



Eximia Journal
(ISSN 2784-0735)

Vol. 13

2024

The use of artificial intelligence in developing students' footwork in badminton was raised

Muhannad Nazar Kzar

Faculty of Physical Education and Science Sport, Al-Mustaqbal University, Babylon, Iraq

muhannad.nazar@umous.edu.iq

Abstract. The paper explores the impact of artificial intelligence (AI) on developing students' footwork in the sport of badminton. It emphasizes the potential of AI in improving motor skills required for badminton and discusses the role of AI in deducing and updating knowledge and skills. The study employs an experimental approach with third-year students at a physical education college in Iraq, focusing on the use of AI techniques and devices to enhance footwork training. The paper highlights positive effects of AI-based training programs, such as promoting healthier muscle strength, improving swing technique, and enhancing communication and cooperation among students. Additionally, it discusses the potential benefits of integrating technology, such as AI, to enhance the effectiveness of footwork training in badminton. The findings indicate a high average use and reliance on AI technologies for improving athletes' performance and suggest the need for further research to evaluate the effectiveness of these techniques and determine the most effective ways to apply them in badminton. Overall, the paper suggests that AI has the potential to significantly impact the development of footwork in badminton and improve athletes' performance, calling for continued exploration and application of AI in sports training.

Keywords. artificial intelligence, footwork

Introduction

Badminton is a sport that requires high motor skills, especially footwork. Artificial intelligence can play an important role in developing these skills in students. (Ahmed, 2023), Artificial intelligence techniques in educational devices and software are able to deduce the knowledge and skills required at a specific time, and thus automatically update what is required and present it to the student in a way that suits his needs and abilities. (Ghazi., 2022), Artificial intelligence is changing the way sports are played and how people communicate with them. This is largely a result of sports being a growing industry as a result of the increased emphasis on analytical activities. Artificial intelligence has been at the heart of sports because of the role that competition plays in the game and its ability to create talent. Strategic innovation and artificial intelligence are important in the sports industry. It is an activity that includes a set of interactions between groups of entities. There is a sense of social engagement between these entities based on achieving a specific goal. (Ghazi M.A., 2022), (Muhommed Asim Ghazi) confirms that artificial intelligence techniques at the present time are among the means and

techniques, the most important of which is obtaining modern data that helps to reach the desired goal and reach the result in the current study (Ghazi, 2022)

Objectives of the study,

- Determining the effect of using artificial intelligence in developing students' footwork in badminton.
- Determine the best methods for using artificial intelligence to improve footwork in badminton.
- Developing a training program supported by artificial intelligence to improve footwork in badminton.

importance of the study

- Improve performance
- . Increase motivation
- . time saving
- . Sports development

Background study

Study variables: Independent variable: Type of training program (traditional vs. supported by artificial intelligence) Dependent variable: Students' performance on the footwork test

Study questions:

What is the impact of using artificial intelligence on developing students' footwork in badminton?

Sub-questions: 1- What is the difference in footwork test performance between students receiving traditional training and students receiving AI-powered training? 2- What foot motor skills do students receiving AI-assisted training demonstrate better than students receiving traditional training? 3- What are the factors that affect the effectiveness of using artificial intelligence in developing students' footwork in badminton?

Terminology of study

- **Artificial Intelligence** : The ability to use computers to analyze data, learn from experiences, and make decisions.

- **Footwork** : The ability to move the feet quickly and accurately in different directions.

Study procedures

The experimental approach was used, and the study sample was third-year students at the College of Physical Education and Sports Sciences at Al-Mustaqbal University in Iraq. They are students who study the badminton curriculum. They are (50) students. The study sample was chosen intentionally from those who practice badminton and are in the sub-team. For the city of Babylon in Iraq, the data was collected by analyzing the movements of the feet using one of the programs for movement analysis using artificial intelligence, which is (Open Pose.Ai).

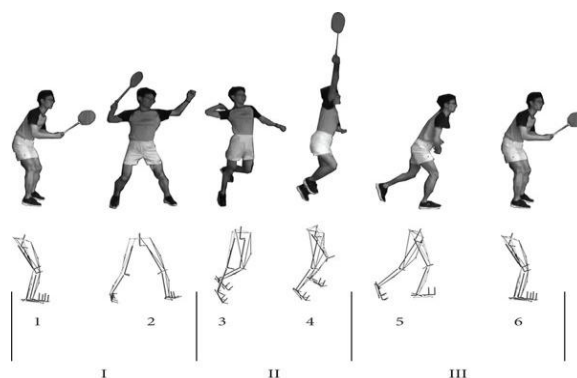
Study questions

What is the impact of using artificial intelligence on developing students' footwork in badminton?

The use of artificial intelligence in teaching badminton has shown positive effects on the development of students' footwork. The use of a Badminton Learning System (BTAS) with a neural network-based machine learning model has been found to promote healthier muscle strength during swing movements, leading to improved swing technique (Kuo, 2023). Intelligent Computer-Assisted Instruction (ICAI) has also been found to improve Great teaching effectiveness and efficiency, enhances communication and cooperation among students and develops their lifelong mathematical awareness (YunFei, 2020). In addition, the use of neural networks and image analysis techniques can help analyze stroke movements and provide recommendations for improving posture and muscle coordination, leading to improved movement Foot (Divya, 2022). Machine learning algorithms, such as Hidden Markov Model (HMM), have been used to classify and recognize badminton strikes in real-time, further contributing to the development of foot movement skills (Ping, 2021). The integration of AI and smartphone teaching methods also showed higher technical movements, theoretical knowledge, interest in learning and satisfaction among students, indicating a positive

Move feet in a game of badminton

Training the feet in badminton has proved useful for various aspects of the fitness components required for the game. One study found that 6 weeks of foot training led to significant improvements in the strength and agility of college badminton players (Mehak, 2022). Another study compared the use of arc support slippers (ASI) and flat slippers (FLI) during the steps of the network and found that ASI led to increased hip bend and smaller reflection angles of the foot, indicating that ASI could improve the dynamic mechanical parameters and performance of the sport (Hung-Wen, 2022). In addition, there are inventions for badminton training devices that use



technology such as height measurement tools, detection units and laser projection units to provide guidance and guidance to trainees during foot training (Eka, 2018). In general, these studies and inventions highlight the importance of foot training in badminton and the potential benefits of integrating technology, such as artificial intelligence, to enhance the effectiveness of training

In Figure No. 1, the badminton stadium simulation appears in our lab including the eight camera placements, motion area and shuttle loading area. (b) detailed blueprint for the clear strike in the rear area; The top image shows the whole body of one of the featured participants and the racket movement; The bottom image shows simulating the movement of his lower limb with the Viscon system.

Figure No. 1

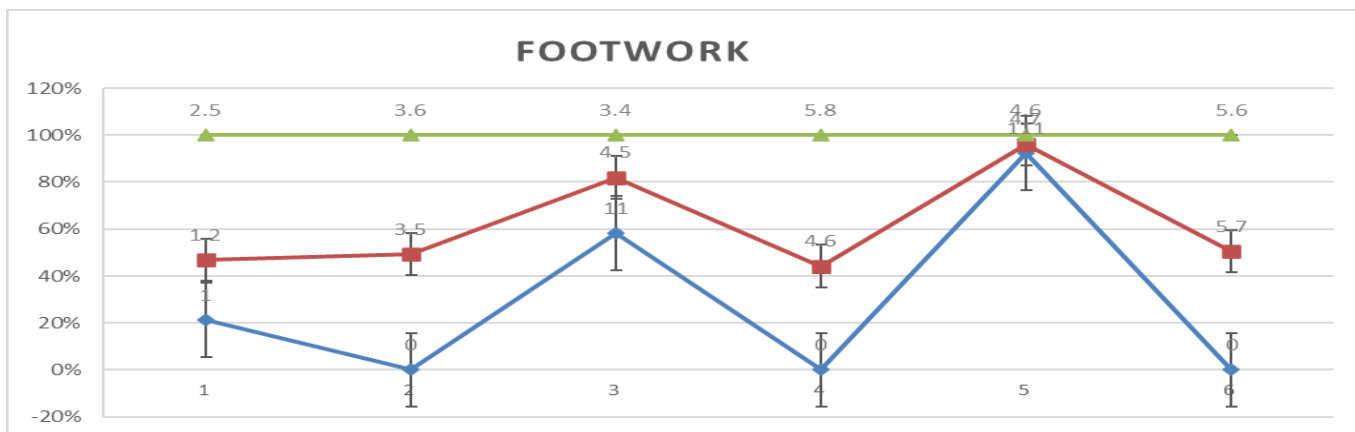


Table No(1)

| Question | Arithmetic mean, | standard deviation | (T) |
|---|------------------|--------------------|-------|
| Have you ever used artificial intelligence techniques to develop footwork in badminton? | 49 | 0.21 | 11.23 |
| Did artificial intelligence techniques help you practice and learn footwork? | 48 | 0.24 | 14.2 |
| Do you use other applications to know foot movement? | 47 | 0.23 | 12.3 |
| Do you rely on techniques to analyze foot movement? | 48 | 0.21 | 13.2 |
| Do you have the ability to use data through artificial intelligence techniques? | 47 | 0.22 | 12.3 |
| Do you have the ability to apply these techniques to badminton? | 46 | 0.12 | 11.2 |

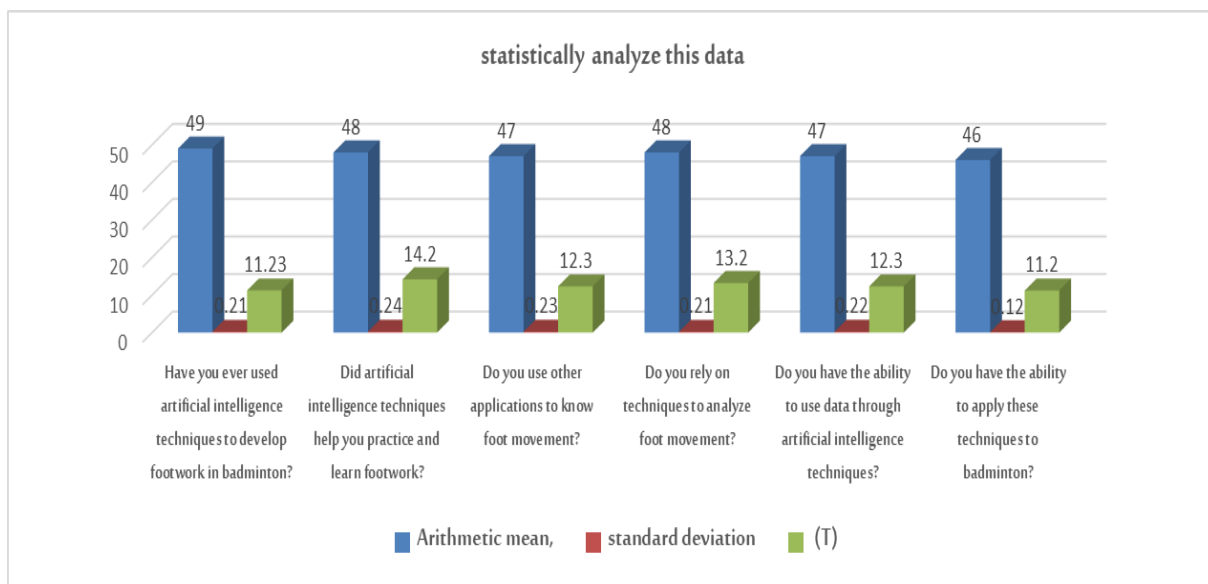


Figure No. 2

In table No(1)& In Figure No.(2)To statistically analyze this data, we can use basic statistical methods such as the arithmetic mean and standard deviation to understand the distribution of the data and present the results in a robust and reliable manner. Arithmetic mean:

Average answers to the question “Have you ever used artificial intelligence techniques to develop movement in badminton?” He is 49. Average answers to the question “Have AI techniques helped you practice and learn movement?” He is 48. Average answers to the other questions range between 46 and 48. standard deviation:

The standard deviation gives us an idea of the dispersion of the data around the arithmetic mean. In this case, the standard deviation ranges between 0.12 and 0.24. Based on these data, some To develop foot movements in badminton, different training

methods and devices can be used. One approach is wearable resistance training (WR), which involves attaching additional loads to the body or limbs to practice high-speed movements and improve foot movement efficiency (Lin, 2022). Another way is to use a badminton training device that includes a badminton throwing machine, height measuring instrument and detection units. This device helps athletes improve their footwork by providing feedback about their posture and stimulating the pace of their movements (Zhou, 2022). Infrared cameras can also be used to enhance training effects by analyzing athletes' movements and adjusting impact points and swing techniques (Joo-Ho, 2024).In addition, predictable and unpredictable training exercises, such as agility training, can improve Foot Speed and Skills in Badminton (Rizal, 2022)These training methods and devices can help athletes improve their footwork and improve their performance in badminton games.

Conclusions and recommendations

There appears to be widespread interest in applying artificial intelligence techniques to developing footwork in badminton.

With a high average use and reliance on AI technologies, these technologies can be effective in improving the performance of athletes.It is necessary to conduct further research and experiments to more accurately evaluate the effectiveness of these techniques and determine the most effective ways to apply them in developing movement in badminton.

These findings and recommendations can help improve the application of artificial intelligence techniques in developing movement in badminton and achieve better results for athletes.

References

1. Ahmed, H. M. (2023). The Effect of Artificial Intelligence Techniques on Motor Interaction and Its Relationship to Some Offensive Skills in Kickboxing (Educational Robot). *Education*, 8(2), 9-14.
2. Divya, G. T. (2022). AI Coach for Badminton. doi: 10.1109/incet54531.2022.9825164.
3. Eka, N. D. (2018). Pengaruh latihan kelincahan terhadap kemampuan footwork permainan bulutangkis. .
4. Ghazi, M. A. (2022). Artificial Intelligence Techniques and Body Position Analysis to Determine the Speed of Hit in Karate.
5. Ghazi, M. A. (2022). The Effect of the Artificial Intelligence Techniques Towards Psychomotor Performance Modelling to Improve Sports Performance in Karate. *Automation, Control and Intelligent Systems*, 10(3), 35-40. <https://doi.org/10.11648/j.acis>.
6. Ghazi., M. A. (2022). An Analytical Method for Evaluating the Performance of the URA MAWASHI GERI Skill Using Time Series and Artificial Intelligence Techniques. *American Journal of Artificial Intelligence*, 6(2), 31-35. <https://doi.org/10.11648/j.a>.
7. Hung-Wen, C. H. (2022). Analysis of Functional Arch Support Insoles on the Biomechanics and Performance in Right-Forward Lunging Step of Badminton Players. *International Journal of Environmental Research and Public Health*, doi:.
8. Joo-Ho, S. K.-H. (2024). *Research on the movement following a badminton stroke. Journal of Digital Convergence*, doi: 10.14400/JDC.2014.12.9.465.
9. Kuo, C. L.-L.-C.-W.-L.-S. (2023). The Effects of the Badminton Teaching-Assisted System using Electromyography and Gyroscope on Learners' Badminton Skills. *IEEE Transactions on L*.
10. Lin, Y. N. (2022). Development of Badminton-specific Footwork Training from Traditional Physical Exercise to Novel Intervention Approaches. *Physical activity and health*, doi: 10.5334/paah.207.
11. Mehak, B. S. (2022). Footwork Training in Colleges' Female Badminton Players: Focusing Performance Outcomes of Strength and Agility. *Global social sciences review*, doi: 10.31703/gssr.2022(vii-iii).03.
12. Ping, W. (2021). Modeling of Badminton Intelligent Teaching System Based on Neural Network. *Wireless Communications and Mobile Computing*, doi: 10.1155/2021/9933285.
13. Rizal, A. F. (2022). *The Effect of Predictable and Unpredictable Training on the Speed of Footwork in Badminton. Kinestetik: jurnal ilmiah pendidikan jasmani*, doi: 10.33369/jk.v6i4.25561.
14. YunFei, H. (2020). Realization of Intelligent Computer Aided System in Physical Education and Training. *Computer-aided Design and Applications*, doi: 10.14733/CADAPS.2021.S2.80-91.

15. Zaharia, N. K. (2020). Sport management programs in business schools: Trends and key issues', Sport Management Education Journal, . *Sports innovation management Anagnostopoulos,*, 10-18.
16. Zhou, H. C. (2022). *Badminton footwork training device.*