

Use of Nature-inspired Computing Techniques in Real World Applications (2010-2019)

A Brief Review

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Abstract:

Nature-inspired computing techniques are the emerging computing techniques that have been used in a wide sphere of applications. The study presents a brief review of some of the major applications of these techniques. This study is restricted to the manuscripts which were published during 2010-2019 only. It is not possible to cover a large number of applications in one single brief study. Therefore, here, four different types of applications such as disease diagnosis, query optimization, sentiment analysis and stock data mining have been only considered.

Keywords: Nature-inspired computing, disease diagnosis, query optimization, sentiment analysis, stock data mining.

1. Introduction

As stated earlier, Nature-inspired computing techniques are the emerging computing techniques that have been used in a wide sphere of applications. It has been successfully used to solve different application area like disease diagnosis, query optimization, sentiment analysis, stock prediction, agriculture applications, task scheduling etc. in this manuscript, the brief review of use of NIC techniques related to four major applications area viz. disease diagnosis, stock prediction, sentiment analysis and query optimization has been taken.

2. Review results

Table 1 briefly depicted the use of NIC in the four major (disease diagnosis, stock prediction, sentiment analysis and query optimization) applications areas.

S.No.	Authors and Year	Application	Techniques used	Concluding Remarks
1.	Youness Khourdifi and Mohamed Bahaj, 2019 [1]	Heart	Particle swarm optimization (PSO), Ant colony optimization (ACO), K-NN	A PA-KNN (fusion of PSO, ACO and KNN) method was proposed for the effective diagnosis of heart disease.
2.	Gehad Ismail Sayed et al., 2017[2]	Alzheimer's disease (AD)	Moth flame optimization	An automated system for the diagnosis of AD was proposed using a dataset of 20 patients.
3.	Harikumar Rajaguru and Sunil Kumar Prabhakar, 2017[3]	Epilepsy	Artificial Bee Colony and particle swarm optimization	An excellent rate of accuracy was achieved in the diagnosis of epilepsy using hybridization of ABC and PSO.
4.	S. Anto, S. Chandramathi, 2015[4]	Hepatitis Diagnosis	SVM, GA, Simulated Annealing	A CDSS system was proposed for the diagnosis of hepatitis in

				patients using a fusion of SVM, SA, and GA classifiers.
5.	Margarita-Arimatea Díaz Cortés et al., 2018[5]	Breast Cancer	Dragonfly Algorithm	A novel optimization method, dragonfly method was proposed for the effective and reliable results in the diagnosis of breast cancer using thermography images.
6.	Gadekallu Thippa Reddy and Neelu Khare., 2017 [6]	Diabetes	Firefly Algorithm (FA), BAT Algorithm	An optimization algorithm FFBAT-ANN was proposed for diabetes classification
7.	Deepak Gupta et al., 2018 [7]	Parkinson's Disorder	Crow Search Algorithm (CSA)	An optimized version of CSA was proposed for finding out the optimal set of features for the early prediction of PD.
8.	Nguyen Cong Long et al., 2015[8]	Heart Disease	Firefly Algorithm	The proposed method i.e. FA found to better in the diagnosis of heart disease as compared to traditional methods (SVM, ANN, and Naïve Bayes)
9.	Shalini Gambhir et al., 2017[9]	dengue disease	PSO, ANN	A hybridization of PSO and ANN was used for early prediction of dengue disorder on a dataset of 110 patients.
10.	Prerna Sharma et al.,2018 [10]	Parkinson's Disorder	Grey wolf optimization (GWO)	A modified GWO (MGWO)algorithm was proposed for feature selection. The performance of MGWO was measured using handwriting and voice datasets.
11.	Anuradha et al., 2018[11]	Diabetes	ACO	A novel fuzzy-rule miner algorithm (ANT_ FDCSM) derived from the ACO technique for the early detection of diabetes was proposed.
12.	Ming Zhang et al.,2017[12]	Depression	PSO, SVM	A hybridization of PSO and SVM was proposed for the diagnosis of depression in humans.
13.	Gorla, N., Song S. K. (2010). [13]	Query optimization	Genetic Algorithm	Authors have provided the GA based query optimizer for OLTP queries.
14.	Kumar, Akshi, and Renu Khorwal 2017 [14]	Sentiment Analysis	Firefly algorithm	A firefly algorithm has been employed to select optimal features for solving the sentiment analysis problem.
15.	Sharma, Manik, et al (2013) [15]	Query optimization	Restricted Genetic Algorithm	A distributed query optimizer using restricted genetic approach has been proposed.

16.	Sharma, Manik et al. (2018) [16]	Stock	Traditional Data Mining	Supervised learning techniques were used to solve the stock prediction problem.
17.	Kaur, Prableen, and Manik Sharma (2019) [17]	Disease diagnosis	NIC Techniques	An extensive review of different psychological disorders mined using differently supervised and NIC has been provided.
18.	Kumar, T. V et al. (2013) [18]	Query optimization	HBMO.	A novel query optimizer designed using HBMO was proposed.
19.	Wagh, A., & Nemade, V. (2017). [19]	Query optimization	Ant colony optimization	
20.	Sharma, Manik et al. (2019) [20]	Query optimization	Nature inspired computing techniques	An extensive review on OLTP, DSS and energy efficient query optimizer has been presented.
21.	Gautam, Ritu et al. (2019) [21]	Disease diagnosis	Insect based computing	A review on the use of different insect-based computing algorithms used in the diagnosis of diabetes and cancer has been depicted.
22.	Sharma, M et al. (2018) [22]	CDSS query optimization	hybrid Firefly and controlled GA	A hybrid DSS query optimizer designed using the combined feature of Firefly and genetic algorithm.
23.	Sharma, M et al. (2017) [23]	Disease diagnosis	Data mining and NIC	An advanced conceptual diagnostic healthcare framework for diabetes and cardiovascular disorders has been presented.
24.	Sharma, M., G. Singh, and R. Singh [24]	Disease diagnosis	Nature-inspired Techniques	In this manuscript, authors have provided a stark assessment of various lifestyle based diseases among human beings.
25.	Kaur, Prableen, and Manik Sharma (2017) [25]	Fatal human diseases	Nature-inspired Techniques	This paper provides a review on using NIC for diagnosis of fatal human disorders.
26.	Sharma, Manik et al. (2019) [26]	Sentiment Analysis	Genetic algorithm	A sentiment analyzer based upon GA has
27.	Sharma, Samriti et al. (2019) [27]	Disease diagnosis,	NIC	In this manuscript, the author has presented an extensive review on the use of various classification and NIC computing techniques

				for solving the variety of problems in major research areas.
28.	Sharma, Samriti et al. (2019) [28]	Stock	Nature inspired computing techniques	Authors have presented an extensive review of the use of NIC in stock data mining.
29.	Ahmad et al. (2019) [29]	Sentiment analysis	Ant colony optimization	ACO-KNN algorithm was proposed for text feature selection method. Wrapper method with ACO was used for feature selection and KNN was used to select the optimum features.
30.	Tuba et al. (2019) [30]	Sentiment analysis	Intelligent Water Drops	Best features are selected using IWD technique for sentiment analysis.
31.	Mohammad et al. (2019) [31]	Sentiment analysis	Whale Optimization Algorithm	An algorithm was proposed using WOA and SVM in selection features for sentiment analysis.
32.	Abdulaziz et al. [32]	Sentiment analysis	Cat swarm optimization	CSO-LSTMNN algorithm was proposed for sentiment analysis.
33.	Kumar et al. (2017) [33]	Sentiment analysis	Firefly algorithm	Firefly algorithm was used to selection the features and SVM was used as a classifier.
34.	Zhang et al. (2019) [34]	Stock price forecasting	Firefly algorithm	Support vector regression with FA was used to forecast the stock price.
35.	Sedighi et al. (2019) [35]	Stock price forecasting	Artificial Bee Colony	ABC with SVM and ANFIS was used to forecast the accurate stock price.
36.	Asadi et al. (2019) [36]	Stock price forecasting	Genetic algorithm	GA with RIPPER method was used for stock market prediction.
37.	Iqbal et al. (2019) [37]	Sentiment analysis	Genetic algorithm	GA with PCA was used for feature selection in sentiment analysis.
38.	Uma et al. (2019) [38]	Sentiment analysis	Grey Wolf Optimization	The author proposed a sentiment analysis method using GWO which is used for social

				web big data sentiment trend analysis problem.
39.	Sharma M., Samriti, Singh G. (2019) [39]	Healthcare Framework	IoT, Energy Efficient Nature inspired computing techniques.	Finally, the need and design of energy-efficient IoT-based healthcare system for psychological and neurological disordered patients have been proposed.

Conclusion

In this paper thirty nine different articles related to the use of nature inspired computing techniques in four different majore areas have been studied. Nature-inspired computing techniques are dominant computing techniques that have been inspired by the natural behaviour of different aspects of nature. In the last ten years, these techniques have been frequently used to solve the problems related to query optimization, disease diagnosis, query sentiment analysis and stock data mining. The paper presented a brief review of some of the major manuscript that has been published in the last ten years.

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