, Volume 1 By Wesley Chun