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Editorial

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

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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.

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