The Reality of Using Artificial Intelligence Techniques in Football

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Abstract:

This study aims to identify the reality of using artificial intelligence in the football training process for players aged 12-16 years. The descriptive approach was used for its suitability to the study problem and its nature. The scale of using artificial intelligence techniques in performance analysis by Sami Abdel Salam and Ahmed Ibrahim (modified) was also used, which consists of 30 phrases distributed over three main dimensions. The study sample consisted of 40 football players who were selected using a simple random method. The results of the study concluded that the use of artificial intelligence techniques in the football training process is average in general.

Key Words: Artificial Intelligence, Techniques, Analysis, Football.

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1. INTRODUCTION

The sport has benefited from artificial intelligence to a great extent, as the latter has contributed to the development of some concepts and the provision of some facilities, such as the use by FIFA of Video Assistant Referee technology, This technique provided additional support to the main referee, and it also had positive psychological repercussions on the players and supporters (Qiyu, 2021), the use of artificial intelligence in match analysis has many benefits that can help sports teams identify patterns and trends that they may not have been aware of (Ryan Beal, 2019), and it can also help them make better strategic decisions while playing giving them a competitive advantage.(Meliji, 2023)**.** Artificial intelligence in sports performance analysis provides a holistic perspective in an innovative approach that points to practical applications for both academics and practitioners in the fields of coaching, sports analysis and sports science, as well as related subjects such as engineering, computer, science data and statistics(Duarte Araújo, 2021, p. 52)

When young children play football, they do not realize who will win, and this is due to the lack of self-awareness in children, which makes them enjoy the game a lot and develop, but when they grow up and start facing bigger, faster and stronger players, this development can stop and therefore lose confidence, and this is because of the rough and competitive nature of the sport of football (Collins, Gould, Lauer, & Chung, 2009), Self-confidence is the greatest skill a young person can possess, it is the cornerstone on which all great players are built, and a talented player often stumbles if he does not believe in his own abilities(Alfie, 2024)

This study aims to identify the level of use of artificial intelligence in analyzing football matches, in light of a group of independent variables represented by gender, age, and environment.

2. MATERIAL AND METHODS

2.1 Study design and sampling

The Artificial Intelligence Scale in Performance Analysis (AISPA) was distributed to football players. They were selected by a simple random method, and in this study we relied on the descriptive approach as it suits the problem and nature of the study. Data collection began on May 5, 2024, at 10:00 am, until May

10, 2024, at 12:00 am, Algeria time. It took each participant approximately 15 minutes to answer the scale information. Note that the AISPA was distributed to 40 football players aged between 12 and 16 years. Of the study sample, 38 players responded, with a response rate of 95%. Whose characteristics are explained in Table 1. Questions explored included demographic and social variables. In addition, the reality of using artificial intelligence techniques in performance analysis was evaluated using AISPA by Sami Abdel Salam and Ahmed Ibrahim (Ibrahim, 2023),and its validity and reliability were measured (internal consistency, comparison of extreme groups, Cranach's alpha and split-half) and presented in Tables 2 and 3, respectively. The scale used in our study consists of 30 items divided into 3 sub-dimensions. There are 1-10 items within the sub-dimension Performance Improvement (PI); 11–20 items fall within the Players Choice (PC) sub-dimension; there are 21-30 items within the Forecasting (F) sub-dimension. These questions are answered on a Likert scale with three answer alternatives: "(1) Agree", "(2) Neutral", "(3) Disagree", all items on this scale are positive. The highest point that can be scored on this scale is 90, and the lowest point is 30. High scores indicate high levels of use of artificial intelligence in analyzing performance in the sport of football. IASPA scores were distributed as follows: low use from 30 to 50, moderate use from 51 to 70, and high use from 71 to 90.

Table 1. Demographic proprieties of samples

Variables	Frequency	Proportion (%)
Gender		
Male	36	90%
Female	04	10%
Age		
12-14	20	50%
14-16	20	50%
Environment		
Countryside	08	20%
City	32	80%

Source: Spss[26] Program Outputs

Table 2. Validity of IASPA

A. Validity of IASPA in an Internal Consistency manner.

	PI	PC	F	IASPA
PI	1.00	.502**	-.092	**.688****
PC	.502**	1.00	-.046	**.648****
F	-.092	-.046	1.00	**.422***
IASPA	**.688****	**.648****	**.422***	**1.00**

Source: Spss[26] Program Outputs

** Correlation is significant at the 0.01 level.

* Correlation is significant at the 0.05 level.

B. Validity of IASPA in manner of Comparison of Extreme Groups.

Scale	Comparison groups	N	Mean	Std Deviation	T-value	df	Sig.
IASPA	**Lower group**	10	21.515	3.212	-4.602	9	.001
	Upper group	10	24.712	2.988			

Source: Spss[26] Program Outputs

Table 3. Reliability of IASPA

A. Reliability of IASPA in Alpha-Crunbach manner.

Crumbach's Alpha	N of items
.712	30

Source: Spss[26] Program Outputs

B. Reliability of IASPA in Split Half manner.

Items	Mean	Stddivution	N of items	Reliability		
				Befor correction	After correction	
				Pearson corrilation	Guttman Coefficient	Spearman-Brown Coefficient
Individual	21.657	2.121	15	.546	.692	.695
Pinary	23.971	2.624	15			
Total	22.814	2.372	30			

Source: Spss[26] Program Outputs

From Tables 1 and 2, we notice that the IASPA has high degrees of validity and reliability.

2.2 Statistical analysis

In order to describe the Socio-demographic characteristics of the study sample, descriptive analyses have been conducted in our study, as well as to determine the scores for IASPA. The differences examination has been performed in the studied variables (gender, age, and environment) according IASPA by the Mann-Whitney U test. This statistic was selected because the data are nominal and do not follow a normal distribution. The SPSS[26] was used to analyze all data. When the P-value is less than 0.05, it is considered statistically significant.

3 RESULTS

3.1 Characteristics of the sample

The study sample consists of 40 football players. Descriptive statistics for this sample are presented in Table 1. Briefly, the number of male participants was 36 (90%), and the ages of the study sample (12-14) were 20 (50%). The number of participants who live in the city was 32 (80%).

3.2 The Reality of Using Artificial Intelligence Among Football Players

The ranking of the IASPA dimensions appears in Table 4. From the table it is clear that both dimensions (PC) and (PI) came at the beginning of the ranking, while the dimension (F) came at the end of the ranking.

Accordingly, the use of artificial intelligence among football players was moderate in general.

Table 4. Dimensions arrangement of IASPA

Scale dimensions	Responses of students				
	Degrees	Mean	Std. division	Percent	Arrangement of dimensions
PI	840	21.00	1.857	39.26	1
PC	680	17.00	1.928	31.77	2
F	620	15.50	1.888	28.97	3

IASPA	2140	53.50	5.673	100	-

Source: Spss[26] Program Outputs

3.3 Differences in the study variables with respect to the IASPA

The results presented in Table 5 report that there are no significant differences in all studied variables (Gender, Age, Environment) with regard to the IASPA.

Variables	**IASPA**		
	Mann–Whitney U	**Z**	**Sig.**
Gender	35.000	-1.231	.208
Age	42.000	-1.411	.118
Environment	47.500	-.919	.240

Source: Spss[26] Program Outputs

4 DISCUSSION

Artificial intelligence in sports performance analysis provides a holistic perspective in an innovative approach that points to practical applications for both academics and practitioners in the fields of coaching, sports analysis and sports science, as well as related subjects such as engineering, computer, science data and statistics**,** (Duarte Araújo, 2021)technology in general, and digital computers in particular have had a profound impact on sports, as practitioners rely on digital data to monitor and improve performance (Kunz, 2020) officials also use tracking and micro-monitoring systems in order to increase the accuracy of judging motor performance, the masses of spectators and fans also seek to use common collective data under the pretext of expanding the places where sports events and sports competitions can be watched, and the extraction of data and huge statistics from the dynamics of sports performance has become a standard procedure at major sporting events. (Hans Van Eetvelde, 2021)

Currently, one of the important challenges for sports practitioners and scientists is to understand the dynamic patterns of behavior and interaction between athletes that characterize successful performance in various sports for this is becoming increasingly popular use (Woods, 2020), artificial intelligence research has been concerned with the creation of artificial intelligence

methodologies and the development of hardware and software systems that can record, classify, analyze and interpret large amounts of data (Yuchen Jiang, 2022), however, one of the risks of artificial intelligence research is that it is based only on data, so it was very important not only to rely on data, but also decisions based on this data should be made, because this is necessary to involve learners, coaches and players (Chase, 2020).This may necessarily require a comprehensive theoretical framework to critically interpret information from large and complex data sets to enhance the performance of athletes in training and competition, and therefore it was necessary to adopt an environmental dynamics framework to guide those involved in the sports industry in understanding how to use artificial intelligence methodologies in analyzing sports performance for all types of sports, whether they are team, such as football, basketball, handball, volleyball, hockey, with additional emphasis on how to use artificial intelligence methodologies in individual sports as well, such as fencing, wrestling, swimming, karate, and others other sports such as athletics And gymnastics (Cossich, 2023).

Artificial intelligence methods aim to create reliable and reproducible predictive models from data sets that may contain a large number of different variables, so as to deal with the large number of variables efficiently. These algorithms can be used to search the prediction range and highlight the variables with explanatory power. we must realize that these methods do not guarantee to find an ideal predictive model of the phenomenon under study, but instead they can find a model that works well under a variety of conditions, offering better diagnostics and interventions (Pachouly, 2022).

When young children play football, they do not realize who will win, and this is due to the lack of self-awareness in children, which makes them enjoy the game a lot and develop, but when they grow up and start facing bigger, faster and stronger players, this development can stop and therefore lose confidence, and this is because of the rough and competitive nature of the sport of football, American football coach and psychologist Ivan Joseph said that self-confidence is the biggest skill a young youngster may possess, and from Ivan Joseph's perspective, self-confidence is the foundation stone that all the great players were built on, and a talented player will often stumble if he does not believe in his own abilities.(Dilm, 2023, p. 490)

From this point of view, the psychological aspect of the player has a big role in the success or failure of the team, and to analyze the behavioral phenomenon of the player, it is necessary to analyze and determine the link between what is hidden and what is apparent, psychological changes and internal emotions can only be determined by visible changes that can be observed by the eye, anxiety is accompanied by changes and behaviors, anger is also accompanied by actions and changes, but noticing these changes is difficult and difficult compared to the capabilities of the human mind and what can be absorbed, the coach on the field can observe a player or even ten players, and but maybe he misses someone, he notices motor performance, but he loses sight of mental presence and psychological readiness, and even with Modern technologies such as video recording, which analyzes performance after the end of the match, but the difference is made in the second half, the coaches ' half, which is the interval between success or failure, winning or losing, so it is imperative that speed and accuracy be in the analysis and provide accurate data, suggestions and solutions through which it can make the difference and achieve victory, and from this came to us the idea of making a proposal that can be applied, which is a camera that takes pictures of the players on and submits it to the database in the form of inputs through input channels so that the artificial neuron receives the signals (data) coming to it through the Associated neurons, and these signals are called inputs،The program analyzes these inputs according to what has been saved in the database as a description of the psychological state and the accompanying application of artificial intelligence in the field of analysis and evaluation of psychological performance of football players during sports competitions .From physiological changes such as facial gestures, anger, raising a hand, not listening to the coach's directions and advice, aggressive behaviors, frequent protesting against referee decisions ..The machine provides outputs that are in the form of results, directions or decisions based mainly on accurate scientific rules, such as the degree of mental presence of each player at each stage of the interview, the psychological state, the degree of anxiety and stress of each player, the most important mistakes he made, and finally The machine provides a series of suggestions and directions that the coach can adopt in order to bring about change and achieve victory, and this avoids the coach's wrong guesses and negative judgments on the players resulting from the coach's lack of experience in this field, especially since mental and psychological training is not given much attention in Algeria, the trainee or athlete always needs to raise his psychological morale in

order to develop his abilities and explode his energies, not only on the physical field, but even in the level of concentration that contributes to the activation and development of intelligence, the higher the mental presence, the higher the level of performance. (Nabil, 2022)

5.CONCLUSION

In light of the above in the research axes, we can say that artificial intelligence is important in the sports field, and this is thanks to the leading technologies that have the ability to understand and teach, and create an atmosphere of interaction between athletes, and also helped coaches to overcome many obstacles and problems in terms of decision-making both before and during the game, artificial intelligence also contributed to predicting the chances of success and reducing many manifestations of violence in stadiums, which made countries race towards owning the latest technologies and developing programs and applications, and to keep abreast of these developments, it became necessary to include modern technologies of artificial intelligence in the sports field in addition to the need to take care of the side Psychological of the player..

It is also worth mentioning at the end of this research that the proposed program should be given the opportunity to be applied on the ground, believing and hoping that it will be a good addition in the field of sports training, as it will eliminate many of the mistakes that the coaches were making and give some kind of confidence to the players, in addition, it will explain the concept of sports psychology to the players and the importance of mental presence during the interview, how to control negative emotions and how to develop their emotional intelligence to raise the individual level of the player and the team.

6. BIBLIOGRAPHY LIST

Alfie, B. M. (2024). More than a footballer: developing a self-assessment tool for evaluating holistic development programming features for elite youth footballers. Boston : Thèse de doctorat. Boston University.

Chase, C. (2020). The data revolution: cloud computing, artificial intelligence, and machine learning in the future of sports. 21st century sports: how technologies will change sports in the digital age.

Collins, K., Gould, D., Lauer, L., & Chung, Y. (2009). Coaching Life Skills through Football: Philosophical Beliefs of Outstanding High School Football Coaches. International Journal of Coaching Science , 3 (1).

Cossich, V. R. (2023). Technological Breakthroughs in Sport: Current Practice and Future Potential of Artificial Intelligence, Virtual Reality, Augmented Reality, and Modern Data Visualization in Performance Analysis. Applied Sciences , 13 (23).

Dilm, R. (2023). Application of artificial intelligence in the field of analysis and evaluation of psychological performance of football players during sports competitions. 01 (10), 490.

Duarte Araújo, M. C. (2021). Artificial Intelligence in Sport Performance Analysis (éd. 1). New York: Routledge.

Hans Van Eetvelde, L. D. (2021). Machine learning methods in sport injury prediction and prevention. Journal of Experimental , 27.

Ibrahim, I. H. (2023). Uses of artificial intelligence in analyzing the level of performance and practical development thereof. Assiut Journal of Science and Arts , 67 (4).

Kunz, R. E. (2020). Sport content and virtual reality technology acceptance. Sport, Business and Management: An International Journal , 10 (1), 83-103.

Meliji, M. I. (2023). Artificial intelligence and the sports industry. 01.

Nabil, S. W. (2022). Psychological support for karate sports through the application of social intelligence techniques.

Pachouly, J. A. (2022). A systematic literature review on software defect prediction using artificial intelligence: Datasets, Data Validation Methods, Approaches, and Tools. 111.

Qiyu, P. (2021). the effects of artificial intelligence on competitive sports. clark university.

Ryan Beal, T. J. (2019). Artificial intelligence for team sports: a survey. The Knowledge Engineering Review , 34.

Woods, C. T. (2020). Sport practitioners as sport ecology designers: how ecological dynamics has progressively changed perceptions of skill “acquisition” in the sporting habitat. Frontiers in psychology , 11.

Yuchen Jiang, X. L. (2022). Quo vadis artificial intelligence? Discover Artificial Intelligence , 2 (1), 4.