

# OCR BASED PLAYER JERSEY NUMBER IDENTIFICATION FOR GENERATING COMMENTARY FROM VIDEO

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**Abstract:** Commentary is the explication of a particular game or an event. In cricket, the commentary plays an important role in entertaining the viewers. Without commentary the game won't be much effective. The system proposes a solution which is an AI based approach that generates play-by-play commentary and automated color commentary from any video clip given, by extracting different features. For generating color commentary the most important feature is the player identification using the jersey numbers. Using Optical Character Recognition and with the help of pattern matching algorithm the numbers are identified. The methodologies used for the system are video processing, Human detection, Player identification and jersey number identification, Construction of stories related to game and players, matching the identified player with the story constructed, and finally generating commentary.

**Keywords:** OCR, Pattern Matching Algorithm, Color commentary, Play-by-Play Commentary

## I. INTRODUCTION

In sports broadcasting, there are mainly two commentators. The primary commentator is the play-by-play commentator who describes what is happening in the game and he describes the live events like which all are the players and the scores scored by them etc. The commentator who speaks along with the play-by play commentator is the color commentator. The color commentator describes the background details of the players, team, the statistics etc. For generating the color commentary the player's jersey numbers are identified using optical character recognition. Optical Character Recognition (OCR) is the electronic translation of images into machine encoded text. Computer systems set with OCR system increases the rate of input process, reduce some human errors and facilitate compressed

space, speedy retrieval and other file manipulations. The variety of applications comprises postal code recognition, automatic data entry into large administrative systems, banking etc. Correctness, flexibility and speediness are the chief qualities that portray a good OCR system. Numerous algorithms for character recognition have been created based on selection of features. The functioning of the systems has been constrained by the dependency on font, size and orientation. Based on the choice of the features extracted the recognition rate is calculated. Different steps involve in generating commentary includes human detection, and player and team identification using OCR.

The necessity for commentary is generally to tot up color to the game and also to inform new fans about the facts of the game. It allows you to keep track of things you may not necessarily pay interest to, or the visual is not focusing on. It provides outlook. It provides humour. It can provide situation framework. It provides insights, often from experts. It also provides that human element company, while watching the sport. It provides soothe when we hear a recognizable and trusted voice. Audiences identify with these. As per today no automatic color commentary systems are existing for cricket. The computational intelligence based automated color commentary system is a new system which automates the task of color commentary and provides very accurate information for the commentators so that they will be able to perform well.

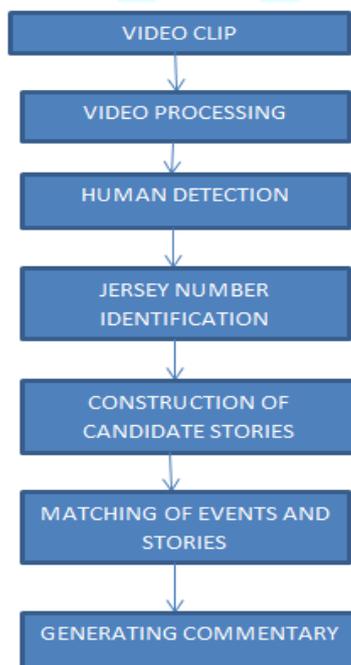
## II. RELATED WORKS

Numerous studies have been done to find out the implication of commentary during sports broadcasting. Ryan in 1993 put forward a method in which human commentator's attempts to merge a story with a coherent plot through unpredictable sports games. Plot is a complicated narrative measurement for the broadcast team, as they dont have an idea about the result at the end of the game. The three RoboCup simulation league

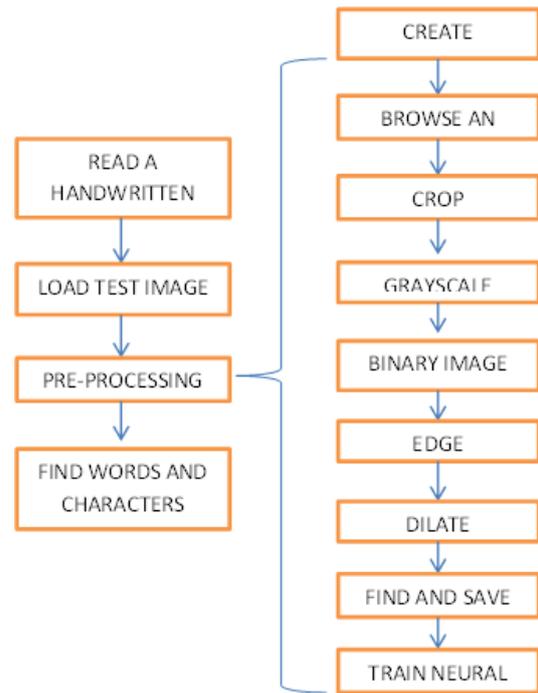
commentator systems are Rocco, Byrne and Mike. The Rocco commentator system is a recreation of an early research prototype called Soccer which was built in the late 80s for the automated interpretation and natural language description of time varying scenes.

Byrne can make use of any modular game analysis system as its contribution module. Sports commentary recommendation system (SCoReS) was able to attain significant improvements in overall enjoyment and rising interest in watching baseball. The system includes two types of stories. 1) Game story 2) candidate story. The game story includes different game states. Temporal Classification of Events in Cricket Videos segments a cricket video into shots and identifies the visual content in them. Using sequential pattern mining and support vector machine, the series of shots are classified into four events, namely run, four, six and out. The cricket video is then summarized based on some parameters. The performance and working of the system has been tested on numerous cricket video clips and has an accuracy of more than 87.8%.

### III DESIGN LAYOUT



This is the main design layout of the system. The video is processed and the humans are detected using Kalman filter. The Kalman filter algorithm helps to track moving objects. The design layout of OCR is given below:



### IV. PROPOSED SYSTEM

#### 4.1 OCR

The method for jersey number identification is based on diagonal pixel. In this approach the given image is resized into 90\*60 pixels and divided into 54 equal zones, each of size 10\*10 pixels. From each zone the features are extracted by moving along the diagonals. Since each zone is of 10\*10 pixel it will have 19 diagonal lines and the foreground pixels present long each diagonal line is summed to get a single sub-feature, thus 19 sub-features are obtained from the each zone. For each zone single features is identified by computing the average of these 19 sub-features. This procedure is sequentially repeated for all the zones. There could be some zones whose diagonals are empty of foreground pixels. The feature values corresponding to these zones are zero. So for each character 54 features are extracted. In addition to these 54 features 15 more are obtained by averaging the values placed in zones row wise and column wise, respectively as there are 9 row and 6 column zones. As result, every character is represented by 69, that is, 54 +15 features. The main functional modules in our OCR systems are:

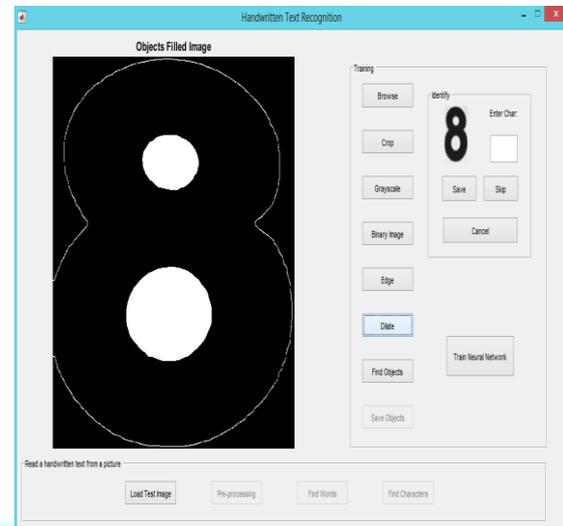
1. Browse: The function browse is to browse an image. This image is then pre-processed.
2. Crop: From the image previously loaded, crop the portion that has the jersey number. Here the aim of the system is to identify jersey numbers and then using the number, provide commentary for that person. The original image will be resized.
3. Grayscale: Grayscale images have many shades of gray. Grayscale images are the result

of measuring intensity of each pixel. For achieving accuracy input document should be gray scaled. The RGB image is converted into grayscale image.

4. The grayscale image is then converted into binary image. Im2bw produces binary images from indexed, intensity, or RGB images. To do this, it converts the input image to grayscale format (if it is not already an intensity image), and then converts this grayscale image to binary by thresholding. The output binary image BW has values of 0 (black) for all pixels in the input image with luminance less than level and 1 (white) for all other pixels.
5. Edge detection is the name for a set of mathematical methods which aim at identifying points in a digital image at which the image brightness changes sharply or, more formally, has discontinuities. The points at which image brightness changes sharply are typically organized into a set of curved line segments termed edges. Edge detection is a fundamental tool in image processing, machine vision and computer vision, particularly in the areas of feature detection and feature extraction. This detects the edge of the image.
6. Dilate: Dilating of an image includes image dilation and image filling. Dilation adds pixels to the boundaries of objects in an image. Number of pixels added to the objects from an image depends on the size and shape of the structuring element. Dilation doesn't necessarily mean the dilation of the holes. It contracts the holes. After detecting the edges, the edges are dilated.
7. Find objects: Finding objects include blob analysis and plotting the object location. The blob analysis is used to extract a portion from an image. To get the number of connected objects in the binary image, we got to use the bwlable so that we get to know how many number of letter present in the text. Now the important step is to calculate the region properties of the image by using the Regionprops. Regionprops measures a set of properties for each connected component (object) in the binary image.
8. Save objects: The character recognized is saved. In the identify box, enter the character recognized manually and then save the character. Likewise do it for all the jersey numbers identified during the play.
9. Reading a handwritten text from a picture: This phase includes another 4 steps. First one is loading a test image. This step involves loading a frame in the video. The second step is pre-processing. Here the loaded image is then pre-processed with the previously done steps. From this find words and characters.

10. Training the neural network: In this stage, the training images and the loaded images are matched using artificial neural network pattern matching.

So in this system the OCR is helpful in identifying the jersey numbers of players. Using the jersey number identification the commentary can be generated for players.



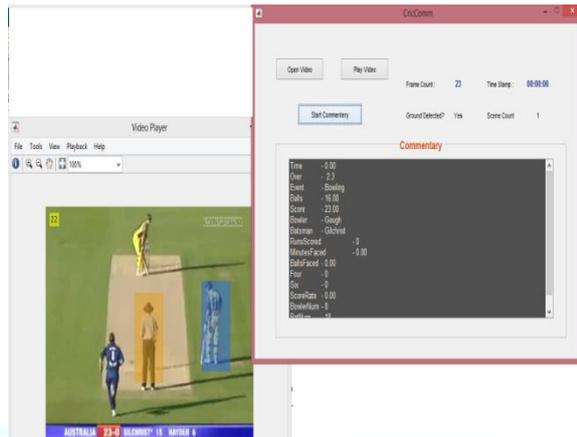
#### 4.2 Construction of Candidate stories

For each event, candidate stories can be prepared. The color commentary means providing background details. Different stories are built. Stories about the players, their batting averages, bowling averages, and the series played between different teams are collected as candidate stories. If the database is huge, many stories can be recorded so that color commentary can be generated for live cricket. Candidate stories for color commentary includes the player details, the number of matches the player had played, his ODI career, best scores. Like for play by play commentary automation is not possible while playing a video so from the video itself a general score updates, player statistics are generated.

#### 4.3 Matching of events and candidate stories

When a video is played, in each frame different objects will be there like players, umpire, bat, ball, stump, audience etc. So according to the video processing stage, from each frame the players are identified. With the OCR method the jersey numbers in the player's jersey is identified and the commentary is played regarding the matching of jersey number with the particular player. So color commentary will be automatically generated in each frame for particular players. When the frame is detecting ground or if the scene is regarding a ground view, at this time the color commentary about the series played between the teams, and some other general information's will be shown. After each over, the total score and the status of the

game will be displayed as play by play commentary. If a player is out, then the statistics of the player and the details regarding the out will be shown as commentary from the video being played. From a video identifying the events like toss, batting is difficult. So generating commentary is a huge task. So the only method to generate commentary is matching the features identified with the frame. Likewise for each frame the system generates commentary. The commentary will be generated in the form of text.



## V CONCLUSION AND FUTURE WORK

The system of automated storyline is computerized sports interpretation. To make the audience well-informed and entertain, sports commentary is needed. By conveying long stories properly throughout the match is one of the way through which one can entertain the onlookers. A system is build that can indorse stories automatically for interpreters to be told for the period of games. The stories would contain statistics and the data from the previous or earlier related games. This statistics would consist of data that match the present-day game statistics with the earlier game statistics, some associated facts about the players and teams involved. Beyond reporting the activities of the players as they occur, the play-by-play commentator typically comments such facts as the score of the game, upcoming batters and statistics for the teams and players involved in the game. Color commentary, on the other hand, is much more subjective and wide, with the purpose being to increase entertainment to the broadcast. To a realistic deployment, it would further improve the entertainment value of sports broadcasts. It also offers many possible future applications along the lines of fully automated commentary A larger story database for the system provide with more flexibility, making it more likely there is a story in the database relevant to each game situation

encountered. So with more good pattern matching algorithms the player identification using jersey numbers can be improved.

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