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An Efficient Partial Black Widow based Neural Network (PBW-NN) for Acute Myelogenous Leukemia Prediction

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ABSTRACT
The higher mortality rate with the number of new cases of Acute Myelogenous Leukemia (AML) increased day by day due to improper treatment and delay in diagnosis. As of late, the hematological specialists utilized minute examination of fringe blood smear to analyze the hematological issues. Partial Black Widow based Neural Network is proposed to identify the AML. The proposed work is actualized in MATLAB stage with various execution measurements. Tentatively, the proposed strategy achieves preferred identification rates over other condition of-workmanship techniques.
Keywords: PBW-NN, Partial Black Widow, Optimization, Blood Cancer Prediction, Acute Myelogenous Leukemia (AML).

I. INTRODUCTION

Due to malignant WBC, the damages have occurred to different human body parts including the brain, spleen, kidney, liver, and etc., that may lead to another deadly type of cancers. While contrast to normal cells, this Leukemia cell contains more survival time with abnormality growth [1-16]. Leukemia is categorized into acute or chronic. Acute Leukemia is growing quickly due to fatal within some moths when if not treated but chronic Leukemia takes more time interval for development [17-45]. Further, Acute Myeloid Leukemia and Acute Lymphoblastic Leukemia are the common types of Acute Lymphocytic Leukemia that are also termed as Acute Myelogenous Leukemia (AML). Acute Lymphoblastic Leukemia is classified into three kinds of cells such as L1, L2 and L3, which are similar in shape with smaller in sizes. Compared to the L1 type, the L2 type cell is oversized with shape variability. But, the L3 cell types are regular in shape with similar shapes [46-59]. Hematologic infections, similar to some other medical care fields, produce a tremendous measure of information. Customary measurements isn't sufficient to investigation these information, utilizing information mining procedures is a superior option Many sorts of examination were done in this field, attempting to find another information or examples which can assist the mankind with recognizing sicknesses and in best case foresee it prior to occurring, by applying various kinds of information mining strategies and techniques [54,55].

II. RELATED WORKS

Shankar et al. [65] recommended k-implies grouping and backing vector machine (SVM) to consequently perceive the Acute Myelogenous Leukemia in blood minute pictures. At first, the pictures are acquired from the patient's blood spreads with typical and Acute Myelogenous Leukemia cases. The white platelets are portioned by utilizing shading division instrument. From the whole picture, the discriminative highlights, for example, shape, shading and surface highlights are removed and furthermore, the SVM groups whether the picture is dangerous or non-harmful. The exhibition proportions of exactness, particularity and affectability boundaries were utilized to assess the classifier execution. The k-mean bunching calculation was proposed by Wei et al. [66]. this strategy consequently distinguishes the Acute Myelogenous Leukemia. For leukemia analysis, the best strategy is the tiny assessment of bone marrow or blood test. The k-implies bunching strategy can section, channel, and improve the platelet pictures, especially regarding morphological characters. The current technique, for example, Naive Bayes (NB) and Nearest Neighbor (NN) classifier accomplishes lower results than the k-implies grouping strategy.

The PC supported demonstrative framework is expected by Nieto et al. [68]. The hematological problems are analyzed by shape-based highlights and dark level co-event frameworks (GLCM). The lymphoblast cells are sorted with the assistance of SVM. Contrasted with an individual's, the grouping precision with the blend of shape and surface highlights yielded 89.8% exactness. The k-implies bunching strategy can section, channel, and improve the platelet pictures, especially regarding morphological characters. The current technique, for example, Naive Bayes (NB) and Nearest Neighbor (NN)

classifier accomplishes lower results than the k-implies grouping strategy.

III. METHODOLOGY

The Chan-Vese model or region based model detects the object in the image. Divide the image into a different number of regions in which every sub region is denoted as the part-wise constant. The FCM and dynamic form are contrasted and the acquired fragments. The neighboring pixels concerning portion entropy are determined in the event of explicit picture pixel got by means of FCM and dynamic shape contrasts. For producing picture fragmenting, the sections comparing to the negligible entropy is chosen. The versatile fluffy entropy read the dynamic form by produced portions. The FCM and dynamic form is contrasted with portion the individual picture pixel has a place with it. Where, λ is denoted as each image piece. The minimum pixel intensity variations out of the image to be represented for curve fitting over the object in the image.

The quantity of picture sections means that if the fragment is the external region of the picture or core and cytoplasm. The unpredictable applications in design acknowledgment, framework ID and advancement are effortlessly fathomed utilizing the ANN [21]. Meta heuristic issue of the preparation phase of ANN is the significant portrayal of the issue and it is overwhelmed by utilizing Meta heuristic calculation. So we presented a Gray Wolf Optimization (GWO) calculation for weight updation of fake neural organization. The single concealed layer of MLP network with the most well known factors loads and inclinations are streamlined utilizing GWO. The sign connection between two neurons is determined by utilizing this strategy.

There are three layers to be specific information, yield and concealed layers with loads present in ANN. In this work, the normal highlights specifically measurable and picture level highlights are acquired from the component extraction are given to the contribution of ANN and the neurons cycle the data. Each Neural Network (NN) incorporates own information yield and furthermore the initiation work with its engineering characterizes the NN [20]. In this segment, the ANN engineering is utilized for the discovery of Acute Myelogenous Leukemia. By and by, the regular ANN doesn't convey the ideal yield because of inappropriate shrouded layer and loads. Henceforth, we utilized the mix of ANN with Fractional Black Widow Optimization (FBWO) calculation.

IV. Prediction Analysis

In equal, a progression of advances in ML, AI, and computational measurements have changed our comprehension of expectation utilizing high-dimensional information. An assortment of approaches are currently a set up piece of the tool stash, and for certain models (counting inadequate straight and summed up direct, there is a rich numerical hypothesis concerning their exhibition in the high-dimensional setting. Basically, the group of exact and hypothetical exploration has demonstrated that learning prescient models over enormous quantities of factors is regularly attainable and amazingly powerful.

As per BO calculation, the affectability assessment assumes an essential function in boundary tuning that helps stage tinge with zeroing in on the boundaries of touchy. The autonomous factors with various worth impacts on the predetermined outcomes under give presumption sets are resolved with the assistance of affectability investigation. The quantity of pockets and getting away from edge boundaries has been picked that has basic investigation and misuse rate impacts. For Rastrigin work, the BO calculation affectability on variety of these boundaries is analyzed.

V. CONCLUSION

In this work, various types of AML datasets with different test examinations are directed to approve the presentation of the proposed strategy. While contrasting with the current techniques, the proposed FBW-NN conveys higher identification rates as far as, and picture sizes. The proposed FBW-NN yields 96.56% exactness, 97.81% explicitness, 96.90% affectability, 97.20% accuracy and 97.90% review regarding AML recognition rate than other existing methods.iques including SVM, neighborhood directional way (LDP) and k-mean grouping are utilized to characterize the ordinary and unusual status of patients. Because of 9% exactness is acquired along these lines ninety infinitesimal pictures are tried.

REFERENCES

[1] Feng, Y., Yi, J. H., & Wang, G. G. (2019). Enhanced Moth Search Algorithm for the Set-Union Knapsack Problems. IEEE Access, 7, 173774-173785.

[2] Sivaram, M., Batri, K., Amin Salih, M., &Porkodi, V. (2019). Exploiting the Local Optima in Genetic Algorithm using Tabu Search. Indian Journal of Science and Technology, 12(1), 1-13.

[3] Venkatraman, S., & Surendiran, B. (2020). Adaptive hybrid intrusion detection system for crowd sourced multimedia internet of things systems. Multimedia Tools and Applications, 79(5), 3993-4010.

[4] Sujitha, B., Parvathy, V. S., Lydia, E. L., Rani, P., Polkowski, Z., & Shankar, K. (2020). Optimal deep learning based image compression technique for data transmission on industrial Internet of things applications. Transactions on Emerging Telecommunications Technologies, e3976.

[5] Ezhilarasu, P., Krishnaraj, N., &Dhiyanesh, B. (2015). Arithmetic Coding for Lossless Data Compression–A Review. International Journal of Computer Science Trends and Technology, 3(3).

[6] Porkodi, V., Singh, A. R., Sait, A. R. W., Shankar, K., Yang, E., Seo, C., & Joshi, G. P. (2020). Resource Provisioning for Cyber–Physical–Social System in Cloud-Fog-Edge Computing Using Optimal Flower Pollination Algorithm. IEEE Access, 8, 105311-105319.

[7] Gao, D., Wang, G. G., &Pedrycz, W. (2020). Solving fuzzy job-shop scheduling problem using DE algorithm improved by a selection mechanism. IEEE Transactions on Fuzzy Systems.

[8] Sivaram, M., Mohammed, A. S., Yuvaraj, D., Porkodi, V., Manikandan, V., &Yuvaraj, N. (2019, February). Advanced expert system using particle swarm optimization based adaptive network based fuzzy inference system to diagnose the physical constitution of human body. In International Conference on Emerging Technologies in Computer Engineering (pp. 349-362). Springer, Singapore.

[9] Jiménez, A. C., García-Díaz, V., González-Crespo, R., &Bolaños, S. (2018). Decentralized Online Simultaneous Localization and Mapping for Multi-Agent Systems. Sensors, 18(8), 2612.

[10] Venkatraman, S., Surendiran, B., & Kumar, P. A. R. (2020). Spam e-mail classification for the Internet of Things environment using semantic similarity approach. The Journal of Supercomputing, 76(2), 756-776.

[11] Lydia, E. L., Raj, J. S., PandiSelvam, R., Elhoseny, M., & Shankar, K. (2019). Application of discrete transforms with selective coefficients for blind image watermarking. Transactions on Emerging Telecommunications Technologies, e3771.

[12] Ezhilarasu, P., Prakash, J., Krishnaraj, N., Kumar, D. S., Babu, K. S., &Parthasarathy, C. (2015). A Novel Approach to Design the Finite Automata to Accept the Palindrome with the Three Input Characters. Indian Journal of Science and Technology, 8(28).

[13] Devaraj, A. F. S., Elhoseny, M., Dhanasekaran, S., Lydia, E. L., & Shankar, K. (2020). Hybridization of firefly and Improved Multi-Objective Particle Swarm Optimization algorithm for energy efficient load balancing in Cloud Computing environments. Journal of Parallel and Distributed Computing.

[14] Zou, D., Wang, G. G., Sangaiah, A. K., & Kong, X. (2017). A memory-based simulated annealing algorithm and a new auxiliary function for the fixed-outline floorplanning with soft blocks. Journal of Ambient Intelligence and Humanized Computing, 1-12.

[15] Kumar, A., Ahuja, H., Singh, N. K., Gupta, D., Khanna, A., & Rodrigues, J. J. (2018). Supported matrix factorization using distributed representations for personalised recommendations on twitter. Computers & Electrical Engineering, 71, 569-577.

[16] Sivaram, M., Porkodi, V., Mohammed, A. S., Manikandan, V., &Yuvaraj, N. (2019). Retransmission DBTMA protocol with fast retransmission strategy to improve the performance of MANETs. IEEE Access, 7, 85098-85109.

[17] Venkatraman, S., & Kumar, P. A. R. (2019). Improving Adhoc wireless sensor networks security using distributed automaton. Cluster Computing, 22(6), 14551-14557.

[18] Lydia, E. L., Govindaswamy, P., Lakshmanaprabu, S., &Ramya, D. (2018). Document clustering based on text mining K-means algorithm using euclidean distance similarity. J. Adv. Res. Dyn. Control Syst.(JARDCS), 10(2), 208-214.

[19] Ortin, F., Mendez, S., García-Díaz, V., & Garcia, M. (2014). On the suitability of dynamic languages for hot-reprogramming a robotics framework: a Python case study. Software: Practice and Experience, 44(1), 77-104.

[20] Krishnaraj, N., Ezhilarasu, P., & Gao, X. Z. Hybrid Soft Computing Approach for Prediction of Cancer in Colon Using Microarray Gene Data. Current Signal Transduction Therapy, 11(2).

[21] Le Nguyen, B., Lydia, E. L., Elhoseny, M., Pustokhina, I., Pustokhin, D. A., Selim, M. M., ... & Shankar, K. (2020). Privacy Preserving Blockchain Technique to Achieve Secure and Reliable Sharing of IoT Data. CMC-COMPUTERS MATERIALS & CONTINUA, 65(1), 87-107.

[22] Chavhan, S., Gupta, D., Chandana, B. N., Khanna, A., & Rodrigues, J. J. (2019). IoT-based Context-Aware Intelligent Public Transport System in a metropolitan area. IEEE Internet of Things Journal.

[23] Gu, Z. M., & Wang, G. G. (2020). Improving NSGA-III algorithms with information feedback models for large-scale many-objective optimization. Future Generation Computer Systems, 107, 49-69.

[24] Porkodi, V., Khan, J., Mohammed, A. S., Bhuvana, J., & Sivaram, M. OPTIMIZED COOPERATIVE QOS ENHANCED DISTRIBUTED MULTIPATH ROUTING PROTOCOL.

[25] Geerthik, S., Venkatraman, S., & Gandhi, R. (2016). AnswerRank: Identifying Right Answers in QA system. International Journal of Electrical and Computer Engineering, 6(4), 1889.

[26] Samad, A., Salima, R., Lydia, E. L., & Shankar, K. (2020). Definition and Features of Rural Marketing Strategies for Encourage Development in Rural Areas. TEST Engineering & Management, 82, 4983-4988.

[27] Palani, E., Nagappan, K., &Alhadidi, B. (2016). Segmentation and Texture Analysis for Efficient Classification of Breast Tumors from Sonograms. Current Signal Transduction Therapy, 11(2), 84-90.

[28] Rajagopal, A., Ramachandran, A., Shankar, K., Khari, M., Jha, S., Lee, Y., & Joshi, G. P. (2020). Fine-tuned residual network-based features with latent variable support vector machine-based optimal scene classification model for unmanned aerial vehicles. IEEE Access, 8, 118396-118404.

[29] Mondragon, V. M., García-Díaz, V., Porcel, C., & Crespo, R. G. (2018). Adaptive contents for interactive TV guided by machine learning based on predictive sentiment analysis of data. Soft Computing, 22(8), 2731-2752.

[30] Feng, Y., Yu, X., & Wang, G. G. (2019). A Novel Monarch Butterfly Optimization with Global Position Updating Operator for Large-Scale 0-1 Knapsack Problems. Mathematics, 7(11), 1056.

[31] Mohammed, A. S., & Sivaram, P. (2018). Securing the Sensor Networks Along With Secured Routing Protocols for Data Transfer in Wireless Sensor Networks.

[32] Geerthik, S., Venkatraman, S., & Gandhi, K. R. (2016, February). Reward rank: A novel approach for positioning user answers in community question answering system. In 2016 International Conference on Information Communication and Embedded Systems (ICICES) (pp. 1-6). IEEE.

[33] Sivaram, M., Lydia, E. L., Pustokhina, I. V., Pustokhin, D. A., Elhoseny, M., Joshi, G. P., & Shankar, K. (2020). An optimal least square support vector machine based earnings prediction of blockchain financial products. IEEE Access, 8, 120321-120330.

[34] Ghantasala, G. P., &KrishnaRaj, N. Support Vector Machine Based Automatic Mammogram Classification Using Hybrid Optimization Algorithm.

[35] Sikkandar, M. Y., Alrasheadi, B. A., Prakash, N. B., Hemalakshmi, G. R., Mohanarathinam, A., & Shankar, K. (2020). Deep learning based an automated skin lesion segmentation and intelligent classification model. Journal of Ambient Intelligence and Humanized Computing, 1-11.

[36] Zhang, Z., Wang, G. G., Zou, K., & Zhang, J. (2014). A solution quality assessment method for swarm intelligence optimization algorithms. The Scientific World Journal, 2014.

[37] Sivaram, Murugan et al. 'Data Fusion Using Tabu Crossover Genetic Algorithm in Information Retrieval'. 1 Jan. 2020 : 1 – 10.

[38] Khamparia, A., Pandey, B., Tiwari, S., Gupta, D., Khanna, A., & Rodrigues, J. J. (2020). An integrated hybrid CNN–RNN model for visual description and generation of captions. Circuits, Systems, and Signal Processing, 39(2), 776-788.

[39] Geerthik, S., Gandhi, K. R., &Venkatraman, S. (2016, December). Domain expert ranking for finding domain authoritative users on community question answering sites. In 2016 IEEE International Conference on Computational Intelligence and Computing Research (ICCIC) (pp. 1-5). IEEE.

[40] Muruganantham, A., Nguyen, P. T., Lydia, E. L., Shankar, K., Hashim, W., &Maseleno, A. (2019). Big data analytics and intelligence: A perspective for health care.

[41] Ramkumar, V., &Krishnaraj, N. Weight Based LSA to Retrieve Information from Web Pages Based On Document Score.

[42] Balakiruthiga, B., Deepalakshmi, P., Mohanty, S. N., Gupta, D., Kumar, P. P., & Shankar, K. (2020). Segment routing based energy aware routing for software defined data center. Cognitive Systems Research.

[43] Chu, H. C., Wang, G. G., & Deng, D. J. (2016). The social networking investigation of metadata of forensic artifacts of a typical WeChat session under Windows. Security and Communication Networks, 9(18), 5698-5709.

[44] Sivaram, M., Yuvaraj, D., Mohammed, A. S., Manikandan, V., Porkodi, V., &Yuvaraj, N. (2019). Improved Enhanced Dbtma with Contention-Aware Admission Control to Improve the Network Performance in Manets. CMC-

COMPUTERS MATERIALS & CONTINUA, 60(2), 435-454.

[45] Gochhayat, S. P., Lal, C., Sharma, L., Sharma, D. P., Gupta, D., Saucedo, J. A. M., &Kose, U. (2019). Reliable and secure data transfer in IoT networks. Wireless Networks, 1-14.

[46] Subbarayalu, V., Surendiran, B., &Arun Raj Kumar, P. (2019). Hybrid Network Intrusion Detection System for Smart Environments Based on Internet of Things. The Computer Journal, 62(12), 1822-1839.

[47] Rosa, A. T. R., Pustokhina, I. V., Lydia, E. L., Shankar, K., & Huda, M. (2019). Concept of electronic document management system (EDMS) as an efficient tool for storing document. Journal of Critical Reviews, 6(5), 85-90.

[48] Espada, J. P., Diaz, V. G., Crespo, R. G., Bustelo, B. C. P. G., &Lovelle, J. M. C. (2015). An intelligent Mobile Web Browser to adapt the mobile web as a function of the physical environment. IEEE Latin America Transactions, 13(2), 503-509.

[49] Kumar, R. S., Krishnaraj, N., &Keerthana, G. (2017). Assessment of Quality of Service in Communication Network and Evaluating Connectivity Among IP Networks. Asian Journal of Applied Science and Technology (AJAST), 1(3), 319-322.

[50] Elhoseny, M., Rajan, R. S., Hammoudeh, M., Shankar, K., &Aldabbas, O. (2020). Swarm intelligence–based energy efficient clustering with multihop routing protocol for sustainable wireless sensor networks. International Journal of Distributed Sensor Networks, 16(9), 1550147720949133.

[51] Chu, H. C., Wang, G. G., & Park, J. H. (2015). The digital fingerprinting analysis concerning google calendar under ubiquitous mobile computing era. Symmetry, 7(2), 383-394.

[52] Manikandan, V., Sivaram, M., Mohammed, A. S., &Porkodi, V. (2020). Nature Inspired Improved Firefly Algorithm for Node Clustering in WSNs. CMC-COMPUTERS MATERIALS & CONTINUA, 64(2), 753-776.

[53] Kuppusamy, P., Venkatraman, S., Rishikeshan, C. A., & Reddy, Y. P. (2020). Deep learning based energy efficient optimal timetable rescheduling model for intelligent metro transportation systems. Physical Communication, 101131.

[54] Asih, E. S., Nguyen, P. T., Lydia, E. L., Shankar, K., Hashim, W., &Maseleno, A. (2019). Mobile E-commerce website for technology-based buying selling services. International Journal of Engineering and Advanced Technology, 8(6), 884-888.

[55] Lydia, E. L., &Swarup, M. B. (2015). Big data analysis using hadoop components like flume, mapreduce, pig and hive. International Journal of Science, Engineering and Computer Technology, 5(11), 390.

[56] Sengar, S. S., Hariharan, U., &Rajkumar, K. (2020, March). Multimodal Biometric Authentication System using Deep Learning Method. In 2020 International Conference on Emerging Smart Computing and Informatics (ESCI) (pp. 309-312). IEEE.

[57] Maseleno, A., Hashim, W., Perumal, E., Ilayaraja, M., & Shankar, K. (2020). Access control and classifier-based blockchain technology in e-healthcare applications. In Intelligent Data Security Solutions for e-Health Applications (pp. 151-167). Academic Press.

[58] Li, J., Lei, H., Alavi, A. H., & Wang, G. G. (2020). Elephant Herding Optimization: Variants, Hybrids, and Applications. Mathematics, 8(9), 1415.

[59] Mohammed, A. S., Kareem, S. W., Al Azzawi, A. K., & Sivaram, M. (2018). Time series prediction using SRE-NAR and SRE-ADALINE. Journal of Advanced Research in Dynamical and Control Systems, Pages, 1716-1726.

[60] Shankar, K., Elhoseny, M., Chelvi, E. D., Lakshmanaprabu, S. K., & Wu, W. (2018). An efficient optimal key based chaos function for medical image security. IEEE Access, 6, 77145-77154.

[61] Geerthik, S., Gandhi, R., &Venkatraman, S. (2006). CATEGORY BASED EXPERT RANKING: A NOVEL APPROACH FOR EXPERT IDENTIFICATION IN COMMUNITY QUESTION ANSWERING.

[62] Laxmi, C. V., &Somasundaram, K. (2014). Application Level Scheduling (AppLeS) in Grid with Quality of Service (QoS). International Journal of Grid Computing & Applications, 5(2), 1.

[63] Kumar, R. S., Krishnaraj, N., &Keerthana, G. Highly Energy Efficient and Scalable Distributed Clustering Procedure for Dense Wireless Sensor Networks.

[64] Krishnaraj, N., Kumar, K. A., & Kumar, P. K. (2018). DESIGN OF ADAPTIVE SCHEDULER TO IMPROVE PERFORMANCE OF COMPUTATIONAL GRIDS. International Journal of Pure and Applied Mathematics, 119(18), 1741-1751.

[65] Shankar, K., & Eswaran, P. (2016, January). A new k out of n secret image sharing scheme in visual cryptography. In 2016 10th International Conference on Intelligent Systems and Control (ISCO) (pp. 1-6). IEEE.

[66] Wei, C. L., & Wang, G. G. (2020). Hybrid Annealing Krill Herd and Quantum-Behaved Particle Swarm Optimization. Mathematics, 8(9), 1403.

[67] Sivaram, M., Yuvaraj, D., Mohammed, A. S., &Porkodi, V. Estimating the Secret Message in the Digital Image. International Journal of Computer Applications, 975, 8887.

[68] Nieto, Y., Gacía-Díaz, V., Montenegro, C., González, C. C., & Crespo, R. G. (2019). Usage of machine learning for strategic decision making at higher educational institutions. IEEE Access, 7, 75007-75017.