



STARC '23 Abstract

Analyzing Playing Techniques and Personalized Training Recommendations in Racket Sports

Sport:	Badminton/Tennis
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Project Details

Background

In the realm of racket sports, such as badminton and tennis, there is a growing interest in leveraging advanced technologies to enhance player performance and provide personalized training recommendations. This project aims to utilize computer vision techniques and data analysis to analyze players' techniques, playing style, and compare their performance. By doing so, the project aims to provide valuable insights and customized training suggestions to help players improve their overall skills and performance.

Also to create a personalized badminton and tennis training platform that will cater to families who may not have the means to afford a dedicated coach. Our vision is to leverage cutting-edge technologies, including deep learning, image processing, video processing, and machine learning, to develop a platform that offers tailored training feedback and guidance.

Goals, Objectives and Scope

Goals :-

1. Analyze players' movements, techniques, and playing style in badminton/tennis.
2. Provide personalized training recommendations based on the analysis.
3. Compare players' performances and identify areas for improvement.
4. Enhance overall player skills and performance through targeted training.

Objectives :-

1. Develop algorithms for pose estimation and object detection to analyze players' movements accurately.
2. Extract relevant features from the analyzed data to assess players' techniques and playing style.
3. Implement machine learning models to compare players' performances and identify patterns and trends.
4. Provide actionable feedback and personalized training recommendations based on the analysis results.

Scope :-

1. Focus on badminton and tennis sports for analysis and improvement.
2. Collect a diverse dataset of videos capturing different skill levels, playing conditions, and players.
3. Process the collected data to extract relevant frames and segments for analysis.

Applications:

This project has numerous applications in the field of racket sports training and performance enhancement. It can be utilized by players of all skill levels, from beginners to professionals, to gain insights into their techniques, style, and areas for improvement. Coaches and trainers can also utilize the system to assess players' performance, track progress, and tailor training programs accordingly.

Deliverables

Data Collection:

- Gather a diverse dataset of badminton and tennis videos capturing various scenarios and skill levels.
- Ensure the dataset represents different playing conditions, player demographics, and skill levels to provide comprehensive analysis.

Data Preprocessing:

- Preprocess the collected videos by extracting relevant frames and segments for analysis.
- Clean the data by removing any irrelevant or noisy frames that could affect the accuracy of the analysis.

Feature Engineering:

- Design and implement algorithms to extract key features related to players' techniques, playing style, and movement patterns.
- Extract features such as body posture, footwork, racket position, ball trajectory, or contact points.

Model Evaluation:

- Develop machine learning models that leverage the extracted features to analyze players' performances.
- Evaluate the models' accuracy and performance in comparing players, identifying patterns, and assessing skill levels.

Fine tuning:

- Optimize the machine learning models based on evaluation results to improve accuracy and enhance the analysis capabilities.
- Fine-tune the models' parameters, architecture, or algorithms to ensure the best possible performance for personalized recommendations.

User Interface Development:

- Design and develop a user-friendly interface where players can easily input their videos and access the analysis results.
- Create a visually appealing and intuitive interface that provides clear and concise feedback on techniques and training recommendations.

Potential Obstacles

1. Incorporate real-time analysis and feedback during gameplay or practice sessions.
2. Integrate wearable devices to capture additional data points for a comprehensive analysis.
3. Expand the analysis to include other racket sports such as squash or table tennis.
4. Acquiring a diverse and high-quality dataset of badminton and tennis videos may pose a challenge. It can be time-consuming to collect a substantial amount of data that adequately represents various playing conditions, skill levels, and player demographics.
5. Accurately detecting and tracking specific objects like rackets or balls using algorithms like YOLO can be challenging due to variations in lighting conditions, object sizes, and occlusions.

Project Approval

Suggestions

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Approved by

Approved by:

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