

RESEARCH ARTICLE

FNN for Diabetic Prediction Using Oppositional Whale Optimization Algorithm

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ABSTRACT The medical field is witnessing rapid adoption of artificial intelligence (AI) and machine learning (ML), revolutionizing disease diagnosis and treatment management. Researchers explore how AI and ML can optimize medical decision-making, promising to transform healthcare. Feed Forward Neural Networks (FNN) are widely used to create predictive disease models, cross-validated by medical experts. However, complex medical data like diabetes leads to multi-modal search spaces prone to local minima, affecting optimal solutions. In this study, we focus on optimizing a diabetes dataset from the Pima Indian community, evaluating decision-making performance in diabetes management. Employing multimodal datasets, we compare various optimization algorithms, including the Whale Optimization Algorithm (WOA) and Particle Swarm Optimization (PSO). The test results encompass essential metrics like best-fit value, mean, median, and standard deviation to assess the impact of different optimization techniques. The findings highlight the superiority of the Oppositional Whale Optimization Algorithm (OWOA) over other methods employed in our research setup. This study demonstrates the immense potential of AI and metaheuristic algorithms to revolutionize medical diagnosis and treatment approaches, paving the way for future advancements in the healthcare landscape. Results reveal the superiority of OWOA over other methods. AI and metaheuristics show tremendous potential in transforming medical diagnosis and treatment, driving future healthcare advancements.

INDEX TERMS Feed forward neural network (FNN), oppositional learning, artificial intelligence, meta-heuristic algorithms, whale optimization algorithm (WOA).

I. INTRODUCTION

Machine learning is a branch of science that learns from data and provides insight. One discipline is Artificial Neural Networks (ANN), inspired by neurons in the human brain. The advent of humongous data and excellent computing power

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helps increase neural network's power and use cases. Out of many different types of neural networks available, feed forward is one of the popular oldest neural networks used today.

In the feed forward neural network, the connection from the input to the hidden to-output layer is one-directional. There might be multiple input nodes, each with a specific weight associated and multiplied individually to sum up the