CHAPTER 21

Advancement in Physical Education Teaching and Assessment Based on Human-Computer Interaction with Deep Learning

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ABSTRACT

Physical education (PE) is an important topic in higher education that focuses on physical skills in health-promoting activities. Traditional PE in institutions faces challenges to stimulate graduates' interest in sports, resulting in reduced participation and inability to exercise the body. Innovative teaching methods and procedures are accompanied to make PE to the next level. In the previous work, improved energy efficient scalable routing algorithm (IEESRA) consumes less energy while routing the messages, it prolongs the overall network lifetime. Hence, it degrades the performance in assessing the accuracy of students' physical fitness qualities. In this chapter, we proposed a deep learning-based IoT system (DL-IoTS) to monitor every aspect of daily lifestyle. It predicts the students by forecasting the academic perseverance and improves the potential utility of sports applications that change the dimension of PE, including visualization and repetition by incorporated into PE teaching. In this research, the DL-based IoT system (DL-IoTS) promoted wearable technology in IoT-based human-computer interaction for PE.

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DL-IoTS recognizes all the physical activity data of the students. It collects those data using edge computing technology with an IoT platform and then processes it using the YOLOV5 Algorithm. Without the assistance of the Physical instructor, the students can train themselves using wearable technology. The analysis results show that IoT-based Human-Computer Interaction with YOLOV5 Algorithm improves the graduates' strength, speed, and qualities by 95% and provides a more important reference for enhancing PE success. The proposed framework of "DL-IoTS" is demonstrated its ability to independently collect and teach students.

21.1 INTRODUCTION

In recent years, due to the development of information technology, physical education (PE) teaching and training processes have been rapidly improved in all aspects (Kozina et al., 2021). The PE teaching process is directly connected with students' physical fitness, which makes them healthy (Li, Zhang, & Zhang, 2021). There are a lot of shortcomings in school and college-level sports activities in identifying the areas of weakness (Lee & Yoon, 2021) and techniques to improve students' stamina. The improved community expects to enhance the quality of the PE teaching process. The development of various technologies such as deep learning, machine learning, cloud computing platforms, and the Internet of Things (IoT) enables students to perform PE activities better than obsolete methods (Che, Sivaparthipan, & Alfred, 2021). These methodologies help students improve by identifying their weak areas while participating in sports. The network of physical devices that are embedded with sensors, actuators, and software is used to connect and exchange information between devices through the internet (González-Calvo et al., 2022).

IoT technology helps people to communicate with computers over the internet. In this network, the delay is very low so that this technology operates well in almost all real-time environments with less consumption of battery (Jess, McMillan, Carse, & Munro, 2021). Therefore, with the help of recent developments in the field of information technology, PE can be taught, and students' activities can be easily reviewed (Xu, Zheng, & Jia, 2021). It creates an easily adaptable, interactive, simulated, and autonomous environment in teaching. It aggressively monitors athletes' sports activities and various training modes of instructions with the help of machine learning algorithms (Huifeng, Kadry, & Raj, 2020).