CHAPTER I
INTRODUCTION

1.1 Project Background

Leukemia is a type of cancer that affects blood-forming tissues, the bone marrow, and the lymphatic system (Alimardonovich, 2024). Leukemia affects blood cells, particularly white blood cells (leukocytes), which play an important role in fighting infection in the human body. In leukemia, abnormal white blood cells are produced out of control, disrupting the normal function of blood cells in the body. This can lead to symptoms such as tiredness, frequent infections, bruising and excessive bleeding. If left untreated, leukemia can damage the immune system and other vital functions, making it life-threatening (Ghaderzadeh et al., 2021).

The advancement of technology has been rapid in recent times, particularly in the field of diagnostic medicine (Haleem et al., 2022). However, this has not been reflected in the early detection of diseases such as leukemia, which is often not identified at an early stage due to the vague and non-specific nature of its symptoms (Koo et al., 2018; Meenal et al., 2021). A significant number of patients only seek medical attention after the disease has progressed to a more severe stage, which makes treatment more challenging and less effective (Ogunrinde, 2024). Late detection is a primary contributor to the high mortality rate associated with leukemia, as patients miss the opportunity to receive timely medical intervention that could potentially save their lives. Additionally, a lack of public awareness and limited access to adequate diagnostic tools for leukemia further exacerbate this situation, resulting in many cases being identified too late, and subsequently, in poor or no treatment.

Machine learning (ML) technology represents a potential solution for the healthcare field, particularly in the context of early disease detection, such as that associated with leukemia. The analysis of patterns in medical data enables machine learning algorithms to identify subtle indicators of leukemia that may be overlooked by traditional diagnostic methods. The model can process data such as symptoms,

medical history and risk factors to predict the likelihood of someone suffering from leukemia. The integration of machine learning into the healthcare system not only improves the accuracy of diagnosis but also provides solutions that are accessible to more people, including those in remote areas or with limited access to healthcare.

The application of machine learning in the early detection of leukemia risk is expected to have considerable potential to increase the chances of successful treatment and recovery in this disease, while reducing the burden on patients and the healthcare system. The app is designed to be user-friendly, enabling individuals to assess their own risk of developing leukemia and to seek medical assistance at an early stage if necessary. It is anticipated that this innovation will enhance public health awareness and contribute to global efforts in the fight against leukemia, thereby reducing mortality and improving the quality of life. The objective is to facilitate early detection as the initial step in assessing the risk of leukemia, ensuring that the general public has access to this information without compromising the quality of the results.

1.2 Problem Statement

Some problem statements in development of early leukemia risk detection system using machine learning algorithms:

1. Many people don't know if they're at risk of leukemia because the symptoms are similar to other diseases (Aljamali et al., 2022).
2. After learning of their leukemia risk, people are often confused about what to do next. Without clear advice, they may not know the right steps to take for further check-ups.
3. Many people forget or delay making a doctor's appointment after learning of their risk. Without a reminder, they could be late in getting the treatment they need.

1.3 Project Objectives

1. To check leukemia risk based on basic health data and symptoms using machine learning.

2. To provide suggestions based on the result from leukemia risk detection.

3. To provide reminders for appointment with doctor via email.

1.4 Project Scopes

We divide into two project scopes including:

1.4.1 System Scopes

- Data collection will be carried out by the developer in the form of basic data such as family history (heredity), and age, as well as data on symptoms reported by users.

- This system does not use data from the invasion test.

- The system will train a machine learning model using the collected dataset to predict the risk of leukemia with high accuracy.

- The system is intended to be accessible easily to the general public, with a focus on early detection so that if needed individuals can seek medical advice based on the results provided by the system.

1.4.2 User Scope

- Users can only predict the early risk of leukemia without communicating with a doctor.

1.5 Project Significance

The significance of this project lies in its potential to revolutionize the early detection of leukemia, a critical factor in improving patient outcomes. By leveraging machine learning algorithms, the proposed Early Leukemia Risk Detection System aims to provide individuals with a user-friendly tool to assess their risk of developing leukemia based on basic health data and reported symptoms. Early diagnosis is crucial, especially given the high incidence of leukemia and the often vague symptoms that can lead to late detection.

This system not only enhances public awareness about leukemia but also empowers individuals to seek timely medical intervention, thereby increasing the

chances of successful treatment and recovery. Furthermore, the integration of machine learning into healthcare can help bridge the gap in access to diagnostic tools, particularly for those in remote areas or with limited healthcare resources. Ultimately, this project contributes to global efforts in combating leukemia, reducing mortality rates, and improving the quality of life for affected individuals.

1.6 Chapter Summary

Chapter 1 provides an introduction to the development of the Early Leukemia Risk Detection System using machine learning algorithms. It begins with a project background that highlights the urgency of early diagnosis in leukemia, and discusses the role of genetic and environmental factors in its development. The problem statement outlines the challenges faced by individuals in recognizing their risk of leukemia and the subsequent delays in seeking treatment. The project objectives are clearly defined, focusing on enabling users to assess their leukemia risk, providing suggestions based on results, and offering reminders for medical appointments.

The project scope is detailed, emphasizing the system's accessibility to the general public and its focus on early detection. The significance of the project is underscored, highlighting its potential to improve diagnosis and treatment outcomes. The chapter concludes with a summary that encapsulates the key points discussed, setting the stage for the subsequent literature review and methodology chapters.