Analysis of Sports Performances for Football Academies - An Overview of the Literature

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Abstract

Sports analysis is a broad topic that can be approached from various research directions. In this regard, I could list economic informatics through which the participation of supporters in matches played between football academies can be analyzed; in the field of sports, a research may focus on the analysis of individual performance (player performance) or group performance (team performance); in the field of education, the emphasis can be placed on learning strategies; in the field of health, the physical condition of the players can be monitored, and the examples can certainly continue. For this paper, the main objective is to synthesize the most relevant sports analysis works for football academies, starting from exploratory data analysis machine learning-based techniques and presenting the most current and accessible sports prediction techniques that can be used with the ease of non-programmers, as well as to present future research directions for the field of sports, especially football; hence, the desire to promote exploratory techniques for analyzing data that can be easily collected in electronic form and directly secured from training or matches to keep the data history for each individual academy. Although the main focus is most often on professional football teams, it is necessary to introduce and take into account the performances of academy players who will be selected for professional teams in the near future. In any case, it depends on the management of the academies to identify potential talents and create the most appropriate strategies to achieve their goals.

Keywords: *football academy, exploratory data analysis, types of sports performance, literature overview*

1. Introduction

Sports performance analysis for football academies is the process of collecting, evaluating, and interpreting relevant data about player and team performance within a football academy. The main purpose of this analysis is to assess and monitor the progress of the players, identify their strengths and weaknesses, and develop personalized strategies and training plans to maximize their potential.
Here are some key aspects of sports performance analysis in football academies:
- Individual assessment of players: The analysis of sports performance involves the individual assessment of players, according to technical, tactical and physical abilities. This may include specific assessment of football skills such as dribbling, passing, shooting, understanding of game tactics, etc.
- Monitoring performance over time: It is important to monitor the evolution of players over time to observe improvements and identify potential problems or stagnation. This may involve assessing performance in regular matches and training sessions, recording and analyzing statistical data such as goals scored, assists, pass accuracy etc.
- Tactical analysis: The analysis of sports performance can include the evaluation of the game tactics of the team and individual players. This involves studying movements, positioning on the field, interaction between players, etc. to identify effective strategies and improve coordination and collaboration between players.
- Use of advanced technologies: In sports performance analysis, advanced technologies such as video analysis, motion sensors and other technological devices can be used to collect and analyze data in a more accurate and objective manner. These technologies can provide detailed information about players' movement, heart rate, running speed, etc.
- Benchmarking: Sports performance analysis can also involve comparing players' performances with other reference players, with higher performance levels, or with top players in the same age group. This can help assess potential and identify players' strengths and weaknesses compared to others.[1]

- Development of personalized training plans: Based on data and results obtained from performance analysis, coaches can develop personalized training plans for each player, tailored to their specific needs and goals. This may involve working on improving areas of weakness and developing specific skills.
Sports performance analysis in football academies has a key role in identifying and developing talent, as well as increasing individual and team performance. By evaluating and interpreting data, informed decisions can be made to ensure optimal player development and maximize their potential.

2. A literature review

Having easy access to the presentation of relevant scientific papers that have carried out sports analysis in children's football academies is beneficial for several reasons:
- Synthesize important information: Abstracts provide a concise synthesis of a scientific paper, presenting the key points, objectives, methodology and main results of the study. This allows researchers, trainers and other interested parties to quickly and efficiently understand the content of the paper.
- Access to research: Abstracts allow interested people to get an idea of the results and conclusions of scientific papers, even when they do not have access to the full text of the paper. This is useful to spread and share knowledge in the academic and sports community.
- Guidance in decision-making: Summaries can provide important information in the decision-making process for coaches, football academy managers and other sports professionals. They can provide guidance and evidence to support the selection and implementation of appropriate training programs for children.
- Identifying trends and gaps: By examining the abstracts of several papers, common trends and patterns in research on children's soccer academies can be identified. Gaps or unaddressed aspects may also be identified, which may inspire new research directions or innovative approaches in children's sports training.
- Time efficiency: Summaries allow quick evaluation and filtering of information. This is useful when sports researchers or practitioners need to analyze a large number of papers in a limited time frame. Abstracts facilitate the process of selection and identification of relevant works.[2]

Using the Google Scholar and Scopus search engines, we have identified the 10 most relevant papers for the subject treated in this paper, in the field of football and sports performance. In what follows, I will detail for each work the key aspects identified and the directions for future analysis.

I will start by presenting the work of Claudino et. all from 2021 [3], which is a review of the literature by analyzing 94 scientific papers with information that helped to select the most appropriate tools and parameters for which to use load monitoring with traditional and Big Data approaches.
Rebelo-Gonçalves et al. [4] proposes an approach to evaluate the effectiveness of these goalkeeper-specific tests in measuring technical skills such as catching, reflexes, positioning and other essential aspects of football goalkeepers. Reliability refers to the consistency and stability of measurements over time, while validity refers to the degree to which these tests really measure the specific technical skills of goalkeepers. Therefore, this paper aims to provide a rigorous evaluation of tests specific to youth soccer goalkeepers and determine whether they are appropriate and valid to assess the technical skills of goalkeepers at this age level.
An approach that goes towards the medical field focuses on analyzing the mental and muscular fatigue that can influence the performance of soccer players and how these aspects can interact with each other. Mental fatigue refers to the depletion of cognitive resources and concentration, while muscle fatigue refers to the depletion of physical resources and decreased muscle capacity. The authors intend to highlight the importance and impact of mental and muscular fatigue on the performance of soccer players, as well as how they can interact and influence each other. In this way, the study provides an insight into how these two types of fatigue can affect football performance and can contribute to the development of strategies to manage fatigue and optimize the performance of athletes.[5]
A work relevant to sports clubs that can provide valuable information for coaches and decision-makers regarding appropriate strategies and approaches to improve the defensive performance of youth teams in such games has been published since 2016.[6] Also in this sense, another work focuses on the evaluation of the physiological and physical effects of young soccer players in games with a small number of players. The authors investigate how changing pitch dimensions and the presence of the goalkeeper in 4x4 games can influence the performance of these players. The aim of the paper is to

understand how changing constraints in football games with a small number of players can affect the physiological and physical aspects of under-12 and under-15 players. By identifying the effects of these changes, important information can be obtained for coaches and decision-makers in developing training programs and strategies appropriate for this age group.[7] [8]
Sarmento et al. [9] provides a systematic review focused on the identification and development of talent in men's soccer at the academy level. The authors analyze the methods used to identify talented young players, the criteria used in the selection process and the strategies for their development and monitoring. By examining a large number of studies and research in the field, the authors aim to provide a comprehensive perspective on the process of identifying and developing talent in men's soccer. The systematic review can be useful for coaches, academies and organizations involved in the development of young players, providing them with information on the most effective selection methods and criteria, as well as long-term development strategies. This work can contribute to improving the process of talent identification and development in men's football, with the potential to support informed decision-making in the selection and training of young players to reach their full potential in this sport.
Also within the topic of identifying young talents, another paper focuses on the factors that influence the process of identifying talented young footballers at a high level. The authors present a case study that highlights various aspects that can impact the identification and selection of talent in soccer. The case study looks at different factors, including the individual characteristics of the players, the influence of coaches and the training environment, the selection criteria used and the process of performance monitoring and evaluation. The authors also examine the psychological and socio-cultural factors that may influence the identification and development of football talent.[10]
In recent years researchers have increasingly focused on using machine learning methods to predict the ranking of football clubs in the Turkish Premier League. In the paper [11], the authors explore how machine learning technologies can be applied to football to make predictions about club rankings. This involves the analysis and interpretation of a relevant data set, which may include variables such as match results, individual and team statistics, fitness and others. By applying machine learning techniques such as classification and regression algorithms, the authors aim to develop a model that provides as accurate predictions as possible regarding the ranking of football clubs in the Turkish Premier League. This can be useful both for clubs and coaches, who can benefit from information for strategies and decision-making, and for fans and supporters interested in analyzing team performance. The paper highlights the potential of machine learning technologies in football and demonstrates how they can be applied to the prediction and analysis of club performance.
Another study focuses on how factors such as intensity of effort, duration of the match, position on the field and other situational variables can influence the way soccer players perceive the effort made during their sports activity. To analyze these aspects, the authors use the Random Forest algorithm, which is a machine learning technique used in data classification and regression.
By applying this algorithm, researchers can identify complex relationships between situational variables and perceived exertion in elite soccer players. This can help to gain a deeper understanding of how contextual factors influence how players experience exertion and can be used to optimize athlete training and performance. This paper highlights the importance and relevance of analyzing situational variables on perceived exertion among elite youth soccer players and demonstrates how the Random Forest algorithm can be used to explore these complex relationships. [12]
We could not end the documentary series without also analyzing the players' injuries. The latter paper proposes machine learning methods to analyze large data sets collected from athletes, including information about training, competition and possible previous injuries. By applying these machine learning algorithms, researchers can identify patterns and relationships between various variables and the likelihood of suffering an injury in the future. This can help develop more effective injury prevention methods and strategies in team sports. This new approach based on machine learning provides an innovative insight into the identification and assessment of injury risk factors and can contribute to the improvement of training and protection strategies for young athletes. The paper promotes the use of machine learning methods for the detection of injury risk factors in young team athletes and emphasizes the importance of this approach in the prevention and management of sports injuries.[13]

All these papers have in common that they focus on aspects specific to football and sports performance. Although each paper addresses different topics, such as the assessment of technical skills, the effects of mental and muscular fatigue, the defensive performance of youth soccer teams, the effects of plyometric training, talent identification and development, the prediction of soccer club rankings, and the detection of injury risk factors, all fall within the realm of football and sports

performance. The papers use various research methods, from systematic reviews and meta-analyses to machine learning approaches, to explore and better understand these issues.

3. Conclusions

There are several arguments why researchers continue to do sports analysis in children's academies, and taking into account the analysis of the specialized literature presented in the article, I can mention the following:

- Understanding children's development and performance in sport: Sport analyzes in children's academies offer researchers the opportunity to better understand how children develop in sport and what are the key factors that influence their performance. This can help identify best practices for training and developing young athletes.
- Talent identification: Sports analytics can help identify and select talent in children's sports. By evaluating individual data and performance, researchers can contribute to the development of more objective and valid selection methods and criteria.
- Optimizing training and development: Sports analytics can provide important information for coaches and sports development specialists, allowing them to better understand the individual needs of children and adapt the training program accordingly. This can help optimize children's development and sports performance.
- Injury prevention and health promotion: Sports analytics can be used to identify risk factors for injuries and develop strategies to prevent them. By monitoring and analyzing performance and health data, researchers can help promote the health and well-being of children involved in sports activities.
- Basis for improvements and innovations in sports: Sports analyzes in children's academies can bring to light aspects and trends that can be used to generate improvements and innovations in sports training and development. This research can help identify more effective training methods, develop innovative technologies and tools, and optimize the process of training children in sports.

Sports analysis in children's academies is therefore essential to advance knowledge and understanding of children's sport development and performance, thereby improving training, selection and development practices in children's sport.

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