

AN IMPROVED METHOD USING FUZZY
SYSTEM BASED ON HYBRID BOAHS FOR
PHISHING ATTACK DETECTION

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SUPERVISOR'S DECLARATION

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I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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Thesis submitted in fulfillment of the requirements
for the award of the degree of
Master of Science

Faculty of Computing
UNIVERSITI MALAYSIA PAHANG

MARCH 2022

ACKNOWLEDGEMENTS

From the very bottom of my heart, I would like to thank Allah for giving me his blessings and wellness to successfully complete my thesis. Next, I would like to give my biggest appreciation and gratefulness to my supervisor, Ts. Dr. Mohd Arfian Ismail for being a great helper, guider and giving me full support in the process of accomplishing this thesis. I would also like to express my gratitude to the sponsor for this research. This study was supported by Fundamental Research Grant Scheme (FRGS) with Vot No. FRGS/1/2018/ICT02/UMP/02/2: RDU190113 from Ministry of Education and managed by Universiti Malaysia Pahang.

I am also thankful to all my family members especially my parents for giving and shower me with the never-ending love and support throughout my life. Not to forget, a big thank you to all my friends for always being by my side through good and bad times and keep encourage me to complete this project perfectly.

Last but not least, thank you everyone who directly or indirectly involved with my master's study. I heartily appreciate all your helps and encouragement.

ABSTRAK

Sistem kabur ialah sistem yang berasaskan peraturan yang menggunakan kepakaran manusia di mana ia memegang nilai kebenaran atau fungsi keahlian untuk membuat keputusan tertentu. Walau bagaimanapun, sukar untuk menghasilkan parameter kabur secara manual apabila diterapkan pada masalah yang terlalu rumit untuk diselesaikan. Oleh itu, algoritma metaheuristik sebagai kaedah pengoptimuman diperlukan untuk menyelesaikan masalah ini. Satu eksperimen kecil telah dihasilkan untuk memilih algoritma metaheuristik terbaik di mana tujuh algoritma metaheuristik dianalisis dari segi pengukuran prestasi mereka yang melibatkan “accuracy”, “recall”, “precision”, dan “f-measure”. Algoritma tersebut ialah “Genetic Algorithm”, “Differential Evolution Algorithm”, “Particle Swarm Optimization”, “Butterfly Optimization Algorithm”, “Teaching-Learning-Based Optimization Algorithm”, “Harmony Search Algorithm” and “Gravitational Search Algorithm”. Kaedah kajian yang dicadangkan adalah untuk membaiki masalah yang berlaku dalam system kabur dengan menggunakan kaedah pengoptimuman. Selain itu, “Butterfly Optimization Algorithm” dan “Harmony Search” telah digabungkan sebagai kaedah pengoptimuman yang membawa kepada kaedah baru dinamakan “BOAHS”. Algoritma yang dicadangkan telah memanfaatkan kelebihan kedua-dua algoritma tersebut untuk mengimbangi proses pencarian “exploration” dan “exploitation”. Eksperimen ini dijalankan dengan menggunakan teknik “k-fold cross validation” untuk meramalkan prestasi algoritma klasifikasi. Dengan itu, dua dataset; Laman Web Phishing Dataset dan Phishing Laman Web Dataset telah digunakan untuk menguji prestasi kaedah yang dicadangkan. Hasilnya, nilai ketepatan purata untuk kedua-dua dataset masing-masing adalah 98.69% dan 98.80%. Kaedah yang telah dicadangkan telah terbukti mengatasi kaedah-kaedah lain termasuklah algoritma BOA dan HS yang asal.

ABSTRACT

A fuzzy system is a rule-based system that uses human experts' knowledge which holds the truth or false values to make a particular decision. However, it is difficult to generate fuzzy parameters manually to classify data when it comes to a very complex problem. Therefore, metaheuristic algorithm as the optimization method is needed to solve this issue. A small experiment was being performed to choose the best metaheuristic algorithm where seven metaheuristic algorithms were analyzed in terms of their performance measurement that including accuracy, recall, precision, and f-measure. The algorithms involved were Genetic Algorithm, Differential Evolution Algorithm, Particle Swarm Optimization, Butterfly Optimization Algorithm, Teaching-Learning-Based Optimization Algorithm, Harmony Search Algorithm and Gravitational Search Algorithm. The proposed method of this study is to cater the problems occur in fuzzy systems by using optimization method. Moreover, Butterfly Optimization Algorithm and Harmony Search Algorithm were combined as optimization method led to a new method named BOAHS. The proposed algorithm has utilized the advantages of both algorithms to balance the exploration and exploitation search process. The experiment was executed by using k-fold cross validation techniques for predicting the classification algorithm performance. Thereby, two datasets; Website Phishing Dataset and Phishing Websites Dataset were used to test the performance of the proposed method. As a result, the average accuracy value for both datasets are 98.69% and 98.80% respectively. The proposed method has proven to outperform the other methods including the standard BOA and HS algorithm.

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