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J Nanomaterials & Molecular Nanotechnology, Volume 8
DOI: 10.4172/2324-8777-C1-057

The emergence of artificial intelligence: Machine learning-based recognition and treatment approach and a case study of clinical data

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Statement of the problem: In recent decades, Artificial Intelligence (AI) has become a very useful and powerful technology which has helped to improve the quality of people's lives worldwide. Machine Learning (ML) is an especial branch of AI to apply various algorithms which can provide smarter AI-based products. These algorithms have been successfully applied on different subjects. The World Health Organization (WHO) has listed Cardiovascular Diseases (CVDs), which includes several types) as the leading cause of death around the globe. Coronary Artery Disease (CAD) is one of the most important types of CVDs. Methodology & theoretical orientation: The Particle Swarm Optimization (PSO) is one of the well-known Evolutionary Algorithms (EAs) which can be used for different purposes. Therefore, a modified and optimized PSO was applied on the Cleveland heart data with 303 records. The PSO algorithm, therefore, was used for producing different rules in heart disease from original data set and then optimization of these rules and producing the best rules using PSO algorithm. In other words, first random rules were generated and then were optimized using proposed PSO. Moreover, C4.5 decision tree algorithm was also applied to check its performance with proposed PSO. Findings: The results showed that the proposed PSO can optimize the generated rules significantly. Moreover, the findings demonstrated that the fitness function applied in our research has valuable impact on the performance of PSO. In addition, the optimized rules by PSO had better prediction accuracy compared with C4.5 algorithm. Conclusion & Significance: Classical PSO can generate different simple rules, however, optimized PSO can be more efficient to show higher accuracy. Moreover, this optimization technique can be used on different clinical and non-clinical data sets.

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