Detailed Project Proposal

Cricket Shot Classification Using Deep Learning

Student Name:

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Course:

Supervised by:

Type Of Proposal: Research

# Introduction

Cricket is a sport that is famous worldwide with multiple countries participating in it every year. There are multiple variations of shots that a player can play in each turn. By using the power of deep learning and computer vision (*Computer vision in sports: applications and challenges*, no date), a deep learning system can be trained to classify the kind of shot a player played. This research explores the dataset curated on the open-source website Kaggle. This dataset will be augmented (Sharma, 2021) to increase the number of records. To conduct this research two frameworks PyTorch (Simplilearn, 2021) and TensorFlow (Banoula, 2020) will be used and to construct and train the models.

# Problem Statement

Although there are advanced computer science techniques being used in cricket right now, the power of ML and AI are not yet fully being utilized. A main challenge is that each player has his own unique posture and style of playing a certain shot. Existing methods for this classification is manual where a person manually looks at the shot and labels it based on the domain knowledge. This information is then used to calculate the user statistics. This process can be automated using a well-built machine learning system, to not only save time but to increase the use of AI in this sport.

# Research Question

* What is the comparative performance of Pytorch and TensorFlow in terms of training time, accuracy, precision, and F1 score when classifying different cricket shots from image data?

# Aim

The aim of this project is to develop a highly accurate DL system to identify cricket shots from images. This system is then integrated to Streamlit for easy access and labelling.

# Objectives

* To clean and preprocess the cricket shots dataset for training a DL model.
* To implement model a deep learning model development using two frameworks PyTorch and TensorFlow.
* To compare these models based on multiple metrics like speed, accuracy, precision and f1 score.
* To evaluate the performance of this system on real life data.

# Methodology

1. Data Preparation: the first step of this research is to augment the dataset available on [Kaggle](https://www.kaggle.com/datasets/aneesh10/cricket-shot-dataset), pre-process this dataset to make it more suitable for model training and development.
2. Model Development: Implement a Convolution Neural Network using two frameworks PyTorch and TensorFlow. Try multiple architectures of neural networks and find one that suits the complexity of the data.
3. Training and Validation: Training the models using performance metrics like accuracy and precision. And then perform hyperparameter tuning to optimize the performance of the model even more.
4. Web Application: Create a locally deployed web application using a framework called Streamlit that allows users to upload the images of different shots and then use the trained model to predict and label the images.

# Conclusion

This research project mainly aims to advance the use of AI and machine learning in the field of sports especially cricket. By comparing two different frameworks, more insights can be gained. Though this project only focuses on trying to predict the types of cricket shots from images, in further research it has the potential to do this using a video input or even live streaming. The hardware and software requirements may be increased but there is high scope of research in this area.

# References

Banoula, M. (2020) *What is TensorFlow? Deep learning libraries and program elements explained*, *Simplilearn.com*. Simplilearn. Available at: https://www.simplilearn.com/tutorials/deep-learning-tutorial/what-is-tensorflow (Accessed: June 8, 2024).

*Computer vision in sports: applications and challenges* (no date) *Superannotate.com*. Available at: https://www.superannotate.com/blog/computer-vision-in-sports (Accessed: June 8, 2024).

Sharma, G. (2021) *Image classification with tensorflow: Data augmentation on streaming data (part 2)*, *Analytics Vidhya*. Available at: https://www.analyticsvidhya.com/blog/2021/05/image-classification-with-tensorflow-data-augmentation-on-streaming-data-part-2/ (Accessed: June 8, 2024).

Simplilearn (2021) *What is PyTorch, and how does it work: All you need to know*, *Simplilearn.com*. Simplilearn. Available at: https://www.simplilearn.com/what-is-pytorch-article (Accessed: June 8, 2024).