

# A Systematic Literature Review Of Mental Health Diagnostic Using K-Nearest Neighbour -Whale Optimization Algorithm

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## ABSTRACT

People including unborn infants are negatively impacted by a number of things, such as noise. Noise and the others aspect could affect somebody mental health. Mental health as natural problem might be easier detected using metaheuristic algorithm, K-Nearest Neighbour - Whale Optimization Algorithm (KNN-WOA) is one of them. A variety of trustworthy sources, including IEEE and Scopus, are used to collect the data. In the action research technique, practical applications work as a "Laboratory" for testing hypotheses on synthesized products. There are three fundamental ideas in regard to using WOA for medical purposes. KNN will be used according to the plan for medical diagnostics. WOA, a population-based approach, uses a randomized collectivist humpback whale sample to enhance potential solutions as feature selection while KNN as the main algorithm. Only three of the 94 journals collected met the set standards.

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## 1. Introduction

Nowadays, the majority of people reside in metropolitan regions. The health problem of people from all walks of life, including unborn newborns, is negatively impacted by a number of factors, including noise, according to Gupta et al. (2018). (2018). In one city in southern India, this happened. In order to maintain mental wellness, time management must be optimized.

In the year 2017, IBM first unveiled a solution to address health care concerns. IBM predicted that Artificial Intelligence (AI) would transform the field of mental health within the next five years, placing a special emphasis on diagnostic testing. The doctor will make a better, more precise diagnosis, and the patient's condition will become better (IBM, 2017).

Robotics, language learning, speech learning, machine [algorithm] learning, and autonomous subject-matter knowledge are all important aspects of the study of artificial intelligence (AI) in computer science (Hodgson et al., 2018 ). Psychiatry is reportedly beginning to understand how such technology could improve people's quality of life, particularly in relation to AI-based health problem solutions (Wykes, 2019; Bhugra, 2017).

The Whale Optimization Algorithm (WOA), a metaheuristic algorithm, enhances the bubble-net humpback whale hunting approach (Mirjalili, 2016) and resembles humpback whales' foraging (Mafarja & Mirjalili, 2017). Rajeshkumar and Kousalya claim that the WOA's backpropagation neural network technique may effectively address

the issues of medic categorization (Rajeshkumar and Kousalya, 2017). Many studies have been done in this area. Thus, a grouping research in the medical field utilizing WOA was required.

## 1. Literature

The subject of the following comparison is the same as or comparable to that of the Best Whale (BW), which was developed under the presumption that the object's position will change with each wave (Mirjalili and Lewis, 2016).

$$D = |CX^*(t) - X(t)|$$

$$(t + 1) = X^*(t) - AD$$

The iterations that come after the current one in the aforementioned example are all bound by  $t$  and  $t+1$ .  $X$  and  $X$  awakened the proper pope and all of BW's belongings. This isa constraint for  $A$  and  $C$ .

$$A = 2ar - a$$

$$C = 2r$$

The uncommon parameters in the range of  $[0,2]$  and  $[0,1]$  are "a" and "r". Simulate the conversion of 2 to 0 in one step to achieve the desired result. In this topic, spiral geometry is discussed (Mirjalili and Lewis, 2016).

$$(t + 1) = D'e^{bl} \cos(2\pi l) + X^*(t)$$

In the previous illustration,  $l$  is a random number between  $[-1, 1]$ , and  $b$  is a constant that is used to alter the spiral curve. Using the following formula, the distance  $D$  between each whale and its prey is balanced: 2016's Lewis Mirjalili.

$$D' = |X^*(t) - X(t)|$$

As can be observed in the spiral generator and the shrinking environment indicated above, each whale is accurately searching for prey by changing its position to match the whale that was inserted accurately, as opposed to moving toward BW. These are some facts regarding random number generators (Mirjalili and Lewis, 2016).

$$D = |CX_{rand}(t) - X(t)|$$

$$(t + 1) = X_{rand}(t) - AD$$

The realistically portrayed whale in the aforementioned illustration is named  $X_{rand}$ . In light of the correspondence noted above that puts exploitation and espionage techniques in danger.

## 2. Method

### Collecting

#### Data

Data is gathered from a number of reliable sources, including IEEE and Scopus. Purposive random sampling, which involves taking samples using random methods with preset inclusion criteria, was used to collect the data.

#### Data Analytical

Practical applications serve as a "Laboratory" in the action research methodology for testing theories. It is well accepted that neither technology nor people nor processes alone can determine how technology is used in the field of information systems.

The current study uses the four steps of the simplification process—diagnosis, planning, implementation, and evaluation.

## 3. Result

The use of metaheuristic algorithms (MAs) to solve optimization issues has increased over the past few decades in a variety of industrial and scientific domains (Talbi, 2009), any optimization problem can be solved using a class of general-purpose stochastic

algorithms known as metaheuristics (Glover & Kochenberger, 2006).

On synthetically created goods. There are three fundamental ideas in regard to using WOA for medical purposes. WOA will be utilized for medical purposes, according to the plan. The results of publications that were assessed by researchers as potential literature areas follows:

No	Theme	Authors, Years, Publisher	Summary
1	The Optimal Feature Selection for Heart Disease Prediction Using the Modified Whale Optimization Algorithm	Geethanjali, M. & Madhubala, P., 2020, International Journal of Innovative Technology and Exploring Engineering (IJITEE)	To determine highlights, they use Modified Whale Optimization Algorithm (MWOA). Using the Rapid digger as an instrument, computations using Random Forest, (ANN), Decision Tree, and Naive Bayes (NB) are used as highlight choosing techniques, and improvement is seen in the results by proving the accuracy. The proposed analysis shows that the grouping strategy for artificial neural networks produces higher results in terms of Accuracy, Recall, Precision, and F-measure.
2	Machine Learning for Mental Health Prediction: Taxonomy, Applications, and Problems	Chung, J. & Teo, J., 2022, Applied Computational Intelligence and Soft Computing	The screening and identification procedures resulted in the inclusion of a total of 30 research publications in this review. As the author discuss the results, they consider the difficulties and constraints that machine learning researchers have encountered while studying mental health issues.
3	An Organized and Meta-Analytical Review of the Whale Optimization Algorithm	Mohammed, H. M., Umar, S. U., & Rashid, T. A., 2019, Journal of Computational Intelligence and Neuroscience	The survey's results indicate that WOA as feature selection performs better than other common algorithms in terms of convergence speed and balancing between exploration and exploitation. WOA modifications and hybridizations also perform well compared to WOA.

The World Health Organization (WHO) provides regional status reports on various obstacles to diagnosing mental health issues and encourages scientists to have the scientific knowledge necessary to solve the problem of mental health. Due to technological advancements, there are now several methods for predicting one's mental health. The amount of research in the area of mental health has expanded recently, which has helped to spread knowledge and publications about the various aspects of mental health that can be used to solve a variety of issues.

The process of identifying mental health issues is not simple and cannot be completed in a short amount of time. A particular interview with a lot of questions regarding symptoms, medical history, and physical examination will typically precede the diagnosis. Also, there are psychological exams and evaluation tools that can be used to identify a person's mental health issues.) Many studies have been conducted to look into and analyze facial motions to spot specific mental diseases.

Information about appropriate methods to lessen mental health issues has increased as a result of increased research in the field of mental health. The particular causes of mental diseases, however, remain unknown and uncertain. Many different methodologies and learning methods are thought to have been introduced by machine learning. For instance, supervised learning and unsupervised learning are two popular machine learning techniques. With supplied labelled data input, supervised learning is a method that predicts the eventual result. The goal of this learning is to interpret the data

in relation to the particular measurements. Supervised learning is effective at classification and regression issues. The supervised learning seeks to make sense of the data on its own, in contrast to the unsupervised learning. There are no standards or measurements in unsupervised learning.

Moreover, ensemble learning is a method that intentionally combines and generates classifiers to address a certain issue. Ensemble learning is mostly used to enhance model performance or lessen the likelihood of selecting models with subpar performance. Moreover, due to its propensity to resolve a wide range of issues, including image identification, audio recognition, and natural language processing, neural networks and deep learning have recently gained increased popularity among machine learning methodologies. These methods allow the algorithms to learn from the observational data because they are based on the neural networks of the brain.

## **Discussion**

### **WOA**

#### **Structure**

Several efficient metaheuristics to identify the best solution for various issues were developed as a result of inspiration from and imitation of the behaviors of living things. The two primary kinds of MAs based on their source of inspiration are evolutionary and swarm intelligence algorithms. Evolutionary algorithms are those that mimic an evolutionary process found in the natural world. These methods use evolutionary concepts to enhance a population of solutions that were produced randomly for a specific optimization issue (Nadimi-Shahraki et al., 2021).

A population-based method called the Whale Optimization Technique (WOA) uses a randomized collectivist humpback whale sample to improve prospective solutions (Mirjalili and Lewis, 2016). A huge number of academics have researched WOA because of its drawbacks. Many of them used various tactics and procedures to enhance the whale optimization algorithm (Wang et al., 2022; Chakraborty et al., 2021).

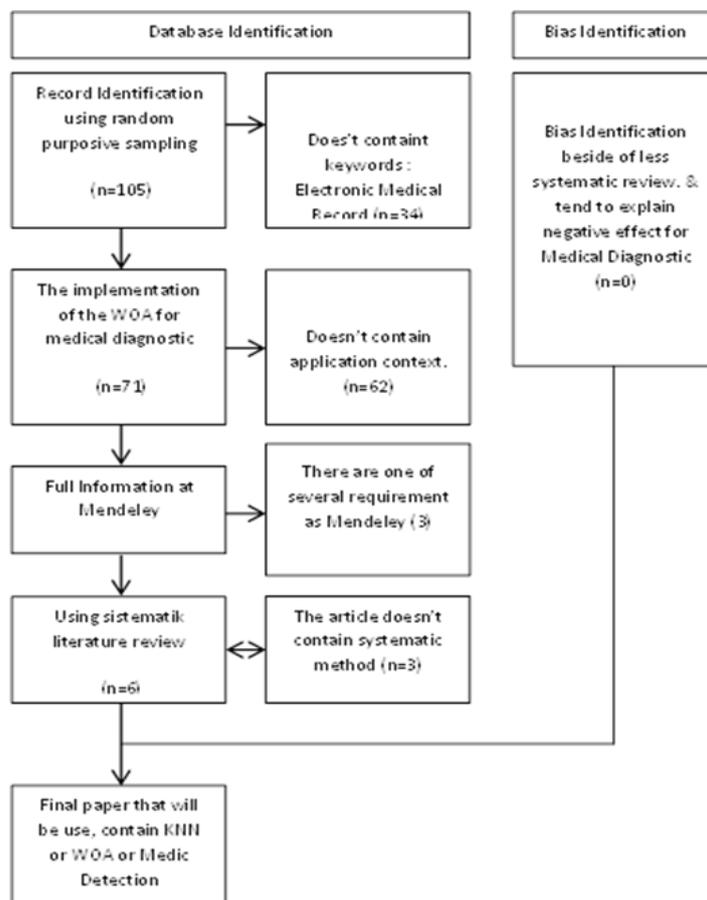
This is how the whale satisfies his hunger by producing spiral-shaped bubbles. The Pope travels by exploitation and discovery everywhere he goes (Mirjalili and Lewis, 2016). A trick is performed using a spiraling, descending, and circular generator. The first is that each whale crosses over perfectly and strikes the target. Each whale engages the spiral curve in the second technique as it is propelled in the direction of the target.

$P$  is randomly selected from the range  $[0, 1]$ . Pope will beep if  $p$  is more than or equal to 0.5. If not, you must be aware of  $A$ 's market value. When  $|A|$  is near to or equal to 1, the reduction shrink procedure will start. If not, Whale will behave as was initially foreseen: strangely. It is crucial to understand that  $A$  values may begin larger than 1, enabling further research. Given that the value of  $A$  is likely to fluctuate between 1 and 2, this causes shrinkage to stretch more than it would normally when compared to the numerical value.

As a result, both the beginning and the end of the algorithm behavior need more exploration. Since WOA was developed to address problems with long-term optimization, we must change it to a silent room to be consistent with the weighted components of the Patient dataset (Mirjalili and Lewis, 2016).

Machine learning algorithms have been used in the medical industry to find novel medications, analyze radiographs, forecast epidemic outbreaks, and diagnose diseases. Machine learning algorithms are typically used as tools to examine the enormous medical data sets. As they became more dependable in their performance, they were used as tools to aid in medical diagnosis.

Machine learning and data mining techniques occasionally continue to advance quickly. More sophisticated neural networks, decision trees, gradient boosting, and other powerful algorithms have been developed and used to address more challenging medical diagnosis issues. Talked about mental health diagnostic using metaheuristic algorithm especially KNN-WOA, beneath are the selection process:



With the help of academic publication repositories and specified keywords, relevant research papers and other documents are acquired and collected. The documents are then identified and divided into several sections on mental health issues.

The article's conclusion outlines how 3 out of the 105 journals gathered by different WOAs satisfied preset standards. Many optimization issues have been solved with WOA in a variety of applications, including disease diagnosis (Wang & Chen, 2020), software defect prediction (Zhu et al., 2021), feature selection (Mohammadzadeh & Gharehchopogh, 2021), clustering (Rahnema & Gharehchopogh, 2020; Kotary & Nanda, 2020), global optimization (Chakraborty et al., 2021), scheduling (Jiang et al., 2018), parameter estimation (Yousri et al., 2019), classification (Tharwat et al., 2017; Abidi et al., 2020), photovoltaic energy generation systems (Olivia et al., 2017), image segmentation (Lang & Jia, 2019), and forecasting (Wang et al., 2017; Zhao, et al., 2017).

While WOA is simple to use and effective for tackling a variety of optimization problems, it lacks the performance to address complex issues. The algorithm has issues with early local optima convergence and an uneven distribution of exploration and exploitation. When the WOA is employed to address complicated issues, these issues result in subpar performance.

#### 4. Conclusion

Many factors, including noise, have a harmful impact on people from all walks of life, including unborn children. In the medical field, a grouping research utilizing WOA was required. The data are gathered from a number of reliable sources, including IEEE and Scopus. Practical elements of the action research technique were critically examined.

##### **Prisma Result Identification**

Applications serve as a "Laboratory" where theories about synthesized goods are tested. Regarding the use of WOA in medicine, there are three key concepts. The proposal calls for the use of WOA for medical purposes. A randomized collectivist humpback whalesample is used in the Whale Optimization Method (WOA), a population-based approach, to improve prospective solutions. Out of the 74 journals gathered, only three matched the requirements.

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