HomeRunIPro

Baseball Swing Analysis for School Level Players in Sri Lanka Using Deep Neural Networks

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Problem Background

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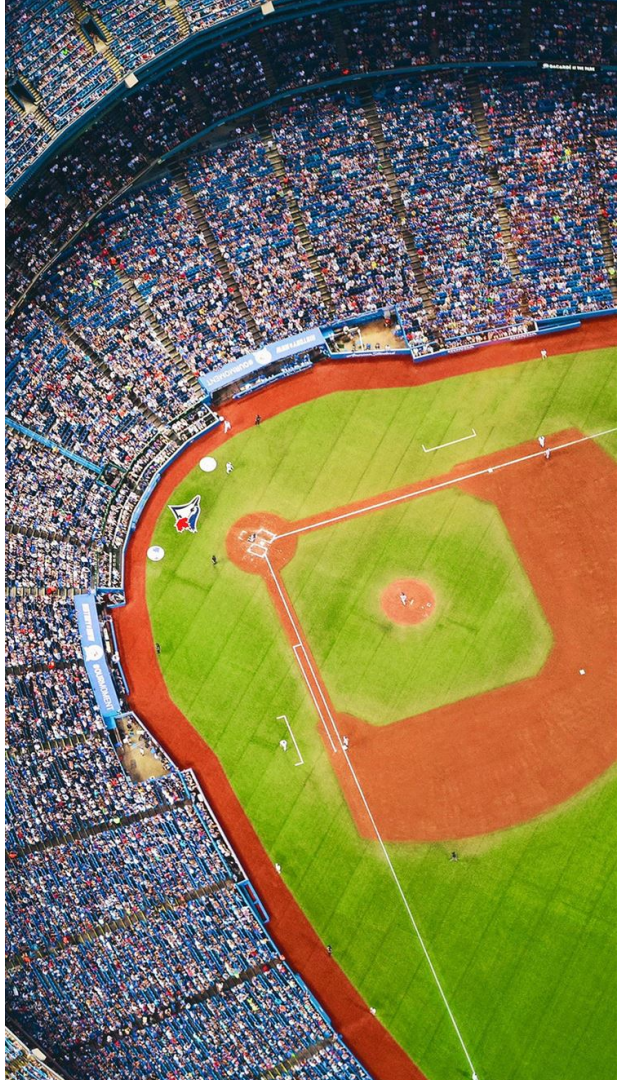
03 Sri Lanka Baseball



Problem Background…

Computer vision is an artificial intelligence area that allows computers and systems to derive meaningful information from digital photos, videos, and other visual inputs and then conduct actions or make suggestions based on that information.

The statistics of different data of athletes in sports, footage may assist athletes not only enhance their technical level but also modify tactical deployment for the entire team in a targeted manner (Rui, Liu, 2021).

Computer vision functions similarly to human vision, with the exception that humans have an advantage (Szegedy and Toshev, 2014). Human vision has the benefit of lifetimes of context to learn how to discern objects apart, how far away they are, if they are moving, and if there is something incorrect with a picture or footage. To do this, two key technologies are used: deep learning, a sort of machine learning, and a convolutional neural network (CNN).

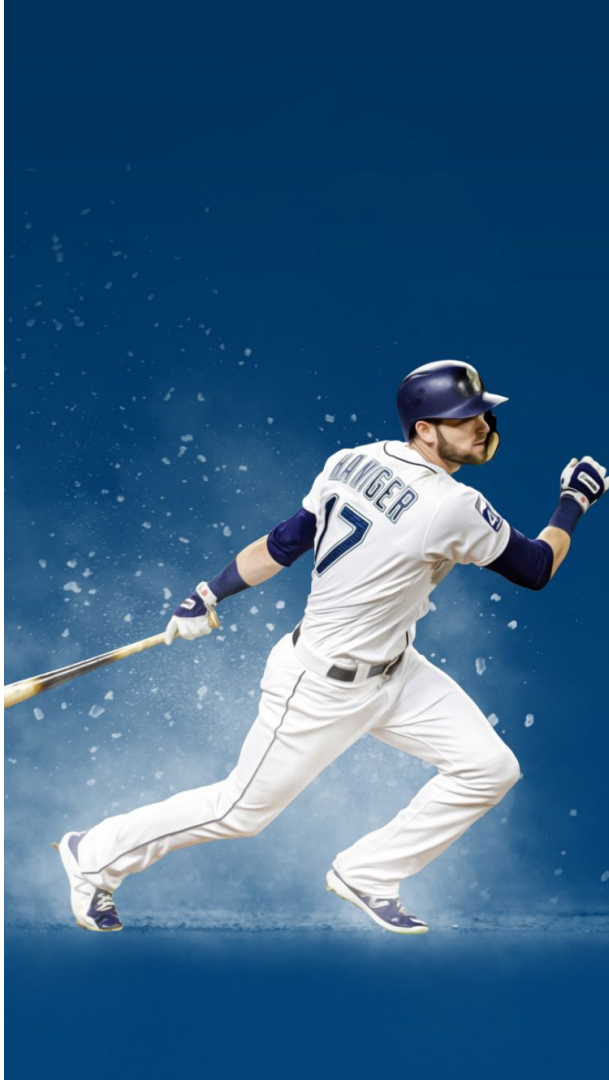
The absence of structured development programs, talent identification programs, and coaching infrastructure, are the main problems in Sri Lanka Baseball.

Research Gap

There aren't any studies that use Custom Deep Convulutional Neural Network approaches to analyse bat swing in the domain of Baseball.

There aren't any application in Sri Lanka to analyse baseball Pose of **Sri Lankan School Level players** without considoring any height & weight and without wearing any devises or sensors using batters side angle view

There aren't any baseball batting image datasets that have created that contains images of batting Stance, Shot Execution and Leg Movement.

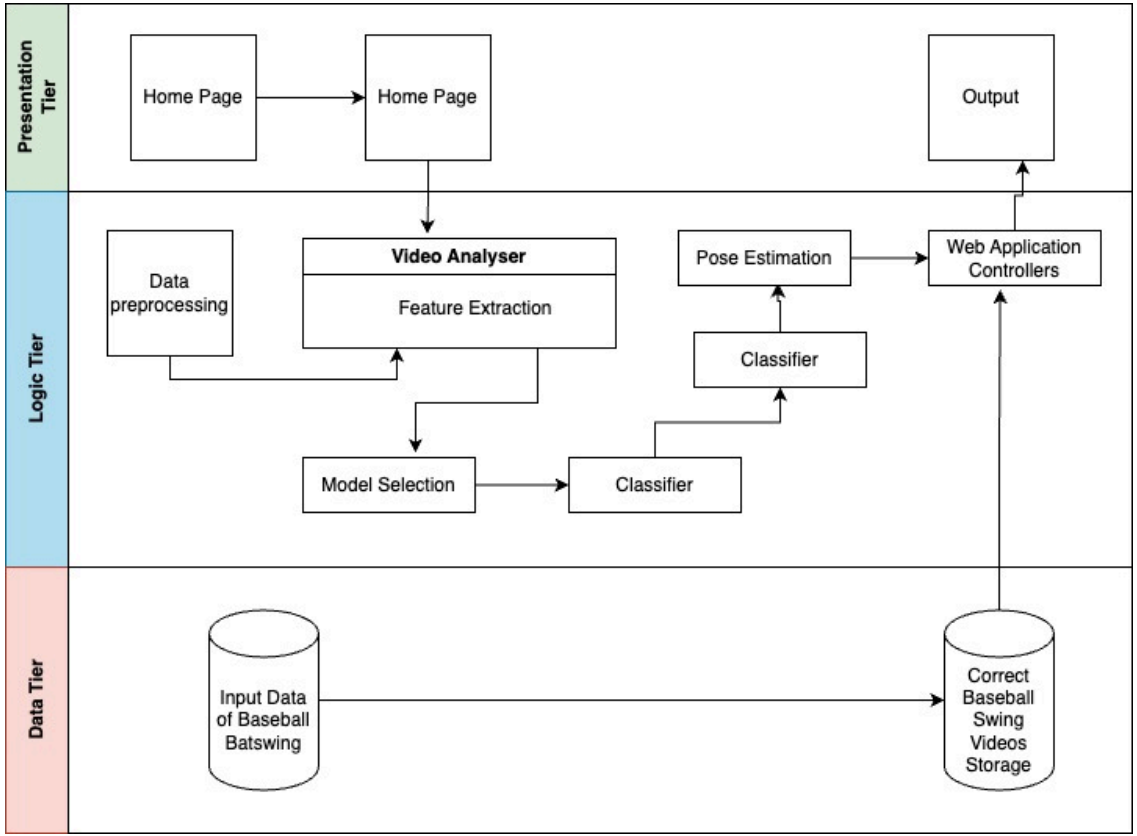


Project Aim

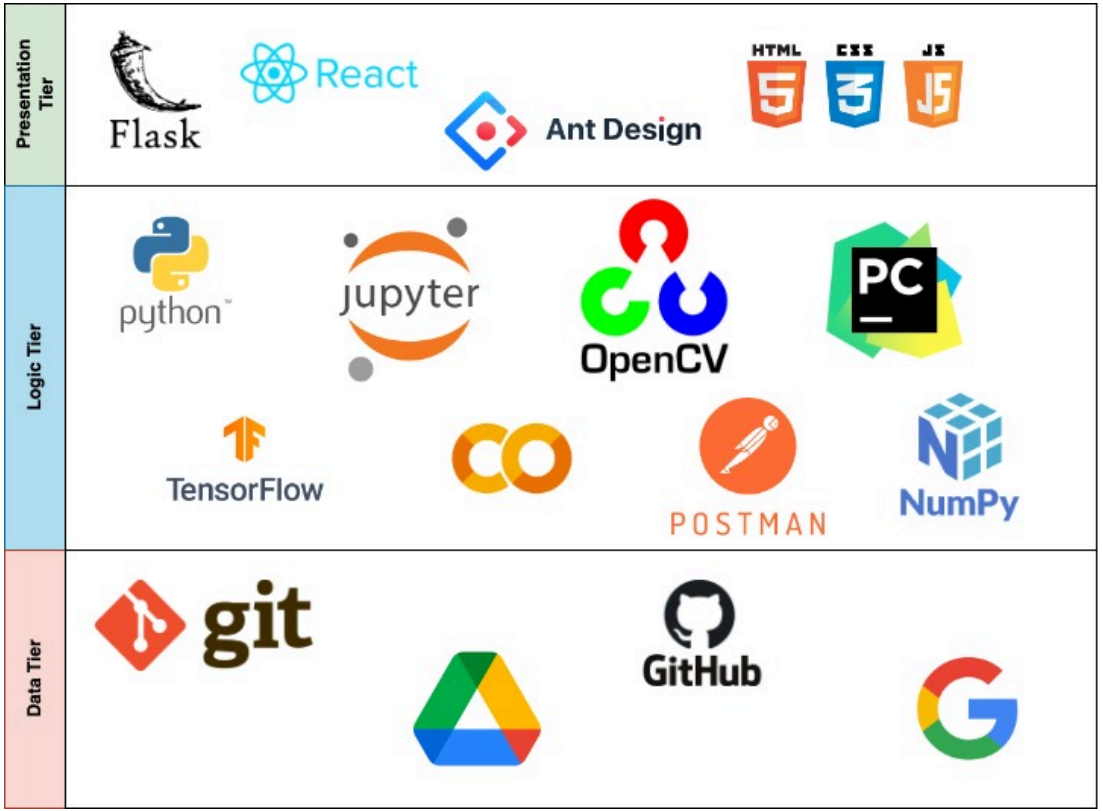
The suggested solution for this research project is to design, develop & evaluate a system which analyses the baseball swing of school level baseball players in Sri Lanka without any professional Intervention, without considering any height and weight, and without using any wearable devices.

And the system will focus on identifying key aspects of theplayers swing stages such as leg movement , shot execution and stance. And system will be able to give results about the analysed bat swing.

System Architecture Diagram



Technology Stack & Implementation

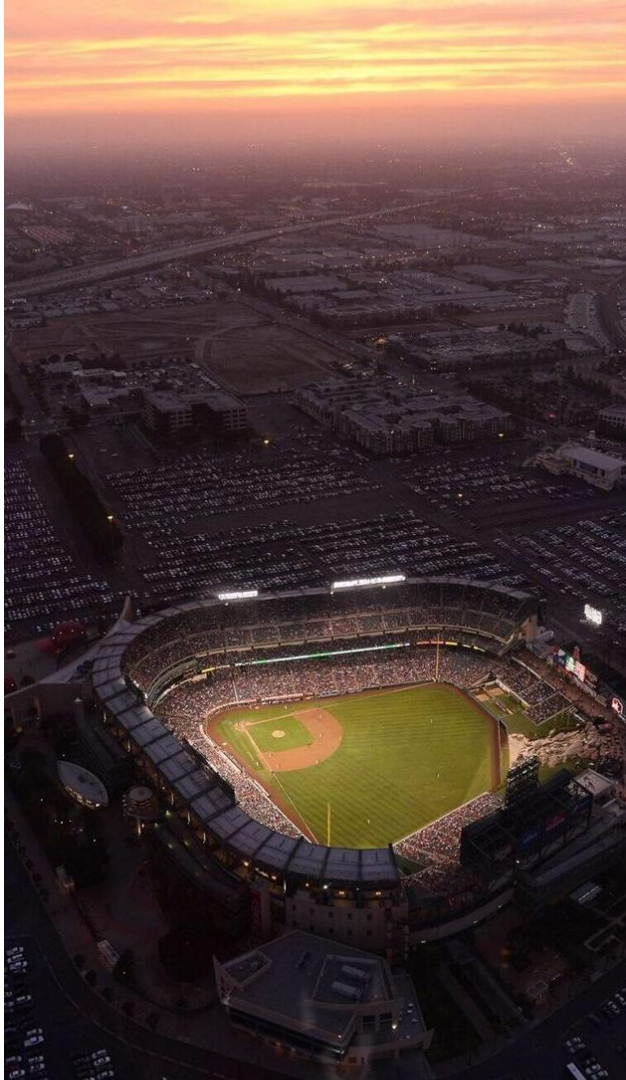


Software Demonstration

Testing

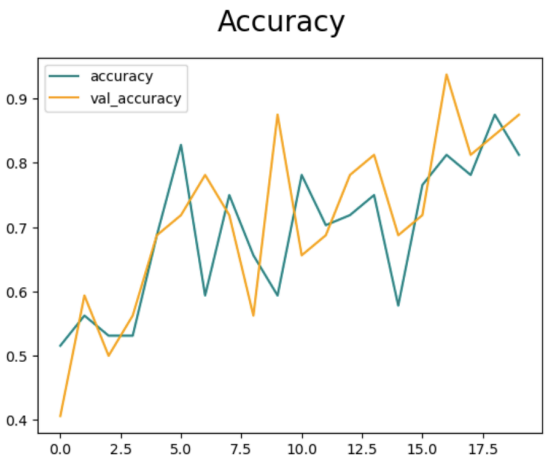
Leg Callification Model Accuracy - 82.14 %
Stance Model Accuracy - 84.37 %
Shot Callification Model Accuracy - 72.72%

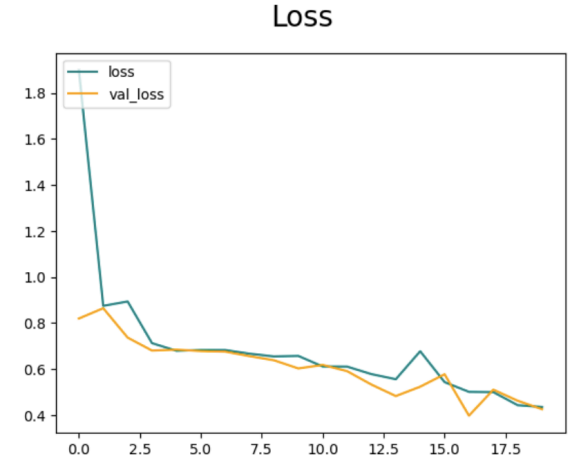
01	Data Set - 260 Images
02	Testing - 10%
03	Validation - 20%
04	Training - 70%

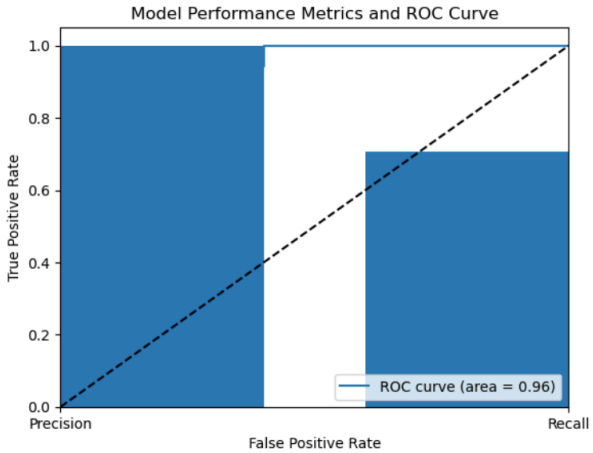


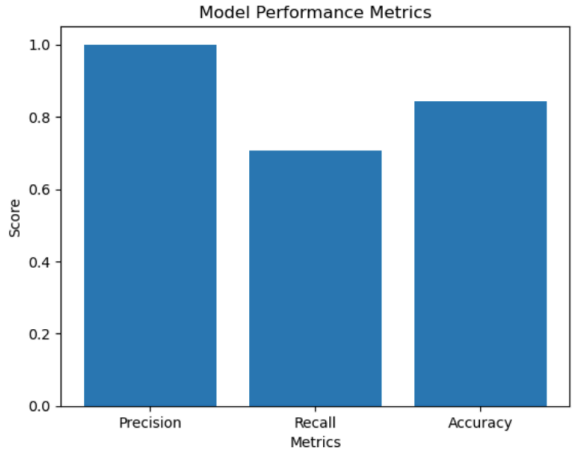
Testing

Stance



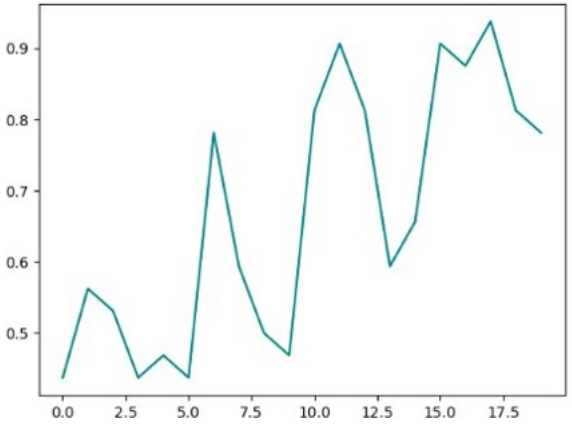


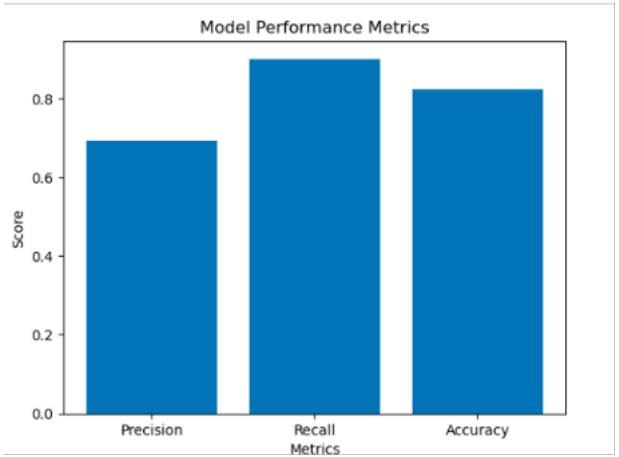


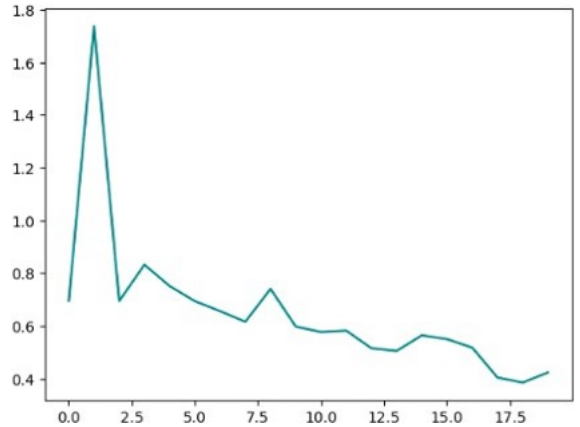


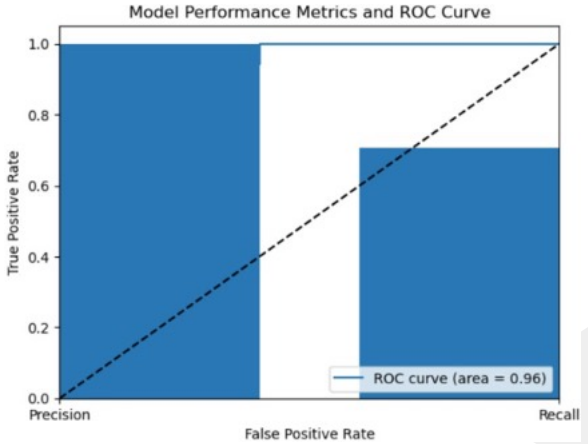
Testing

Leg Movement



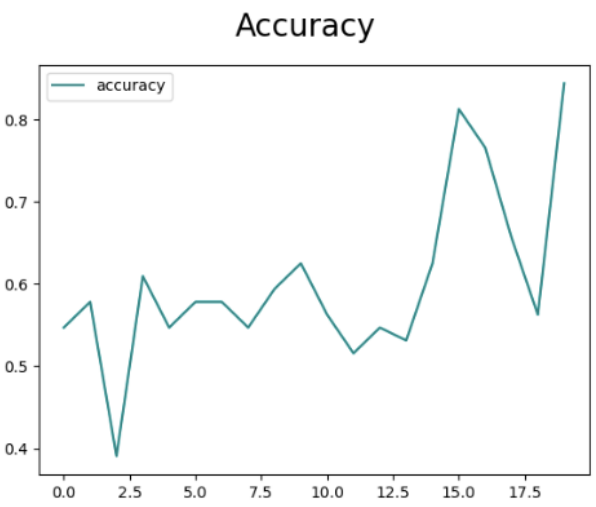


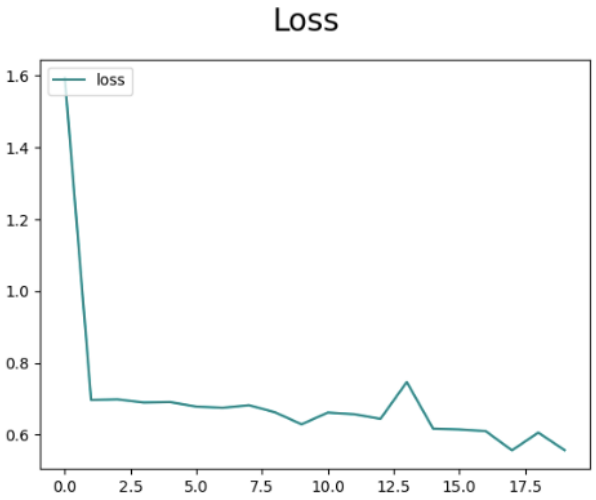


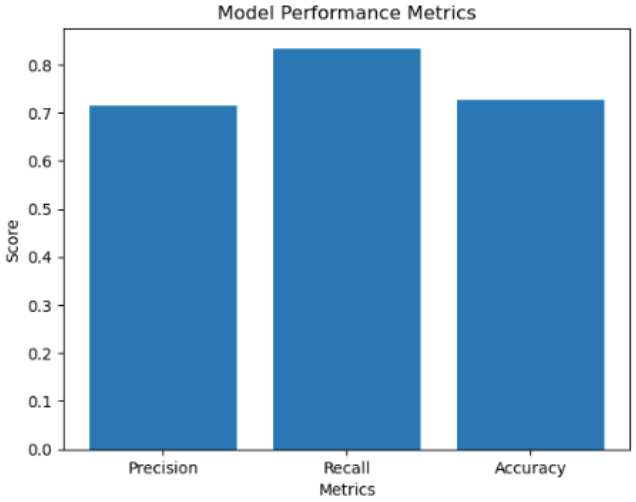


Testing

Shot Execution







Evaluation

01 **Domain Experts**

02 **Technical Experts**

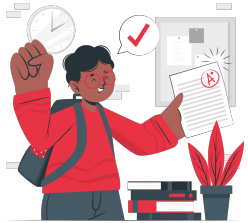
03 **Baseball Players**

Contribution to the Body of Knowledge

baseball swing Analysing system using deep learning technologies hasn't been attempted in previous years' research. And there is no baseball swing analyzing system for Sri Lankan school-level baseball players. So, this research will be done based on Sri Lankan datasets collected from Sri Lankan school level baseball players. This model's accuracy will be very high, and users can get high-quality and correct results using this application.

The main challenge regarding the dataset is that it's not easy to collect data from players because of security and tactical reasons it needs permission to enter practice premises. So, for that reason, an ethical clearance is needed. And the other challenge is capturing images and clarifying whether it is correct or not.

Evaluation content



- ***Sri Lanka National baseball - Head Coach***
  - An application like this can really help players in rural areas.
- ***Sri Lanka National women's baseball - Assistant Coach***
  - The idea is amzing and also it's very helpful for developing women's baseball in Sri Lanka if this application can analyze women's batting techniques.
- ***Former Sri Lanka Baseball Under 18 Captain - 2019***
  - I have been to many countries to play baseball but never had a chance to experience an application like this.
- ***Research Associate - Nanyang Technological University (Singapore)***
  - The research idea is very interesting and little bit challenging and the author's proposed solution is very practical.
- ***Software Engineer at Millennium IT ESP, Sri Lanka***
  - Products like this will be future of the sports domain and can get more accurate results if there is a large data set.

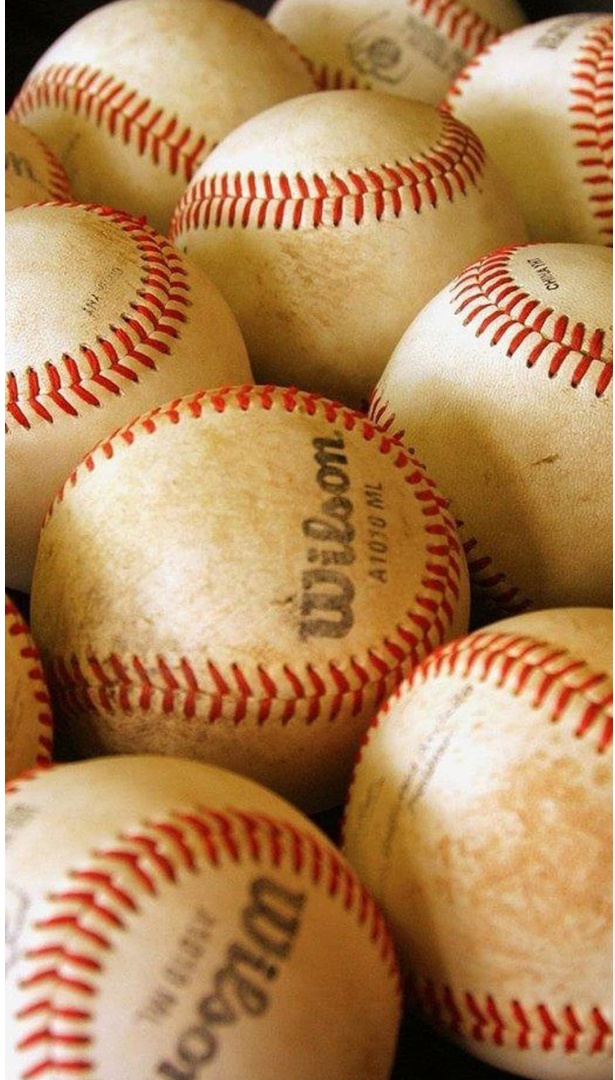
Limitations and Future works

Limitations

- The Application only analyses from side view of the batter.
- The Application only gives the correctness and incorretcteness of the bat swing and Score.
- The outcomes of the model can be influenced by different evironmental conditions.

Future Enhancements

- Multi angle analysis - Expanding the application's capability to analyze swings from different angles.
- Detailed feed back with suggestions for improvements.
- Environmental factors consideration - To increase accuracy of the model.
- Add more data to the dataset - To increase accuracy of the model.



Conclusion

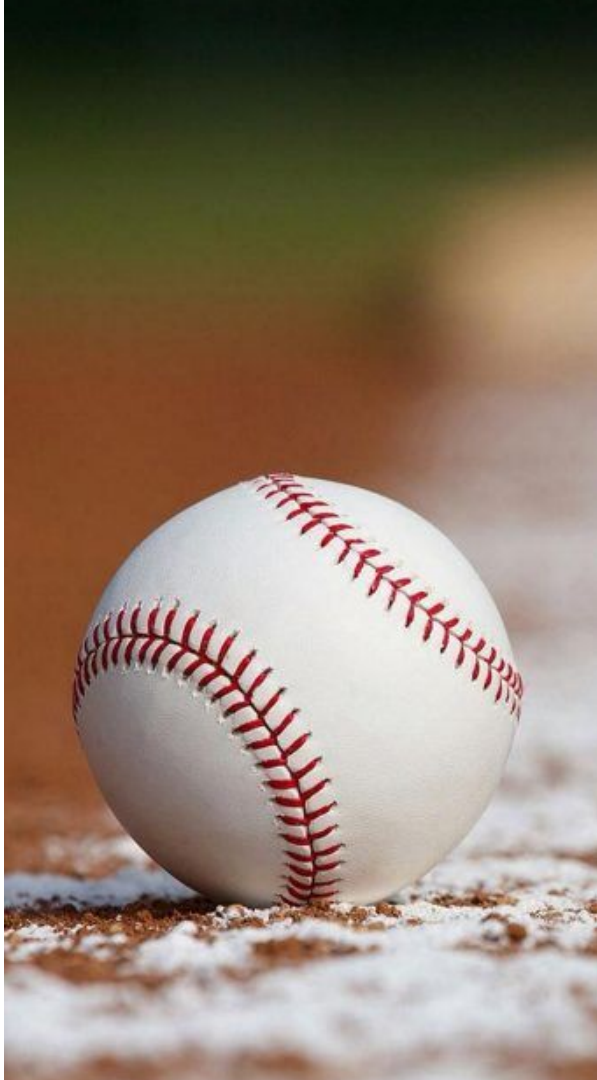
Existing Skills

- Machine learning: The author is familiar with machine learning based python model development because author used machine learning in the software development group project module.Machine Learning
- Industry Placement: The author completed an internship at Millennium IT ESP. The knowledge gained from the internship period helped to develop the system.

New Skills

- CNN
- Human Pose Estimation
- Computer Vision

These Technologies are completely new to the author. So, during the development, these skills were developed.



THANK YOU