ARTICLE TYPE

Football Players Analysis

Abstract

In this project we address a multifaceted issue in football: the strategic analysis of historical games, provided as video, to enhance teams' goal-scoring potential and secure victories, aiming to improve both performance and club profits. This involves meticulous tracking of ball touches and intricate player movements. A comprehensive solution is proposed, utilizing nuanced maneuver categorizations, Convolutional Neural Network (CNN) based positioning algorithm, several classical video tracking methods, and a Feedforward CNN model for maneuver recognition. Using this technology, the client was able to reduce around 35% of the analysis cost for each game, on average.

The Problem

In football, systematic analysis of historical games, with a specific focus on enhancing a team's potential for scoring goals and securing victories, is a key method to improve a team's performance and the club's profits. This entails meticulous tracking and examination of various aspects, such as the frequency of ball touches by the team, aiming to optimize their performance. Concurrently, the intricate movements executed by all players on the field undergo rigorous scrutiny, constant monitoring, and thorough evaluation. This comprehensive analysis is replicated an additional 22 times for every player on the pitch, each time taking into account their distinct positional role and responsibilities. This undertaking encompasses a multitude of intricacies, demanding the seamless synchronization of monitoring, evaluation, and automated analysis for each individual player in close to real time settings. The complexities arise from the need to capture a myriad of data points, encompassing factors like player interactions, spatial dynamics, and strategic decisions.

The Solution

The project was initiated with the establishment and aggregation of nuanced categorizations for each tactical "maneuver". Employing this methodology facilitated the comprehensive acquisition of substantial data pertaining to individual players and the collective team dynamics. Subsequently, a Convolutional Neural Network (CNN) model was employed to ascertain the precise positioning of each player, enabling meticulous documentation of their respective attributes. The subsequent deployment of the video tracking algorithm ensued, effectively tracing the trajectory of every player on the field throughout the entirety of the match. This process of video capture and recording was executed seamlessly without the need for manual configuration or operator intervention, seamlessly capturing the entire pitch in 4K resolution from diverse angles at the simple push of a button. To accommodate novel maneuvers during the phases of training and data compilation, a controlled level of "noise" was introduced. It is noteworthy that the detection of such "maneuvers" is frequently elusive. The cumulative information amassed at this juncture serves as the cornerstone for training and coaching sessions. Its utility lies in pinpointing areas warranting improvement, tailoring individualized training regimens based on specific player weaknesses, and ultimately enhancing the overall in-game performance of the team. Finally, a video tracking algorithm was harnessed to monitor the progression of each player over time. At regular intervals of 10 seconds, the most recent 5 seconds of video footage were utilized to formulate 2D trajectories of all players. By leveraging this dataset

in conjunction with historical maneuver records, a Feedforward Convolutional Neural Network (FcNN) model was employed to discern the presence of a given maneuver.

The Outcome

This technology confers substantial advantages to the business by fostering a comprehensive understanding of player dynamics and team performance. The meticulous data collection through nuanced categorizations of tactical "maneuvers" equips the business with profound insights into player behavior and team strategies. The automated nature of the video capture and recording process, requiring no manual setup or operator involvement, significantly enhances operational efficiency and reduces the client's previous analysis cost at around 35%.