

## **A SURVEY ON LEUKEMIA DETECTION USING MACHINE LEARNING AND DEEP LEARNING TECHNIQUES**

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Leukemia, cancer of the bone marrow and blood, is a major diagnostic problem given its swift progression and volatile early symptoms. Specificity and early diagnosis are essential for treatment success and enhanced survival rates of patients. Classic methods of diagnosis are typically manual, time- consuming, and based on opinion. Over the past decade, machine learning (ML) and especially deep learning (DL) has proven to be an effective method for automated and improved leukemia classification [1,5,15]. In the present article, a variety of ML techniques ranging from conventional classifiers like support vector machines (SVM) and random forests (RF) to sophisticated convolutional neural networks (CNNs) and ensemble frameworks have been examined, mainly employed in peripheral blood smear (PBS) images [2,3,5]. A number of studies indicate CNN-based methods attaining high accuracy levels, with other models. [1,15]. Regardless of how promising such findings are, challenges like small sizes of datasets, overfitting models, and lack of clinical validation persist [15]. Public datasets commonly utilized in leukemia research are also uncovered in this review, as are future directions for the field: constructing explainable AI, using federated learning, and combining multimodal data to construct more resilient detection systems [7,15].