

Analysis of Speed Detection and Angle Detection of A Bowler

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Abstract- Now-a-days, Cricket is a very popular game worldwide. All players are having their own playing style and speed of bowling or hitting. In cricket, two factors are very important is angle at which ball is going to throw and speed at which ball will hit on bat. By using these two factors, we are able to calculate speed of bowling as well as to detect fake bowler. In order to calculate speed of bowling and angle analysis we develop an android application which will take image or video as an input and will calculate speed and detect fake bowler action using image processing. We are using camera of an android phone for capturing of video and we speed depend on distance between bowler and batsman and timestamp between bowling and hitting. By analyzing the elbow angle, we also detect that the bowler's action is fake or wrong. In order to achieve more accuracy, we can attach the external camera with high resolution.

Keywords:- Shot boundary detection, frame classification, Optical flow Analysis, Image Processing, Elbow angle analysis, bowling speed.

I. INTRODUCTION

Cricket is increasing to a greater extent, its popularity is been increasing day by day and it is most popular game in Asia and Subcontinent[1]. To calculate accurate speed of bowler with in stipulated time and to analyze the elbow angle for detection of fake or wrong action in bowling. The video is been captured by camera on basis of learning parameters which deals with small set. The captured video is divided into number of shots i.e. no of frames which are combined from the bowler's release point and point of contact for batsmen. The direction of the stroke is determined by optical flow analysis with an accuracy of 80 percent [3]. The main purpose of Project depicts in calculating the speed of the speed of the ball and the angle detection of the bowler. The video is being captured using a high definition camera. Basic main entity is frame where batsmen hits the ball. This is a critical part of the video and these are the scenes that a video summarization system may need to focus on [3]. Android phone is widely used because of its features like inbuilt camera, Computational ability, processing speed etc.

Researchers are using high speed motion cameras in recent year to evaluate scandalous bowling action. This

method has limitation including a high time commitment [4].The shots are labeled with the type of shot: glance left, glance right, left drive, right drive, left cut, right pull and straight drive. The method has the advantages that it is fast and avoids complex image segmentation[9].In order to achieve more accuracy, we can attach the external camera with high resolution.

II. COMPUTATIONAL TECHNIQUES

The computational techniques used for the implementation of the task are as listed being listed below:

- 1) BLOB ANALYSIS.
- 2) HSV MODEL.
- 3) COUNTER EXTRACTION.
- 4) EDGE DETECTION.
- 5) OPTICAL FLOW-SPEED DTECTION.
- 6) ANGLE CALCULATION.

A. BLOB ANALYSIS

Blob analysis is machine based technique where it is focused on a particular area. Where the object is distinctly visible from the background.

B. HSV MODEL

HSV is a color model.HSV stands for Hue, Saturation and value. It describes about brightness and shades. HSV is also known as HSB where, B stands for Brightness.

C. COUNTER EXTRACTION

Counter Extraction is used in open cv. It filters the noise to get better edge detection.

D. EDGE DETECTION

Edge detection is used to find the edge or boundary of object in a image. It works by detecting interruption in brightness of image.

E. OPTICAL FLOW-SPEED DTECTION

Optical flow or optic flow is the visual pattern that we experience in our day to day life. Optical flow is observed between moving scene and observer (an eye or a camera). Displacement vector shows the movement from first frame to second by 2D vector field. The pattern of ostensible motion of objects, surface and edges are caused by motion between an observer. Thus, this technique helps to find the optical flow-speed detection of a ball.

F. ANGLE CALCULATION

The technique used for angle calculation is the Hough transform. The broken or little distorted shapes are also being recognized by this technique. By using this technique a line can be represented in a parametric form.

III. PROJECTED SYSTEM ARCHITECTURE

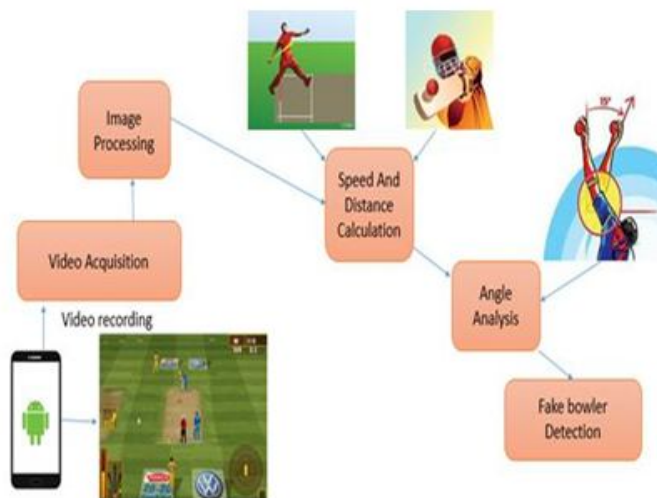


Fig. 1. Projected System Architecture

Usually in cricket bowling action is judged by on field umpires. Even though they may be suspicious action but may go un-noticeable by field umpire. In some instance it may go unnoticeable due to faster arm moment and visual limitation[4].

The main function of the proposed architecture is to calculate the speed and angle detection of the bowler, to analyze the elbow angle detection of fake or wrong bowling action. The video of bowler of bowler is being captured by an Android phone using a high definition camera. The minimum mega pixel required for capturing the video is 20mp. Image processing activity is being carried out on the captured video. The image is being divided into distinct frames. The speed of the bowler is being calculated using the frames per second method. The speed of the ball depends on two factors i.e distance between bowler and the batsman and the timestamp

between bowling and hitting. Hence in order to get accuracy, external camera with high resolution is being captured.

IV. WATERFALL MODEL

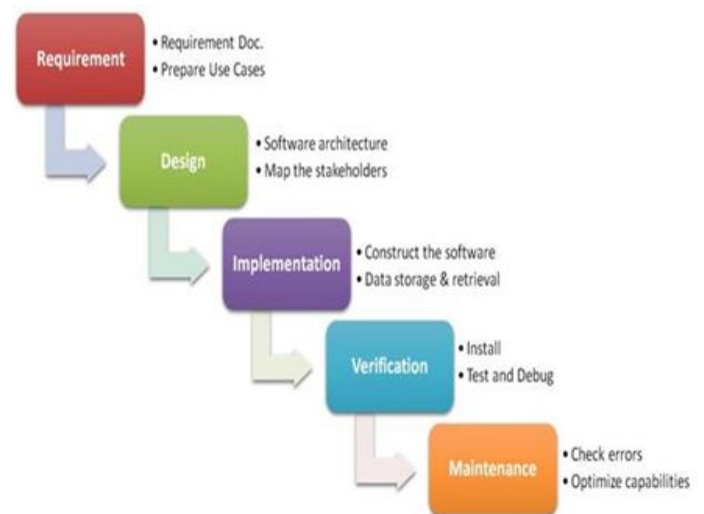


Fig.2. Waterfall Model

1) Communication:

In communication phase developer contact with the end user. Starting phase of project starts with communication.

2) Planning:

It includes cost estimation, schedule, risk in the project regarding voting application and mobile software toolkit application.

3) Modeling:

It includes detail requirement analysis and project design. Flowchart shows complete pictorial flow of program whereas algorithm is step by step solution of problem.

4) Construction:

Construction consist of two steps coding and testing:

• Coding:

Predicted design task is written in form of codes in a particular programming language.

• Testing:

It is carried out by analyzing the system i.e. we first develop the prototype of the system and step by step find

out input and output errors such as interface errors, performance errors, data structure errors, initialization errors etc. Therefore here Black Box testing strategy is useful.

5) Deployment:

It include support and customer feedback. Any modification required by customer is modified by software developer.

V. MATHEMATICAL MODULATION

Set Theory Analysis:

- a. Let 'S' be the | Cricket Speed and Angle Analysis as the final set
 $S = \{ \dots \dots \dots \}$
- b. Identify the inputs as I, T_R, T_H, A
 $S = \{I, T_R, T_H, A\}$
 $I = \{I1, I2, I3 \dots\}$ 'I' given Image
 $T_R = \{T_R1, T_R2, \dots\}$ 'T_R' gives the time at which bowl release }
 $T_H = \{T_H1, T_H2, T_H3, \dots\}$ 'E' gives the Time at which bowl hit to the bat }
 $A = \{A1, A2, A3 \dots\}$ 'A' given Angle of throw }
- c. Identify the outputs as O
 $S = \{SP, FB\}$
 $SP = \{SP1, SP2, SP3 \dots\}$ 'SP' given Speed of bowling }
 $FB = \{FB1, FB2, FB3 \dots\}$ 'FB' gives the Fake bowler detection }
- d. Identify the functions as 'F'
 $S = \{ \dots \}$
 $F = \{f1(), f2(), f3(), f4(), f5(), f6()\}$
 $F1(I) ::$ Image Analysis
 $F2(T_R) ::$ Get Time at which bowl release
 $F3(T_H) ::$ Get Time at which bowl hit to bat
 $F4(T_H, T_R) ::$ calculate distance speed
 $F5(A) ::$ Get angle of throw
 $F6(A) ::$ Fake Bowler detection

VI. CONCLUSION AND FUTURE SCOPE

As the IT field grows, its devices are becoming smaller in size and more efficient. Constantly new products are replaced by the older ones with their ability to improve the user's experience. Android phone is widely used because of its features like inbuilt camera, Computational ability, processing speed etc. Thus, it provides checking whether the bowler is fake or not depending on its action and angle of bowling and

analyzes the elbow angle for detection of fake or wrong action in bowling. We are using camera of an android phone for capturing of video and we speed depend on distance between bowler and batsman and timestamp between bowling and hitting.

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