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AN INTERACTIVE APPROACH TO IDENTIFY CRICKET SHOTS THROUGH DEEP LEARNING MECHANISM

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ABSTRACT

Numerous sports have attracted a lot of interest and popularity recently. The absence of any sporting activities throughout the height of the current outbreak had caused a sizable number of people to crave to see some game being played. In India, cricket is undoubtedly the most well-liked sport, with millions of fans who passionately follow the matches. As a result of their intense interest in the game, fans analysis each player's skills in great detail, especially their shot selection. The popularity of fantasy leagues and other services of a similar nature has increased interest in assessing players so that they might be chosen for their teams. The manual process for identifying better shots is one of the most time-consuming.

KEYWORDS:- Image Normalization, Convolutional Neural Networks, Cricket Shot Identification, Sports analytics, T20 cricket, Region wise strike rate.

Introduction

Cricket is one of the most common and highly popular game being played in the Indian subcontinent. Cricket is complex game that is played between two teams. These teams have to go through a toss to decide their play, if it is batting or bowling. The game of cricket is exhilarating and quite strategic in nature. This allows the game to be fairer without any significant advantage to a particular team throughout. The game of cricket can go on for several hours testing the player's strength, endurance and resilience. A large number of Indians are fanatical about the game of cricket. These fans are extremely into the game and are well aware of the technological advancements that have been happening in this space.

There have been improved usages of the advances in technology that have been crucial in the development of effective methodologies that have been crucial in the enhancement of the sport and its experience to the players as well as the audience as a whole. This is an effective strategy to allow for the game to evolve and become better over the years.

Literature

Classifying various type of bat strokes played in a cricket match has always been an arduous undertaking while indexing the cricket sport. Identifying the type of shot played by the batsman in a cricket match is a substantial aspect as well as one of the unplumbed subjects in this domain. This paper proposes a novel scheme to recognize and classify different types of bat shots played in cricket. The model relies on the state of the art techniques like saliency and optical flow to bring out static and dynamic cues and on Deep Convolutional Neural Networks (DCNN) for extracting representations. Moreover, a completely new dataset of 2000 images, has been trained to evaluate the performance of the proposed framework. The model achieves an accuracy of 83.098% for three classes of right-handed shots.

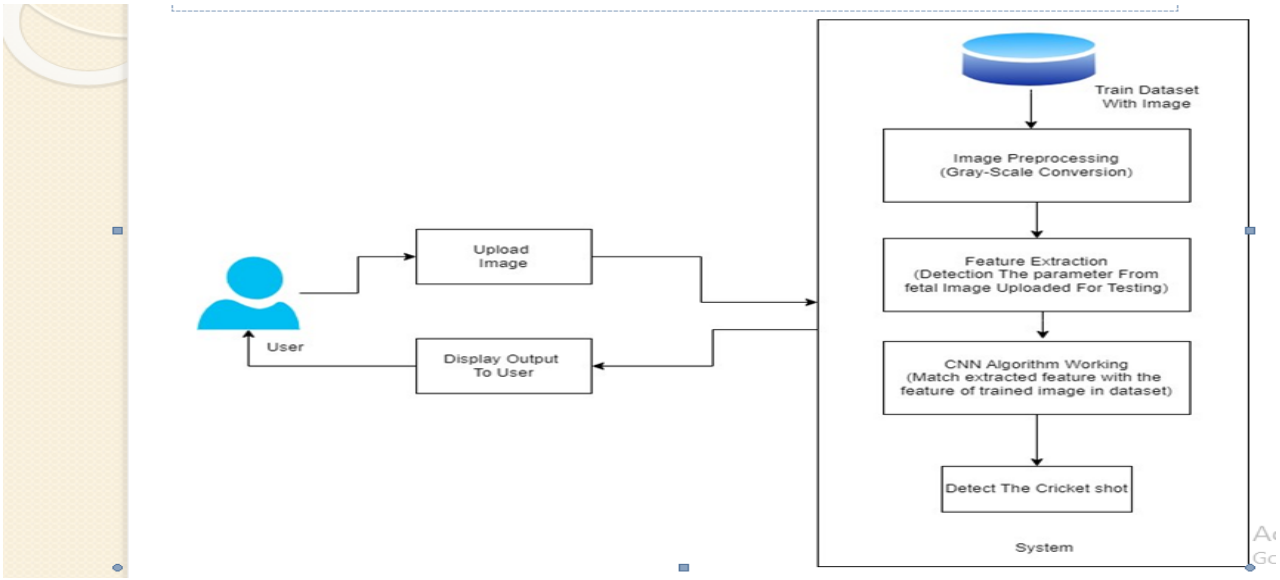
With the advancements in hardware technology and deep learning methodologies, it is now possible to apply these methodologies across a variety of fields. Convolutional Neural Network An architecture from the deep learning field called (CNN) transformed Computer Vision. Sports is one of the avenues where computer vision is widely used. A cricket complex game consisting of different types of shots, bowling acts and numerous other things. Every bowler, in a game of Cricket uses a unique bowling motion. We leverage this point to identify different bowlers. this document, we have suggested a CNN model to distinguish between eighteen utilizing transfer to analysis the bowling movements of cricket bowlers learning. In addition, we developed a brand-new dataset with 8100 photos of cricketers bowling evaluate the performance of the suggested framework after training. We used the pre trained Image net based VGG16 model.built our model by adding a few layers to the dataset.

Currently, deep neural networks (DNNs) are widely employed in a variety of artificial intelligence (AI) applications, such as robotics, speech recognition, and computer vision. While DNNs do many AI tasks with the highest possible accuracy, they also have a significant computational complexity. To enable the widespread adoption of DNNs in AI systems, approaches that enable fast processing of deep neural networks are essential. These techniques must do so without compromising performance accuracy or driving up hardware costs. In order to make DNN processing more effective, this article intends to provide a thorough tutorial and assessment of current developments. In particular, it will give a general introduction of DNNs, talk about various platforms and architectures that support DNNs, and highlight significant developments in current effective processing.

D. Tang introduce the Hybridized Hierarchical Deep Convolutional Neural Network that has been designed to improve picture segmentation accuracy in sports athletics exercise rehabilitation. In the convolutional neural network, designing an image segmentation technique to sample the multi-layer convolution output. The image may be segmented into several super pixels using a super pixel segmentation technique. The classifier is trained to use the hierarchical characteristics of the super pixels, and the classification results are transferred to the pixel. Finally, a random field method with paired potential energy and one potential energy is available for a completely linked layer.

It was expected that fine-tuning a pre-trained CNN model will beat prior PLS accuracy findings, especially for GRMs with higher noise and non-linearity. R. Ji investigates basketball shooting gesture recognition. In the realm of machine vision, human motion tracking and posture recovery have several applications. However, because of the inherent variability of human posture, the dimensionality of the observation data space is too large, the expression of human video image features is complex, and the influence of different experimental environments, etc., human motion tracking remains an unsolved urgent need in the field of machine vision. In light of the aforementioned issues, this research begins with the active principle of basketball shooting and then goes on to explain the research's history, motivations, and present state.

SYSTEM ARCHITECTURE



Step 1: Preprocessing – The proposed model for Cricket shot identification and analysis utilized a dataset that is generated manually for this purpose. The dataset generation process was downloading dataset of images from kaggle pertaining to those shots. The proposed approach is defined to identify 4 different types of shots. Among those shots are the Cover Drive, Pull Shot, Legglance flick, sweep shot from both left and right handed batsmen. The collected images are effectively preprocessed and the frames containing the shot are extracted. The resultant dataset is achieved consisting of 2000 images of various shot types which are segregated equally into training and testing directories utilized in the next step of the methodology.

Step 2: Image Normalization – Before beginning of the training, the cricket shot images are resized to the dimension of 64X64. In this phase of the proposed approach, an ImageDataGenerator object is built utilizing the ratio 1/255 and the libraries TensorFlow and Keras for detailed evaluation. This protocol is used to initiate training and testing on cricket shot images. The ImageDataGenerator object is initialized using characteristics such as training and testing folder locations, batch size of 500 images, and categorical class mode with grayscale as the color mode.

Step 3: Training with Convolutional Neural Network – The Sequential class of the TensorFlow package is used to create a sequential neural network architecture. After that, as the very first layer of the Neural Network only for corresponding dimension of the pictures, a convolution layer with 32 kernels of size 3 X 3 is inserted with “ReLU" activation function. After that, an additional Convolution layer with 64 kernels of size 3 X 3 and the "ReLU" activation function is introduced. A maximum pooling layer of size 2 X 2 with a dropout rate of 25% is established.

Step 4: Testing through Decision Making- The saved trained model data in h5 file format is loaded into the testing image neural network object during the testing procedure. Integer predictions are made using this information. The dictionary of classes recognizes the cricket shot predicated on the integer index and displays it together with the assessment to the user.

METHODOLOGY

- CNN Algorithm: – A Convolutional Neural Network (CNN) is a type of deep learning model that is primarily used for image recognition and classification tasks. It consists of multiple layers, including convolutional layers, pooling layers, and fully connected layers. Convolutional layers are responsible for identifying the features of the image by applying a series of filters or kernels to the input image. Pooling layers are then used to reduce the size of the feature maps and to make the model more efficient. Finally, fully connected layers are used to classify the image based on the features that were identified by the convolutional and pooling layers.

- The architecture of a ConvNet is analogous to that of the connectivity pattern of Neurons in the Human Brain and was inspired by the organization of the Visual Cortex. Individual neurons respond to stimuli only in a restricted region of the visual field known as the Receptive Field. A collection of such fields overlap to cover the entire visual area.

RESULT

The suggested approach for Cricket Shot identification and analysis is written in the Python programming language on a Windows-based workstation. The Spyder IDE is used for coding this strategy. The deployment machine features an Intel Core i7 CPU, 16GB of RAM, and a 1TB hard drive. For a successful deployment of the Convolution neural Network, the reliability of the Cricket shot recognition and analysis technique must be evaluated. This method uses a picture containing one of the four distinct sorts of cricket shots from right handed batsman as input shown in the below result.

CONCLUSION

The process described in this research paper proposes a technique for automatically analyzing cricket shots that uses deep learning strategies to reach a significantly better result. Convolutional Neural Networks are used in the described technique to utilize the video input of each cricket shot being played. A dataset of numerous distinct shots performed by a batsman is used to train the CNN model. The dataset is first preprocessed, and the preprocessed pictures are then normalized before being fed into the CNN model for training. Once the trained model is complete, it is utilized to do the testing utilizing input video that has been adequately preprocessed and normalized without first being exposed to CNN detection. To perform the cricket shot assessment, the results are efficiently categorized utilizing the decision-making process. The outcomes achieved by the prescribed approach are outlined in the research article in the results and discussion sections. The results have demonstrated the superiority of the proposed approach.

FUTURE SCOPE

The future scope for this project is really wide. It can be scaled well to predict many other different types of shots and the accuracy of the shots can also be displayed. Additionally, creation of an application that has the functionality of performing all the tasks can also be done.

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