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# Design and Development of Leukemia Identification System Through Neural Network and SVM Approach for Microscopic Smear Image Database

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## Abstract

The recognition of blood disorder through the visual observation is the most challenging job. In the current technological era computer become the most important part of medical science. The haematological disorders of white blood cells (WBC) are really frequent in medical practices. The objective of this research is to design and development of automated identification of Leukemia using microscopic blood smear image database. This proposed scheme uses the most significant steps of image processing like, pre-processing, image segmentation, extraction of features and classification. The Leukemia smear image database is segmented using Otsu image segmentation. The feature extraction extracts the area, perimeter, solidity, orientation, eccentricity, centroid, entropy and energy features. The classification method applied using neural network, Support vector machine and QDA approach. In the neural network the 60% dataset has been passed for the training, 35% towards the testing and remaining 05% is used for the validation. The SVM and QDA classify the dataset for the two groups such as normal and leukaemia. The classification is done on the extracted 08 features of each image. The performance of the neural network is achieving 98.97% with 1.0246 error rate. The support vector machine is shows the 99.35% accuracy with 0.6500 error rate. The QDA classification reported the 99.70% accuracy with 0.300% error rate. From the reported accuracy the QDA and support vector machine proved as dominant as the neural network.

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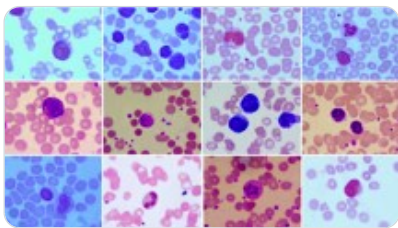
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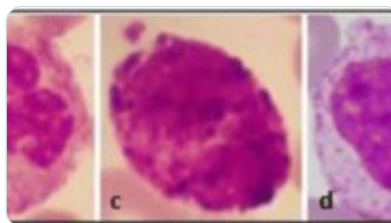
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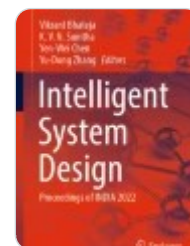
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## References

1. Virmani, J., Kumar, V., Kalra, N., Khandelwal, N.: A rapid approach for prediction of liver cirrhosis based on first order statistics. In: Proceedings of the IEEE International Conference on Multimedia, Signal Processing and Communication Technologies, IMPACT-2011 (2011)

[Google Scholar](#)

2. Mohapatra, S., Patra, D., Satpathi, S.: Image analysis of blood microscopic images for Leukemia detection. In: International Conference on Industrial Electronics, Control and Robotics, pp. 215–219. IEEE (2010)

[Google Scholar](#)

3. National Cancer Institute. <https://seer.cancer.gov/statfacts/html/leuks.html>

4. Virmani, J., Kumar, V., Kalra, N., Khandelwal, N.: Characterization of primary and secondary malignant liver lesions from B-mode ultrasound. J. Digit. Imaging 26(6), 1058–1070 (2013)

[Google Scholar](#)

5. Salihah, A.A., Mashor, M.Y., Harun, N.H., Rosline, H.: Colour image enhancement techniques for acute Leukemia blood cell morphological Features, pp. 3677–3682. IEEE (2010)

[Google Scholar](#)

6. Rajeswari, R., Ramesh, N.: Contrast stretching enhancement techniques for acute leukemia images. Int. J. Publ. Probl. Appl. Eng. Res. Pap. 4(1), 190–194 (2013)

[Google Scholar](#)

7. Haralick, R.M., Shapiro, L.G.: Image segmentation techniques [J]. Comput. Vis. Graph. Image Process. 29(1), 100–132 (1985)

[Google Scholar](#)

8. Fan, W.: Color image segmentation algorithm based on region growth [J]. JisuanjiGongcheng/Comput. Eng. 36(13) (2010)

[Google Scholar](#)

9. Kang, W.X., Yang, Q.Q., Liang, R.P.: The comparative research on image segmentation algorithms. In: IEEE Conference on ETCS, pp. 703–707 (2009)

[Google Scholar](#)

10. Gonzalez, R.C., Woods, R.E.: Digital Image Processing, 2nd edn. Publishing House of Electronics Industry, Beijing (2007)

[Google Scholar](#)

11. Niknejad, M., Mirzaei, V., Heydari, M.: Comparing different classifications of satellite imagery in forest mapping. Int. Res. J. Appl. Basic Sci. 8(7), 1407–1415 (2014)

[Google Scholar](#)

12. QDA. <https://newonlinecourses.science.psu.edu/stat857/node/80/>

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