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Umpire Decision Review System in Cricket

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Abstract- The Umpire Decision Review Method (UDRS) is a strategy used in cricket or any other sport to circumvent the on-field umpires' contentious decisions about ruling a batsman out or not (in cricket). The accuracy of UDRS comes to around 90%. It uses number of specific simulations such as Super Slow-Motion and other video replay etc. On-field Umpires, Batsmen, Fielding Captains and TV Umpires are instruments within a dynamic system of contact protocols. With the help of a live cam, the Third Umpire DRS will help the umpires evaluate the case and will allow him to use functions such as reviewing, pacing it quickly, pacing it slowly, and pacing it very slowly to help him determine the original decision's outcome. It will make decision making clearer and easier. It is cost effective, easily implemented and doesn't require any complex AI technology. We have plethora of investment made on UDRS in national international sport ventures which are complex in terms of their financial and technological capacity. Therefore, we wish to present this cost-effective system for grass root level matches such as the state and district level. This will not only improve decision making quality effective from the roots it will also give a technological exposer to the district and state- local games!

Keywords:- UDRS, cost effective DRS, enhancement of state-district level games, drs, third umpire, var technology.

I. INTRODUCTION

Umpire Decision Review System is basically the reviewing of the series of events that happen during a match that the umpire himself cannot foresee correctly and accurately so if any rash decisions are to be made the on-field umpire can ask to look at the recorded footage of the event and can make pinpoint accurate decisions that goes with the spirit of playing sports.

The second option is an opportunity granted to each of the teams for reviewing the decision on the on-field umpire if they are unsatisfied with the same and want to check for themselves. This option is only allowed once for each team and if the decision comes out in accordance of the on field umpire then that team loses its DRS and cannot further review any further decisions that are made by the umpire in

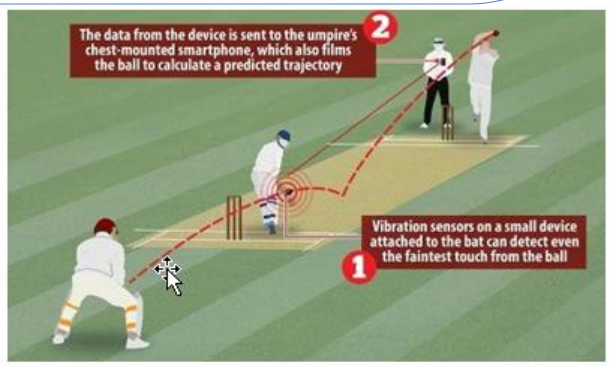

Fig 1. Decision reviewing.

II. HISTORY

A new Decision Review System was initiated by the Indian Test Series in Sri Lanka in July 2008. (DRS). Of the twelve decisions reversed in the context of the DRS, India served only one. Former India batsman Virender Sehwag (lbw) was the first decision reversed

there under the UDRSS in 2008. (as it was called then). In the Tests section of November 2009, the system was officially implemented. In July 2008, the Indian Test Series in Sri Lanka introduced a new Decision Review Framework. DRS of the twelve decisions overturned within the meaning of the DRS, only one served India. The first decision overturned under the UDRSS there in 2008 was former India batsman Virender Sehwag lbw. (as they called it then). The device was formally introduced in the testing portion of November 2009.

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The ICC concluded with one review per squad in February 2017 on the usage of all possible ICC World T20is events. The ICC Women's World Twenty20 2018 was the first T20 tournament to use the technique. It was used in Pakistan Super League 2017, which was the first time DRS was used in a T20 league, in the playoff round. In the India-Australia T20I series in October 2017, DRS was used in a Twenty20 International for the first time.

Under November 2017's revised ICC rules, after 80 overs in test matches, will no further be a top-up of feedback, and teams present will only have 2 failed evaluations per innings. However, players will no longer lose the appeal of an umpire's call for an LBW challenge.ii

When a team opts for DRS, what is the methodology for the umpires?

- To allow the third umpire to review the decision, the on umpire signals a mile area from a Television screen at the bowler's end. Until proceeding to evaluate the replays to make an lbw or spotted call, the third umpire first tests whether that's a true delivery.
- If the determined on-field umpire has issued the batsman out, after the third umpire transmits the order, he signals out. If the third umpire asks his on-field counterpart to reverse his incorrect decisions, he withdraws his initial ruling before signing off by rubbing the opposite hand on both shoulders.

III. LITERATURE REVIEW

In the game of cricket, an umpire is a designated authority on field who has the responsibility to make decisions on the field, as per the regulations of the game. A promising direction for study (and other related items in the sense of cricket) and techniques to further refine and anticipate multiple findings and decisions for the use of computer vision to define, locate and track the ball. Together with the various Machine Learning algorithms and techniques, using just one camera that can be of a quality comparable to everyday mobile-cellphone cameras will enable us to achieve a system that helps the umpire effectively and operates at a cheap cost.

This dissertation aims to produce a very cost effective and affordable computer mechanism that supports and facilitates the cricket umpire, runs at a low budget, has lower technical (software and hardware) requirements, and can be used in cricket tournaments at local district level, this indeed with train the network as well as improve the efficiency of the game from a grass root level.

1. Problem Formulation:

The preference of the match officials' rests on several variables including how the ball pitched, whether the batsman was in the crease or outside when the wickets were struck by the ball, and if the batsman proceeded to hit the ball. In India and many other countries around the world, the game of cricket is commonly played and followed. Millions of amateur and novice cricket players are engaged. But the exorbitant prices and quantity of technological specifications for tracking.

The use of innovations in any competitive matches, tournaments, and coaching academies other than those operating at international level is restricted. For these systems, quantum computing seems like a logical move. There are very few image recognition systems and algorithms that boost the low-cost operating expertise ofcricket, despite the success of computer vision technology in many other areas. The intention is therefore simply to use cameras as low resolution as mobile devices and use them to determine the performance of the following decision to be taken at lower cricket rates.

The review systems have always been a matter of dispute in the sports world. There are many who support the rules and decisions based on the review process while some disagree to them and say that it brings unfairness to the game, but regardless of the diversified views on the whole system "TV Umpiring" has made the game more easier and fairness is bought to the attention at a level which the onfield umpire is uncapabale to deliver.

2. Pros and Cons of the DRS:

When the Decision Review System initially came to existence the system was not so much of what BCCI wanted. The Board of Control for Cricket in India (BCCI) has ruled out the Decision Review System (DRS). There have been many occasions where people believe the umpire has made incorrect decisions, and the addition of DRS may be a solution to this issue.

DRS is a technology-based system that is solely developed to examine contested decisions taken by on-field umpires, most importantly whether or not a batsman has been dismissed. Some people support the scheme wholeheartedly, while others dismiss it as a mere gimmick.

The advantages of the system are as follows:

- **Rational Decisions:** Cricket is more just than a game in India. It's a belief system. Unfair and contentious decisions resulting from the inattentiveness of certain umpires at any given time will cost a team a match or a series if they play their hearts out. When you are safe but sent out, it discourages players and causes viewers to become enraged and anxious. DRS would make cricket more equitable.

- **Reduce Needless Aggression:** A bowler or batsman who is dissatisfied with the umpire's decision is likely to become aggressive and lose all control of the game. Between teams, there is an increasing sense of enmity and hate. This could be completely eliminated if DRS is given a prominent position, and either the bowler or the batsman may request a review if he isn't pleased.

- **An Extra Helping Hand:** Going upstairs any time there is a no ball is impractical, so an extra helping hand from technology that can explain after each ball may be beneficial to the on-field umpire. If there is a no ball and an appeal for out, the umpire is left to settle on his own, which can be challenging at times.

Now looking at the disadvantages:

- **Unreliable:** It has been proven time and time again that DRS technology, like every other technology, is not entirely accurate and has a variety of flaws. Previously, silicon tapes and ball trajectory were in use. Players have called it inaccurate, and audiences have discovered that the judgments have been tampered with on occasion.

- **Mistakes are unavoidable:** There will always be small flawsthat go overlooked by humans, and cricket is no exception. There is just a slight risk that the on-field umpire will produce an incorrect review, which the DRS is said to resolve. However, the contrast of error rates between the two has always favoured on- field umpires over technology.

- **Expensive:** The application of this technology is costly. It has been mentioned that the use of DRS in a single t match would cost a lot, and because all boards do not benefit from test cricket and ODIs, it would be difficult to afford it for all matches. What is more, it'll be a complete waste of money. The lesser level of tournaments doesn't even have a scope for its usage.

- **Disrespecting the on-field umpire:** If DRS is given a prominent position in cricket, the entire point of getting an on-field umpire will be quickly lost. None of the players would obey the umpire's decision, which is supposed to be the highest authority in this game. More significantly, the on-field umpire would be insulted if his decision is reversed repeatedly.

- **Limited Reviews:** It should be remembered that the DRS system must be held to a minimum, otherwise the players will be constantly requesting reviews, which will waste time. Giving just two reviews has an effect on the players since they are used early in the game, and later batsmen must live with the insecurity of not getting the upper hand.

Thus, this all results in a fact that use of technology makes the game better and has various advantages and has an upper hand but when it comes to cost and implementation of this at the lesser levels, the system fails.

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So the task is to make a decision review system that can be easily implemented on the lesser levels and which is cost effective and can be made to run with minimum requirements and boost the sporting spirit among the players and help the umpires make more accurate decisions.

3. Required Tools:

- Python
- Tkinter for GUI
- Pillow, opencv and imutils packages for python

3.1 Tkinter: "Tkinter is a de-facto standard GUI package for Pythons (Graphical User Interface). It is on top of Tcl/Tk, a thin object-oriented layer. TKinter is not the only Python toolkit for GuiProgramming. However, it is the most commonly used one. CameronLaird calls the annual decision to keep Tkinter "one of the minor traditions of the Python world." If you run python-m tkinter from the command prompt, it is important to open a window showing a simple Tk interface, letting you know that tkinter is correctly installed on your device, and also showing which version of Tcl/Tk is running''.

3.2 Open CV: (Open-Source Computer Vision Library) is a library of programming functions aimed specifically at real-time computer vision. Originally designed by Intel, it was later sponsored by Willow Garage and then Itseez (later acquired by Intel). The framework is cross-platform and free-to-use under the open-source Apache 2 License. For real time operations beginning in 2011, OpenCV features GPU acceleration.

Application areas foropen CV include:

- 2D and 3D feature toolkits
- Egomotion estimation
- Gesture recognition

3.3 Pillow: The Standard Python Library (abbreviated as PIL) (known in newer versions as Pillow) is an additional free and open-source Python programming language library that supports the opening, manipulation, and saving of several different image file formats.

There are Windows, Mac OS X and Linux available. "The most recent version of PIL is 1.1.7, which was released in September 2009 and supports Python 1.5.2-2.7, with "later" Python 3 support''.

3.4 Imultis: With Open CV and both Python 2.7 and Python 3, it is much simpler to detect contours, a variety of high - quality custom such as transcription, rotation, reformatting, image segmentation, view of Matplotlib images, sorting of basic image processing functions.

IV. COMPLETE PLAN WORKOUT

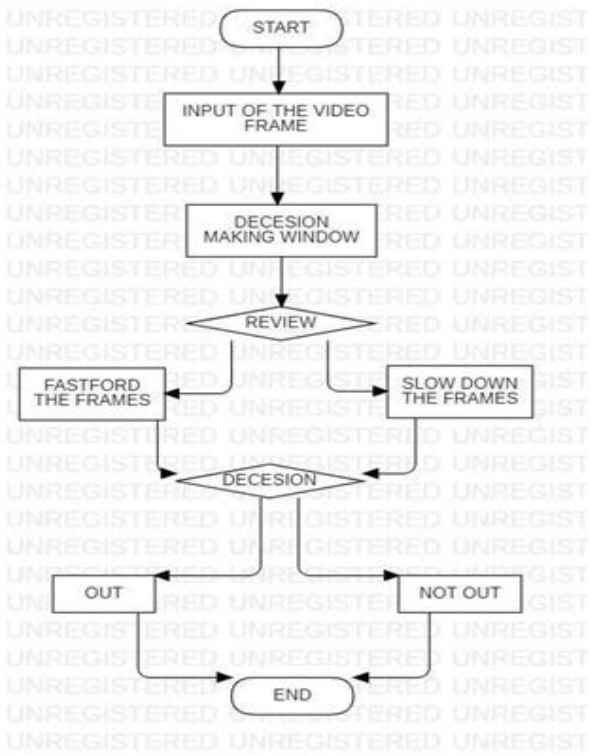

Fig 2. Working behind the software.

V. PROGRESS AND BRIEF LOOK

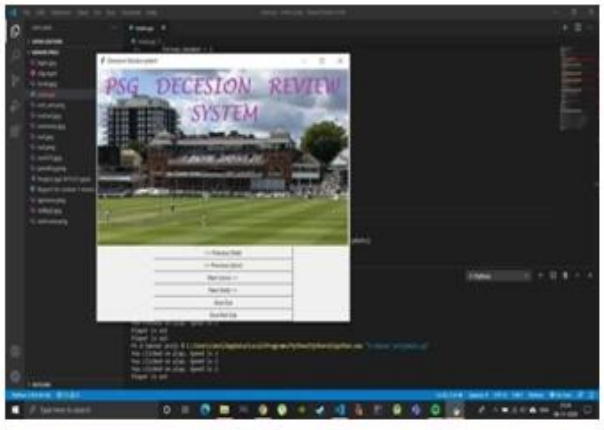

Fig 3. Look of sample software (Home)

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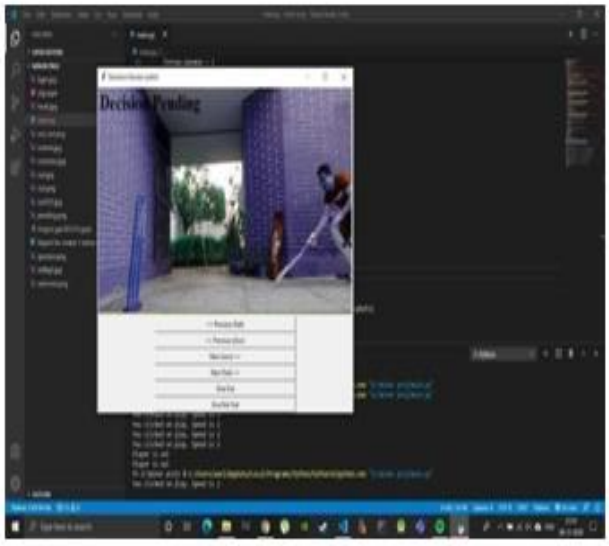

Fig 4.Look of sample software (review In process)

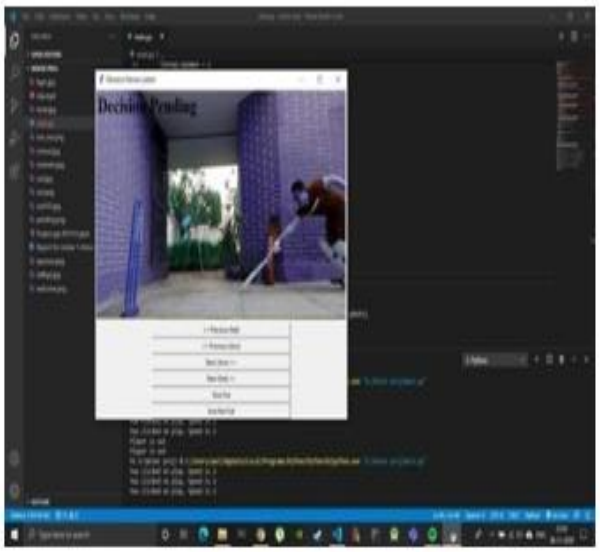

Fig 5.Look of sample software (pending decesion)

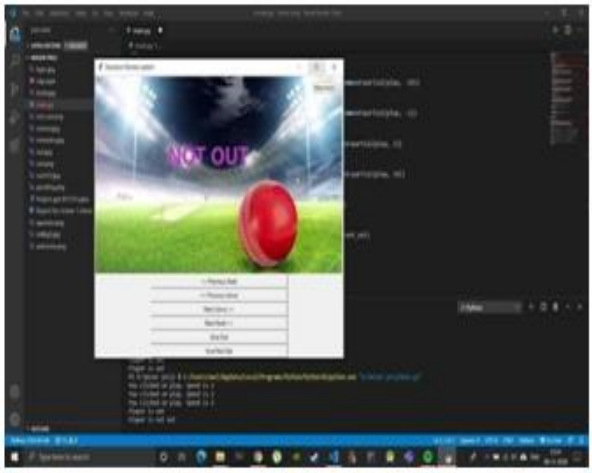

Fig 6.Look of sample software (showing decesion)

VI. APPLICATIONS

1. **Diversity:**
The diversified nature of the project inturn helps in using the software in every other sport rather than bound to a single sport(cricket).
2. **Small Scale Use:**
The technology can be used at small as a district and inter school competitions.
3. **Large Scale Use:**
The technology can be used at high level tournaments like inter-state competitions.
4. **Commercial Use:**
The software can be used as a source of income, as in between the decisions, a small time-break has also been added to show commercial advertisements, which intake can be a good source for gaining profit even at a small level of inter-school tournaments.

VII. SCOPE OF IMPROVEMENT

There is always space for improvement. In this project specifically, live feed of the instance can be fed through the camera as an input stream for the software and thus decisions can be carried out in an instance, for the live audience. Ultimately saving the precious time. This project is only a toddler and there will always be room of improvement, making it more efficient to ease the human efforts and make one's work effortless.

VIII. CONCLUSION

Counting semantic structure, cinematography, framing, iconography, focus management and feedback, there's quite a lot it takes when creating avery efficient third umpire review system so everything we've learned here will help us create a simple and very efficient DRS system applicable in a wide range of outdoor sports.

There is always that instinct of patriotism in sports with fair decisions at the lesser level of sports tournaments to be played and this DRS can provide them a very cost effective and quality decision review system that will boost up the game spirit of each and every player.
Without any fancy equipment and with the help of just a computer system and a camera this system can run efficiently, thus making it compatible for all scale tournaments. This project is only an infant and there

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is always room of improvement and modifications making it more ready to go out and rock the gully cricket world. DRS technologies have been associated generally with very costly applications.

Today the core technologies have evolved and the cost of equipments are going up dramatically due to the integration and the increasing processing power. Certain decision review systems are not so cost effective and highly unreliable as they consume too much data and are time consuming.

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