

REVIEW

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About: Dissertation work of Edjola Naka

Title “ Optimization Algorithms for Data Management”,
submitted for the acquisition of the educational and scientific degree
“Doctor”, doctoral program “Informatics”, professional field 4.6
“Informatics and computer sciences”, scientific field 4. Natural sciences,
mathematics and informatics.

I. Relevance of the thesis

At the current rate, the data industry generates about 2.5 quintillion bytes of data per day. Proper understanding, analysis and reporting of this data is essential to help decision makers and industries make optimal decisions. Public and non-public organizations research, study and heavily fund the healthcare field, one of the largest industries, in order to interpret and predict diseases. The volume of data generated in the medical field is staggering and continues to grow rapidly. Clinical data, genomic data, imaging data, sensor data and IoT data in healthcare are some of their sources. However, the management and exploration of this data presents significant challenges in terms of storage, processing, privacy protection and data integration.

This dissertation explores the application of optimization algorithms and machine learning to help combat Parkinson's disease,

The main goal is formulated: *To design and improve new metaheuristic optimization algorithms to solve the feature selection problem for Parkinson's*

prediction using ML classifiers, focusing on improving the performance, efficiency and runtime of Parkinson's prediction algorithms.

II. General characteristics

The thesis submitted to me consists of 165 pages, 25 figures, 33 tables and bibliographic sources. The main text is divided into an introduction, 3 chapters and a conclusion. The structure is well formed. The references used in Cyrillic, Latin and Internet addresses are 287.

The object of this study is the application of metaheuristic optimization algorithms and machine learning that can be applied to detect features based on Parkinson's datasets that are not useful for improving prediction accuracy, and to reduce the average size of the number of selected features.

III. Evaluation of the scientific results and contributions of the thesis

As main contributions I accept the achievements mentioned by the author of the thesis, namely:

- An analysis of the widespread use of metaheuristic optimization algorithms for feature selection in data processing in combination with machine learning methods is performed, with a special focus on Parkinson's disease prediction.
- A comparative analysis is performed to evaluate different feature selection methods (filter and wrapper) for predicting Parkinson's disease by evaluating the subsets using three machine learning classification algorithms and considering the optimization of their parameters with a generalized Simulated Annealing heuristic algorithm.

- A novel and efficient binary feature selection algorithm is proposed, which predicts Parkinson's disease with higher accuracy and has a faster convergence rate than most other metaheuristic optimization algorithms.
- An integration of an "opposition-based learning" technique into the binary volleyball Premier League algorithm is proposed, which improves its exploration ability and its performance in predicting Parkinson's with higher accuracy.
- A new hybrid metaheuristic algorithm of Binary Volleyball Premier League and Antlion Optimizer algorithm is proposed, which aims to search for a new optimal solution and improve the usage of Binary Volleyball Premier League algorithm by considering the advantages of BALO. The hybrid metaheuristic improves Parkinson's predictability and contributes in a more efficient metaheuristic Binary Volleyball Premier League algorithm.
- A procedure to reduce the runtime of the proposed hybrid metaheuristic algorithm Binary Volleyball Premier League and Antlion Optimizer called "event list" is proposed, which improves its efficiency by avoiding redundant fitness function computations.
 - An efficient method is proposed to reduce the dimensionality of the data and to select the most relevant features by incorporating two algorithms: a cosine similarity-based feature ranking algorithm and a hybrid metaheuristic algorithm Binary Volleyball Premier League and Antlion optimizer algorithm in the most efficient time.

IV. Evaluation of

So far, the PhD student has 7 publications on the dissertation, of which 6 are at international scientific conferences and 1 is in a scientific journal with Q3

V. Critical notes

I have no critical remarks

VI. Final evaluation

The dissertation work is an independent author's scientific research with significant scientific and applied character. I positively appreciate the contributions of Edjola Naka's dissertation, the results of which have been popularized among the scientific community. I consider that they are scientifically applied and applied and meet the requirements of the RASDP Act and the Implementing Regulations of the RASDP Act. I recommend the scientific jury to award to doctoral candidate Edjola Naka the degree of Doctor of Education and Science in Professional Field 4.6 "Informatics and Computer Science", Doctoral Programme "Informatics".

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