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An Interactive Approach to Identify Cricket Batting Shots through Deep Learning Mechanism

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Abstract: *In recent years, a variety of sporting activities have seen increases in both participation and media coverage. Because there had been no sporting events during the worst of the current outbreak, several people had a tremendous urge to witness a game that was being played. Cricket is, without a shadow of a doubt, the most popular sport in India, attracting millions upon millions of devoted viewers to its matches. Due to the fact that they are so emotionally immersed in the game, spectators meticulously evaluate the skills of each player, notably the latter's capacity to select their shots. Because fantasy leagues and other services of a comparable nature are becoming increasingly popular, there has been a rise in the number of people interested in evaluating players for the purpose of selecting them for teams. The determination of batter shots is one of the manual processes that requires the biggest amount of time as well as cumbersome processes. Hence, in this paper, we have pro-posed layered Convolutional Neural Network referred as "Shot-Net" in order to classifying four categories of cricket shots, namely Cover Drive, Sweep shot, Pull Shot, Reverse Shot. Our proposed model has achieved fairly high accuracy with low cross-entropy rate till now.*

Keywords: cricket, Convolutional Neural Network, batting, Cricket shot classification, Deep Learning.

I. INTRODUCTION

Cricket is one of the most exciting games in the world especially in India, batting is the ability ofhitting the cricket ball with a cricket bat perfectly, and there are different kinds of cricketshots. Batsmen have to accommodate to various conditions when playing on different cricket pitches with different environment, especially in different countries therefore, as well as having distinguished physical batting skills, top-level batsmen will have thunder reflexaction, excellent decision making and be good strategists.

Technology has improved sports and spectator experiences. It improves the game. Technicalities have also enabled effective rule application and player analysis. This optimizes performance control and fine-tuning.

Internet photographs and videos have broadened scientific research and ideas. Sports analysis is comprehensive. Cricket, one of the world's most popular sports, is widely covered on television and other media platforms, including camera motion views, events, and reviews. Indexing cricket strokes requires tough categorization.

Batter improvement and stroke restriction require shot detection. Cricket shots are hard to distinguish due to inadequate signal and characteristic extraction data frames. Hence, real-time cricket shot recognition is needed.

Abbreviations and Acronyms

- ML: Machine Learning
- CNN: Convolutional Neural Networks
- DL: Deep Learning

Algorithms

Algorithm for Identification of Cricket Batting Shot:

- Input Cricket Shot Live Video.
- Cricket Shot Image Preprocessing and Feature Extraction

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- Model Development
- Model Evaluation
- Model Deployment

Deep Learning Mechanism:

Deep learning (DL) refers to sophisticated scientific ideas and artificial intelligence (AI) methods. With the constant expansion of digital information that is sent throughout cyberspace, deep learning continues to develop. You can learn more and work in the field of artificial intelligence by specialising in deep learning. In this article, we explore the concept of deep learning in artificial intelligence and give examples of its application to process enhancement and problem-solving.

Advantages:

- There Is No Need to Label the Data.
- Effective at Producing High-Quality Results.
- The Cost-Effectiveness.
- Deep Learning Is Supported in Both Parallel and Distributed Modes.

Disadvantages:

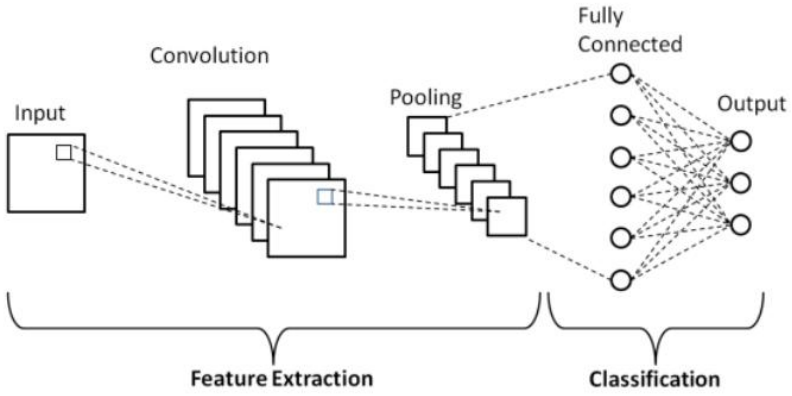
- Massive Data Requirement.
- High Processing Power.
- Struggles With Real-Life Data.
- Black Box Problem.

II. ALGORITHM

CNN Convolutional Neural Networks

A subclass of neural networks called convolutional neural networks have demonstrated to be particularly successful in areas like photo categorization and identification. One or more convolutional layers are followed by one or more fully connected layers in a conventional multilayer neural network.

Neural networks are layers of nodes, just as the human brain is made up of neurons. Layer nodes that are close by to one another are connected. How deep a network is regarded depends on how many layers it has. A single neuron in the human brain receives hundreds of signals from other neurons. In an artificial neural network, signals travel between nodes and apply complementary weights. A node with a higher weight will have a greater impact on the node after it.



Advantages of CNN:

- Efficient image processing and accurate at image recognition.
- Accuracy rates is high.

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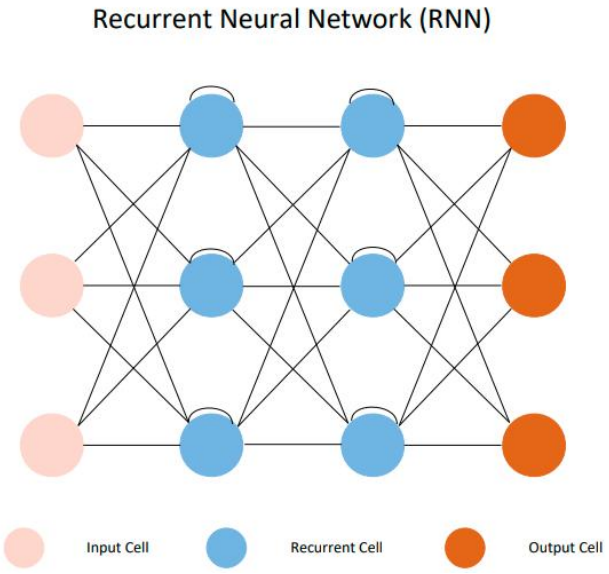
Disadvantages:

- It is slower due to an operation such as maxpool.
- Requires a large Dataset to process and train the neural network.

RNN Recurrent Neural Networks

An artificial neural network called a recurrent neural network (RNN) employs one time series of data or sequential input.. Well-known software like Siri, voice search, and Google Translate use these deep learning techniques. They are frequently used for ordinal or temporal problems in speech recognition, image captioning, and natural language processing (NLP). Recurrent neural networks (RNNs), like feedforward and convolutional neural networks (CNNs), use training data to learn. They can be recognized by their "memory" since it allows them to modify the current input and output using information from past inputs. In contrast to standard deep neural networks, which assume that inputs and outputs are independent of one another, recurrent neural networks' outputs are dependent on the previous components in the sequence.



Architecture of CNN

This layer is fundamental process where we have to choose filter as we have done in the past they have chosen filter 2 × 2, 3 × 3 filters are chosen and it will convolve over the input image. Scanning the pixel is what is called convolving we will roll over the input image and will create and extract the feature map each feature belongs to some class/category and the filter essentially does the hovering work. and that's called convolve. Now include the activation functions.

Second Layer : Pooling Layer (Down Sampling / Sub Sampling)

Suppose there are 20 pixels now we need to reduce /shrink it further so I go with max pooling where we can make it 10 x 10 what did we do ?now We essentially reduced no. of pixels and we down sampled that is what is done after the convolution and that is called pooling layer. We can repeat the pooling layer based on how many layers that we want in our model that we are developing and there is no restriction to it.

Third Layer : Flattering Layer

We are going to flatter means that the Output from previous layers are flattened to single vector which are going to be input for next layer.

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Fourth Layer : First Fully Connected Layer
It's very essential layer which takes input from features analysis and appeal weight to anticipate correct labels.

Fifth Layer : Fully Connected Layer
Here in this layer we completely get the output i.e. is it medicinal leaf or Non medicinal leaf, is it orange or apple etc. that's being done in this layer.

III. CONCLUSION

This research paper provides a method for automatically evaluating cricket shots that makes use of deep learning algorithms in order to achieve a considerably better outcome. This method is explained as a process that can be found in this research article. In the method that has been discussed, Convolutional Neural Networks are utilized in order to make use of the video input of each cricket shot that is being played. For the training of the CNN model, a dataset consisting of a variety of different shots taken by a batter was used. Before feeding the dataset into the CNN model for training, it must first be pre-processed, and then each of the images from the pre-processed dataset must be normalized. After the training of the model has been finished, it is put to use to perform testing on input video that has been properly pre-processed and normalized without first being subjected to CNN detection. This is done using the model. In order to effectively complete the cricket shot assessment, the findings must first be categorized in an efficient manner using the decision-making process

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