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Editorial

Artificial Intelligence (AI), Machine Learning (ML) and Deep Learning (DL) on Health, Safety and Environment (HSE)

Rohollah Fallah Madvari*

Occupational Health Research Center, Department of Occupational Health Engineering, School of Public Health, Shahid Sadoughi University of Medical Sciences, Yazd, Iran• *Corresponding author: Rohollah Fallah Madvari, Email: Fallah134@gmail.com

Artificial intelligence (AI), machine learning (ML) and deep learning (DL) techniques will help humans in the future to predict and detect errors. It remains to be seen what they will do in the field of safety, health and environment (HSE). What will be the various emerging applications of AI such as smart cities, smart buildings, smart industry, smart cars, sensor technologies, robotic devices, etc.? How will it affect HSE? People will face a challenge in the scientific community and industry.

Studies demonstrated that genetic algorithms, neural networks, fuzzy logic, fuzzy sets and ML are the most widely used AI methods in architecture, engineering and construction. [1] In this report, some of the AI activities, which have been carried out in the field of HSE, will be reviewed. Based on the study by Merabet et al., from 1993 to 2020, the use of AI techniques and personalized comfort models, on average, have saved energy consumption (between 21.81% and 44.36 %), and improved comfort (between 21.67 % and 85.77%). [2] Smart buildings can predict the weather, ambient temperature, and solar radiation; they can appropriately change the heating, ventilation, and air conditioning (HVAC) operations, too, based on current and past data. [3] AI focuses on thermal comfort prediction models using various ML algorithms, and implements them in building control systems for energy-saving purposes. [4] The developed neural networks can accurately predict and diagnose the occupational hearing loss threshold of workers. [5] For active noise control, AI can help a lot in noise control in the industry. [6] Regarding lighting and visual comfort of the indoor environment and energy-saving strategy, AI can also be used. [7] In an article, Zhao et al. discussed the prospect of applying ML, including artificial neural network (ANN) control algorithms, in developing active seat suspension systems for vibration control. [8] In 2021, Masood et al. in a review stated that AI has great potential for predicting air pollution in the near future. [9] In different sectors, AI has focused on the development of sensors to detect dangerous situations and the distance of workers. [10] In the field of ergonomics, information obtained through

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physical sensors and biopotential sensors, with analysis through AI systems (ML or DL), can be used in the diagnosis and preventive action of disorders. [11] For example, the signals of wearable sensors to detect and classify the postural and biomechanical load of the worker can be used for preventing musculoskeletal disorders. [11] ML techniques for the prevention of work-related musculoskeletal disorders (WMSDs) have contributed the most to the development of interventions and identification of risk factors. [12] Understanding the challenges of AI in HSE is very important for workers' physical and mental health.

Reference

1. Darko A, Chan AP, Adabre MA, Edwards DJ, Hosseini MR, Ameyaw EE. Artificial intelligence in the AEC industry: Scientometric analysis and visualization of research activities. Automation in Construction. 2020;112:103081.
2. Merabet GH, Essaaidi M, Haddou MB, Qolomany B, Qadir J, Anan M, et al. Intelligent building control systems for thermal comfort and energy-efficiency: A systematic review of artificial intelligence-assisted techniques. Renewable and Sustainable Energy Reviews. 2021;144:110969.
3. Taheri S, Hosseini P, Razban A. Model predictive control of heating, ventilation, and air conditioning (HVAC) systems: A state-of-the-art review. Journal of Building Engineering. 2022:105067.
4. Ngarambe J, Yun GY, Santamouris M. The use of artificial intelligence (AI) methods in the prediction of thermal comfort in buildings: Energy implications of AI-based thermal comfort controls. Energy and Buildings. 2020;211:109807.
5. Aliabadi M, Farhadian M, Darvishi E. Prediction of hearing loss among the noise-exposed workers in a steel factory using artificial intelligence approach. International archives of occupational and environmental health. 2015;88(6):779-87.
6. Lu L, Yin K-L, de Lamare RC, Zheng Z, Yu Y, Yang X, et al. A survey on active noise control in the past decade–Part II: Nonlinear systems. Signal Processing. 2021;181:107929.
7. Baloch AA, Shaikh PH, Shaikh F, Leghari ZH, Mirjat NH, Uqaili MA. Simulation tools application for artificial lighting in buildings. Renewable and Sustainable Energy Reviews. 2018; 3007:26-82
8. Zhao Y, Wang X. A review of low-frequency active vibration control of seat suspension systems. Applied Sciences. 2019;9(16):3326.
9. Masood A, Ahmad K. A review on emerging artificial intelligence (AI) techniques for air pollution forecasting: Fundamentals, application and performance. Journal of Cleaner Production. 2021;322:129072.
10. Pishgar M, Issa SF, Sietsema M, Pratap P, Darabi H. REDECA: a novel framework to review artificial intelligence and its applications in occupational safety and health. International journal of environmental research and public health. 2021;18(13):6705.
11. Donisi L, Cesarelli G, Pisani N, Ponsiglione AM, Ricciardi C, Capodaglio E. Wearable Sensors and Artificial Intelligence for Physical Ergonomics: A Systematic Review of Literature. Diagnostics. 2022;12(12):3048.
12. Chan VC, Ross GB, Clouthier AL, Fischer SL, Graham RB. The role of machine learning in the primary prevention of work-related musculoskeletal disorders: A scoping review. Applied Ergonomics. 2022;98:103574.

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