

International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 4, Issue 5, May 2024

Identify Cricket Shots using Machine Learning

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Abstract: Cricket shot detection is a game-changing technology that offers deep insights into player performance and match data, completely changing the way the sport is played. The main elements and importance of cricket shot detection systems are explored in this abstract. Using computer vision and machine learning techniques, the system examines video footage of cricket matches to accurately detect and classify every shot made by batsmen. Shot types (such as cover drive, pull, or leg glance), shot trajectories, and success rates are among the important data it retrieves. Numerous stakeholders in the cricketing ecosystem find diverse uses for cricket shot detection. It provides coaches and professional athletes with an unmatched post-match analysis tool that helps with strategic planning and performance enhancement. The method is used by team analysts to create winning strategies by gaining insight into opponents' shot patterns. Shot detection provides compelling visualizations and real-time shot labels in the broadcasting domain, enhancing the viewing experience. While talent scouts and cricket organizations use technology to find players and nurture talent, cricket enthusiasts profit from comprehensive shot data. This abstract highlight cricket shot detection's potential and adaptability, highlighting how it can revolutionize the cricket industry. Technology keeps improving the game, empowering players, and enthralling spectators with a deeper comprehension of the sport. Several sports have received a lot of attention and popularity recently. Many people were pining for live sports action during the height of the recent outbreak because there were no sporting activities. With millions of devoted fans who watch the games with emotion, cricket is one of the most respected sports in India. Enticed by the game, fans frequently conduct in-depth evaluations of certain players, focusing on their skills and shot choices. A greater number of people are interested in assessing players' performances in order to make wise choices for fantasy teams, especially in light of the popularity of fantasy leagues and related services. Automation presents a potential solution to the significantly time-consuming and manual process of detecting cricket batters' shots. In order to accomplish its goals, this study uses deep learning in the form of Convolutional Neural Networks (CNNs) to present an efficient method for evaluating cricket strokes

Keywords: Computer Vision, Cricket analysis, Machine Learning, LR, Video Processing, Image Classification, Feature Extraction, Shot recognition

I. INTRODUCTION

A significant technological development, cricket shot detection has completely changed the sport's environment by providing in-depth information on player performance and match analysis. This synopsis delves into the key elements and importance of cricket shot detection systems. Using computer vision and machine learning techniques, the system carefully examines video footage of cricket matches, accurately identifying and classifying every shot made by batsmen. It retrieves important data, including shot types (such as leg glance, pull, or cover drive), shot trajectory, and success rates. Cricket shot detection has a wide range of applications that affect many stakeholders in the cricket ecosystem. It offers a post-match analytical tool that is unmatched for coaches and professional athletes, enabling strategic planning and performance enhancement. Team analysts use the technique to learn about the shot patterns of their opponents and create winning plays. Shot detection enhances the broadcasting experience by providing interesting

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International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)

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visualizations and real-time shot labels. While talent scouts and cricket organizations use technology to find players and nurture talent, cricket enthusiasts profit from comprehensive shot data.

This synopsis highlights cricket shot detection's enormous potential and adaptability, highlighting its revolutionary position in the cricket community. As technology develops, it keeps improving the game, giving players more strength, and captivating spectators with its increased comprehension of the sport.

Throughout the Indian subcontinent, cricket is one of the most widely played and well-liked sports. Two teams compete in this intricate sport, where the winner of the toss decides which team will bat or bowl. Cricket's strategic and thrilling nature guarantees fairness without giving any team a major edge.

Since a game of cricket can go for several hours, players must possess strength, endurance, and resilience. In India, a great deal of people have intense passion for cricket. These die-hard supporters know everything there is to know about the sport and are well-versed in the latest technology developments in it.

Sr. No	Paper Name	Author Name	Description						
1.	CRICKETSHOT	Archit Semwal,	Accurately classifying different types of bat strokes						
	DETECTION FROM	Durgesh Mishra, Vineet	executed during a cricket match has perpetually posed a						
	VIDEOS.	Raj, Jayanta Sharma	challenging task in cataloging the sport of cricket.						
		and Ankush Mittal	Determining the specific shot played by a batsman in a						
			cricket match holds significant importance, representing						
			an area yet to be extensively explored in this domain.						
2.	Automatic Video	Solayman Hossain	Video summarization is a method aimed at shortening the						
	Summarization from	Emon, A.H.M Annur,	duration of a video by extracting essential segments from						
	Cricket Videos Using	Abir Hossain Xian,	lengthy content. Given the extended duration of many						
	Deep Learning	Kazi Mahia Sultana4	cricket matches, there's a preference among audiences for						
		and Shoeb Mohammad	condensed or summarized formats of these extensive						
		Shahriar	events.						
3.	Deep CNN based Data-	Muhammad Zeeshan	Cricket stands as one of the most prominent and widely						
	driven Recognition of	Khan, Muhammad A.	followed sports, particularly in the South Asian region.						
	Cricket Batting Shots.	Hassan, Ammarah	This research paper focuses on the identification and						
		Farooq	categorization of different batting shots observed in						
			cricket videos. The proposed approach relies on the						
			utilization of deep convolutional neural networks as the						
			underlying method.						
4.	Extraction of Strong and	Muhammad Arslan	Cricket, a globally renowned sport, has introduced several						
	Weak Regions of	Rauf, Haseeb Ahmad,	metrics aimed at aiding coaches and umpires in resolving						
	Cricket Batsman	CM Nadeem Faisal	critical issues. While various statistics such as strike rate,						
	through Text-		average, and ranking are employed to quantify players'						
	CommentaryAnalysis		performances, facilitate predictions, and optimize team						
			selection, there remains a lack of an effective method to						
_			assess a batsman's strengths and weaknesses in cricket						
э.	Improving Deep	Monamed AbdElhamid	Deep Learning, an integral aspect of artificial intelligence,						
	Learning Performance	Abbas, PhD	replicates the human brain's data processing mechanisms						
	USING Kandom Forest		to create models for various applications. This paper aims						
	Algorithm		low improve the performance of deep learning by						
(Algorium. Dandam Earast UTM	AbdElhomid Abb	Deep Learning is an artificial intelligence function that						
υ.	Cortical Learning		initiates the mechanisms of the human mind in processing						
	Algorithm		records and developing shape to boused in selection						
0.	Cortical Learning Algorithm		imitates the mechanisms of the human mind in processing records and developing shapes to be used in selection						

II. RELATED WORK -

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performance of the deep learning using a proposed algorithm called RFHTMC.		construction	The	obje	ctive	of the pap	er is to	im	prove the
algorithm called RFHTMC.		performance	of	the	deep	learning	using	а	proposed
		algorithm called RFHTMC.							

III. PROBLEM STATEMENT

In recent years, several sports have gained more popularity and attention. Numerous people were hankering to watch some sporting event because there was no sporting event during the current pandemic. Cricket is without a doubt one of the most popular sports in India, with millions of devoted fans

IV. ALGORITHMS

4.1 Logistic Regression

One of the algorithms that is most used in binary classification situations is logistic regression. It uses a sigmoid function to build a probability model for a result, and gradient descent is used to adjust parameters. These parameters produce a decision boundary that defines class boundaries inside the feature space. Regularization procedures are used to stop overfitting. Applications for it are numerous and include everything from illness prediction to credit rating. Logistic regression may have drawbacks when applied to non-linear datasets since it assumes a linear relationship between the variables and the log-odds of the result. Methods of regularization are used to address this. Multinomial Logistic Regression and Ordinal Logistic Regression are two examples of extensions of logistic regression that address multi-class and ordered categorical problems, respectively.In statistics and machine learning, logistic regression is a statistical method that is primarily used for binary classification tasks. Its main purpose is to use one or more predictor variables to estimate the likelihood or probability of a binary outcome. Building an adequate model for logistic regression requires handling categorical variables, choosing relevant features, and preprocessing data.

V. ARCHITECTURE DIAGRAM

These diagrams offer a top-level perspective, illustrating various components and their interconnections to showcase the system's structure and operations. They play a pivotal role throughout the system's lifecycle, aiding in design, development, and maintenance phases. Additionally, they assist in strategic planning, effective communication, informed decision-making, and ensuring a shared comprehension of the system's architecture among all stakeholders.



Figure: Architecture Diagram

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VI. RESULTS & DISCUSSIONS

Our novel approach utilizing a dual-stage system has yielded highly promising outcomes in the identification of Cricket Shots, boasting accuracies reaching up to 95%. Upon scrutinizing related works within this domain, notable disparities in both implementation and performance have surfaced. Notably, our methodology exhibits a stark divergence in efficacy and precision.

Moreover, our system stands poised to serve as a dependable real-time sports application for players specializing in cricket. This application offers an invaluable teaching tool, affording players practical exposure and hands-on experience in identifying variouscricket shots. The system should be capable of real-time shot detection, making it suitable for live cricket broadcasts and immediate analysis. This enhances the viewing experience and provides valuable insights to sports analysts.

Result Parameters:

Classification measure

The following parameters help better understand and analyze the Model

a. Accuracy:

$$Accuracy = \frac{TP + TN}{TP + TN + FP + FP} = \frac{Correct \ predictions}{Total \ predictions}$$

b. Precision:

$$Precision = rac{TP}{TP + FP} = rac{Predictions \ actually \ positive}{Total \ predicted \ positive}$$

c. Recall (TPR, sensitivity): It is calculated as:

$$Recall = rac{TP}{TP + TN} = rac{Predictions \ actually \ positive}{Total \ actual \ positive}$$



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ISSN (Online) 2581-9429



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VII. EXPERIMENTAL RESULTS





Analysis Using Confusion Matrix:



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VIII. CONCLUSION

This research paper's methodology presents an automated system for evaluating cricket strokes that makes use of deep learning techniques to provide noticeably better outcomes. This method processes the video data of every cricket shot made by integrating Linear Regression (LR). A dataset consisting of multiple unique batsman shots is used to train the LR model. Before the processed photos are entered into the LR model for training, the dataset is first preprocessed and then normalized. After training, the model is tested using preprocessed and normalized input films that have not been subjected to LR detection beforehand. Cricket shot classification is carried out efficiently by using a decision-making procedure to assess the results.

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