Sports Navigator: Data analysis of a match using soccer-log

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Abstract. Applying Machine learning, data analytics etc have proven a greater improvement in decision making in all levels. A special attention has been made in the field of sports. As a whole, team improvement is a main concern in all directions. The goal of any team would be to win every match they play. This can happen only if there is an excellent team effort i.e good coordination between players. We propose Sports Navigator a platform that Clubs, Coaches, and players can use for better performance day by day. In this paper we talk about acquiring the details of a match and presenting team statistics.

Keywords: Data Analysis, Soccer, Machine Learning, Soccer-log.

1. Introduction
Machine learning, Artificial Intelligence has been making a footprint in the current market either education, manufacturing, marketing or any field to mention. Even it has made its way in sports also. Sports Analytics is a new mention that is happening in the current world. Every player, coach or club objective is to win every match they play. All of them have the will to win but important is the preparation to win. Machine learning is assisting all kinds of sports to get out of all flaws and to strengthen their capabilities.

Now there is a tremendous growth in applying different Machine Learning algorithms to all kinds of sports. This has increased the performance as a whole to the team and club. Soccer has been a wonderful sport and that most watched one by the crowd. Soccer analytics has gained lot of importance in today’s world. In this paper, we specifically talk about soccer-log and evaluations of performance of a match.

2. Related Work
[1] Aimed at study of current state in analytics (soccer) and predicted the outcome of soccer match which would benefit for sport analysts, managers of soccer clubs, coaches. Soccer statistics are attracting wide interest from a long time ago. [2] Focused on the most challenging open problems in soccer analytics.
Data-driven analysis has been made a tremendous change in team sport. [3] Useful of visualizations has been made to good extent so that many challenges have been resolved. [4] Position tracking had been used in this paper to unlock what Sports analytics can suggest. Soccer has become a big dollar industry, which is a globally adapted sport. [5] Predicted the future of upcoming soccer matches. [6] The most influential performance metrics of the players are considered for determining the match outcome. Performance indicators are the key to be considered for sports that are related to attacking play in football. [7] Uses the above-mentioned keys for providing appraisal of a player using machine learning concept. Promising results have been seen using Machine learning (ML) particularly in the area of prediction and classification. [8] Provides a sport results using Artificial Neural Networks (ANN) in terms of win or lose also provides focus on analysis of Machine Learning. Sports Analysis is rapidly growing area of sports science with the ever increasing easy internet accessibility and recognition of Machine Learning. [10] Predict win or lose that is the outcome of the matches in English Premier League [11] Proposed a procedure for trying to outcome as win or lose of a soccer match. Bayesian Model based on rank position is used along with a Machine Learning Model. It is modeled to work based on historical data of matches.

3. Sports Navigator

Sports Navigator is one stop solution for all the requirements of sports (Clubs, Coaches and Players).

![Figure 3.1: Data Analysis in Sports Navigator.](image)

3.1 Pre-Processing

Pre-processing in this case is tagging which is achieved by using proprietary software. The input to tagging process is Video recording, which contains video tracking data that describes the player trajectories. The output of tagging is soccer-logs which gives the details of the events that occurred during a match.

![Figure 3.2. Match tagging](image)
The Tagging of a match is a three step process.

**Step 1: Setting formations.**
Before starting tagging, the teams are set to analyze. Identify the own team and the opponent team and also the Jersey number of the corresponding players.

**Step 2: Event tagging.**
A new event on the timeline is created for each ball touch; the operator selects one player identifies using jersey number. Identify the type of the event and attach the type (e.g., pass, dribbling, tackle, shot, etc.) and subtype (e.g., Successful, unsuccessful, goal, saved, off target etc) to that particular player. There by the event is inserted in the streamlined way so that events are attached to the timeline. Normally special customized keys are used to attach the event ie short-cut keys.

**Step 3: Quality control.**
One of the most important steps in tagging is the quality control, performed for each match. Quality control is done by selecting the customize tag and run the video with these customize tags manually and check for correctness. The threshold that has been set approval is 90% in each of these events.

![Diagram of tagging steps](image_url)  
**Figure 3.3.** Steps in tagging
The events captured in the soccer-log are Pass (successful, unsuccessful), Dribbling (successful, unsuccessful), Tackle (successful, unsuccessful), Safe goal, Shot (Goal, saved, off target), Back post pass, Possession etc

3.2 Soccer-log

Soccer-log is the output of tagging process, which contains the event details that occurred during a match. Soccer-log is an XML file with event details. The event Possessions sample in soccer-log is of the form

```
<instance>
  <ID>699</ID>
  <start>640.465</start>
  <end>644.05</end>
  <code>Team1 Possessions</code>
  <label>
    <group>Possessions</group>
    <text>Team Possession</text>
  </label>
  <label>
    <group>Set Pieces</group>
    <text>Goal Kick</text>
  </label>
</instance>
```

Figure 3.4. Event representation in Soccer-log

4. Analysis using soccer-log

The output of tagging is the Soccer-log; using the events in the log file the match statistics are derived. The match statistics are as below:

4.1 Shot Statistics:
The shot is one of the major attribute for a team to win and the shot statistics shows the team effort. In spite Team2 has won, the statistics show a different scenario, out of 33 Shots, only 10 shots were goal so efficiency is 30% which is not actually a good one for a threshold 60%. The shaved shots of Team2 are 45%, so approximately 50% of the time Team1 was successful in blocking Team2 from making a goal.
4.2 Set Pieces:
The set pieces snapshot gives us a more understanding on how the team’s performance has made a difference in the game. Free Kicks indicator shows that Team2 has done 12 fouls, which could have been a major disaster in case Team1 had taken advantage of this.

4.3 Possession and Rating:
Ball Possession plays an important role for any team, which indicates the total time the ball was with the team. The Overall accuracy in terms of shot and pass indicates the success rate.
4.4 Team Play:
The Overall statistics of the teams are depicted as below:

\[\text{Figure 4.3. Possession and Rating.}\]

\[\text{Figure 4.4. Team Play.}\]
5. Conclusion
Sports Navigator is one stop solution for all the requirements of sports (Clubs, Coaches and Players) which helps in developing clubs all together. It engages club members with game footage, a safe communication platform and provides the data in the form of statistics of a match, which help for further actions to be taken.

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7. Reference
[1]. Sukumar, Sunil Srinivas, "Soccer Analytics & its future" (2019). Creative Components. 254. https://lib.dr.iastate.edu/creativecomponents/254.
[2]. Pappalardo, Luca. (2019). Soccer Analytics: how Data Science is changing the "Beautiful Game". 10.13140/RG.2.2.14459.98088.
[3]. Stein, Manuel & Häußler, Johannes & Jäckle, Dominik & Janetzko, Halldor & Schreck, Tobias & Keim, Daniel. (2015). Visual Soccer Analytics: Understanding the Characteristics of Collective Team Movement Based on Feature-Driven Analysis and Abstraction. ISPRS International Journal of Geo-Information. 4. 2159-2184. 10.3390/ijgi4042159.
[4]. F R Goes, L A Meerhoff, M J O Bueno, D M Rodrigues, F A Moura, M S Brink, M T Elferink- Gemser, A J Knobbe, S A Cunha, R S Torres & KAPM Lemmink (2020) Unlocking the potential of big data to support tactical performance analysis in professional soccer: A systematic review, European Journal of Sport Science, DOI: 10.1080/17461391.2020.1747552.
[5]. Berrar D, Lopes P, Davis J Guest editorial: special issue on machine learning for soccer. Mach Learn 108, 1–7 (2019). https://doi.org/10.1007/s10994-018-5763-8
[6]. Kumar, Gunjan. (2013). Machine Learning for Soccer Analytics. 10.13140/RG.2.1.4628.3761.
[7]. Herold, Mat & Goes, Floris & Nopp, Stephan & Bauer, Pascal & Thompson, Chris & Meyer, Tim. (2019). Machine learning in men's professional football: Current applications and future directions for improving attacking play. International Journal of Sports Science & Coaching. 14. 10.1177/1747954119879350.
[8]. Rory P, Bunker, Fadi Thabtah,” A machine learning framework for sport result prediction”, Applied Computing and Informatics Volume 15, Issue 1, January 2019, Pages 27-33.
[9]. Hossam M Zawbaa1 , Nashwa El-Bendary2 , Aboul Ella Hassanien1 , and Tai-hoon Kim3, “Event Detection Based Approach for Soccer Video Summarization Using Machine learning”, International Journal of Multimedia and Ubiquitous Engineering Vol. 7, No. 2, April, 2012.
[10]. Abha Tewari, Tushar Parwani, Ajinkya Phanse, Akshay Sharma and Anush Shetty. Soccer Analytics using Machine Learning. International Journal of Computer , Applications 181(50): 54-56, April 2019.
[11]. L Hervert-Escobar, T I Matis and N Hernandez-Gress, "Prediction Learning Model for Soccer Matches Outcomes," 2018 Seventeenth Mexican International Conference on Artificial Intelligence (MICAI), Guadalajara, Mexico, 2018, pp. 63-69, doi: 10.1109/MICA I46078.2018.00018.