# Chapter 9
# Comparative Study of Cancer Blood Disorder Detection Using Convolutional Neural Networks

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## ABSTRACT

*Blood malignancies and various blood disorders can have an impact on a person. It is a major health issue in all age groups. A blood disorder, such as influence platelets, blood plasma, and white and red blood cells, can impact any of the four primary blood components. The primary goal of this chapter is to detect the cancer blood disorder. This paved the way to propose a comparative study with previous studies based on convolutional neural networks in this work. The authors propose a model for cancer blood disorder detection. It consists of five steps. The blood sample image data set is collected from the Kaggle. First, the data set is transferred for image preprocessing to remove the noise from the images. Next, it is applied to the image enhancement for clarity; the image and segmentation are performed on enhanced images. Next, feature selection is used to extract the features from the segmentation images. The convolutional neural network technique is used for classification finally.*

## 1. INTRODUCTION

Anaemia, hemophilia, leukemia, lymphoma, and myeloma diseases are common blood illnesses. RBC, WBC, and platelets are the three primary types of blood cells that stem cells found in the bone marrow are classified (WebMD). Blood cancer is caused by DNA changes in blood cells (Sharma et al., 2021). Consequently, abnormal behavior in the blood cells starts to occur. Children are affected by certain kinds of blood malignancy (Sharma et al., 2021). The ability of healthy blood cells to fight off infections or stop serious bleeding is disrupted by malignant cells. Lymphoma, myeloma, and leukemia are the main

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kinds of blood cancer. The lymphocytes' infection-fighting cells develop lymphoma. Another type of blood cancer brought on by an excessive increase in WBC is leukemia (Alanazi et al., 2021). The red blood cells and platelets are crowded out by the malignant cells and interfere with the organs' regular function. WBC counts for leukemia patients are higher than those of healthy individuals. Mortality can be decreased if the cancer sickness is identified sooner (Arslan et al., 2021).

Many types of blood diseases are numerous (Nirmala et al., 2023). The patients who suffered from blood disorders in starting stage would recover with treatment. Some are chronic and lifelong, although they do not shorten life expectancy (WHO). Other blood conditions, such as sickle cell disease and blood malignancies, can be lethal. Although screening is one type of approach, not all types of cancer can be detected with it (Ogunmola et al., 2021). There are various forms of cancer, including Any region of the body that can be affected by cancer, which develops when healthy cells turn into cancerous cells like leukemia, lymphoma, and myeloma. Cancer cells spread to entire body parts if cancer therapy is delayed (Sharma et al., 2021). The typical signs of red blood cell issues such as exhaustion, rapid heartbeat, muscle weakness, and difficulty concentrating due to a lack of oxygenated blood in the brain, and the typical signs of white blood cell disorders are weariness from ongoing illnesses, sudden weight loss and generalized sensation of ill health (Sharma et al., 2021).

Image filtering is a crucial step in the processing of images. It may be used for edge detection, blur removal, noise reduction, etc. The algorithms used for filtering include linear and non-linear filters. The appropriate filter should be used for each objective (Pandit, 2023). While a linear low-pass filter is used when the input has a high amount of noise but a low magnitude of noise, non-linear filters are used when the input has a low quantity of noise but a high magnitude of noise (Vashishtha and Dhawan, 2023). Due to their simplicity and speed, linear filters are the most used.

In contrast to non-linear filters, the linear filtering approach involves applying the algorithm to both the input and surrounding pixels of the image (Jeganathan et al., 2023). The quality of the image pixels can be improved via image filtering. It consists of operations that change the pixel values of photographs, like blurring and smoothing.

A machine learning method called deep Convolutional Neural Networks (DCNNs) allows computers to learn from picture samples and extract internal representations or attributes that underlie the grouping or categories of the images. The machine learning approach is applied for cancer blood disorder classification and recognition. Training and testing are the two segments of CNN. The database of CNN is generated based on deep feature extraction. Then based on the database, the testing image is classified and recognized using iterations.

Our paper consists of sections: Section II includes a detailed literature survey to detect the various cancer blood disorder diseases. Section III describes the proposed model. Section IV includes results and discussion, and the comparative analysis of various models is done. Finally, concludes of the paper is presented in section V.

## 2. LITERATURE REVIEW

A comparative analysis for cancer blood disorder detection was created based on earlier studies, and the researchers used different types of neural network methodologies and algorithms.