

APPLICATION OF MACHINE LEARNING FOR EARLY CANCER DETECTION

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Abstract

In 2019, every country's healthcare system got the limelight due to the COVID - 19 pandemic. But before COVID - 19, a few deadly diseases, such as cardiovascular, stroke, cancer, etc., already occurred in the human body, which causes many deaths every year. Among these diseases, cancer is controllable and reduces death's risk factors using early detection, diagnosis, and prevention methods. On the other hand, various cancers such as breast, colorectum (colorectal), lung, cervical, and prostate highly occur in people of Poland and various EU countries and people from various parts of the world.

Different cancer detection methods like imaging, biopsy, and medical data from the laboratory aim to identify cancer in organs at earlier stages of the tumor when treatment can be more successful. Unfortunately, despite screening programs, the interpretation of medical images and data for early cancer detection is affected by high false positives and negative rates. Therefore, there is still no clear answer as to the cause of cancer and no means to prevent cancer. Recently, the development of new emerging technology, such as artificial intelligence, along with a subset of it like machine learning and deep learning shown effective usage for early cancer detection using different types of medical data such as images, blood cells, etc. These learning methods try to find out the defined pattern from the image and cell morphology. Based on the analysis of this pattern, give a prediction about whether cancer is present in the organ.

niques show their considerable value for the early detection of cancer by analyzing various medical images and utilizing diverse blood cell samples. Machine learning is used to find certain patterns in medical data (e.g., imaging, blood cell, etc.) and identify the presence of cancer in the human body. The figure shows how AI can be useful in various stages of cancer treatment in clinical.

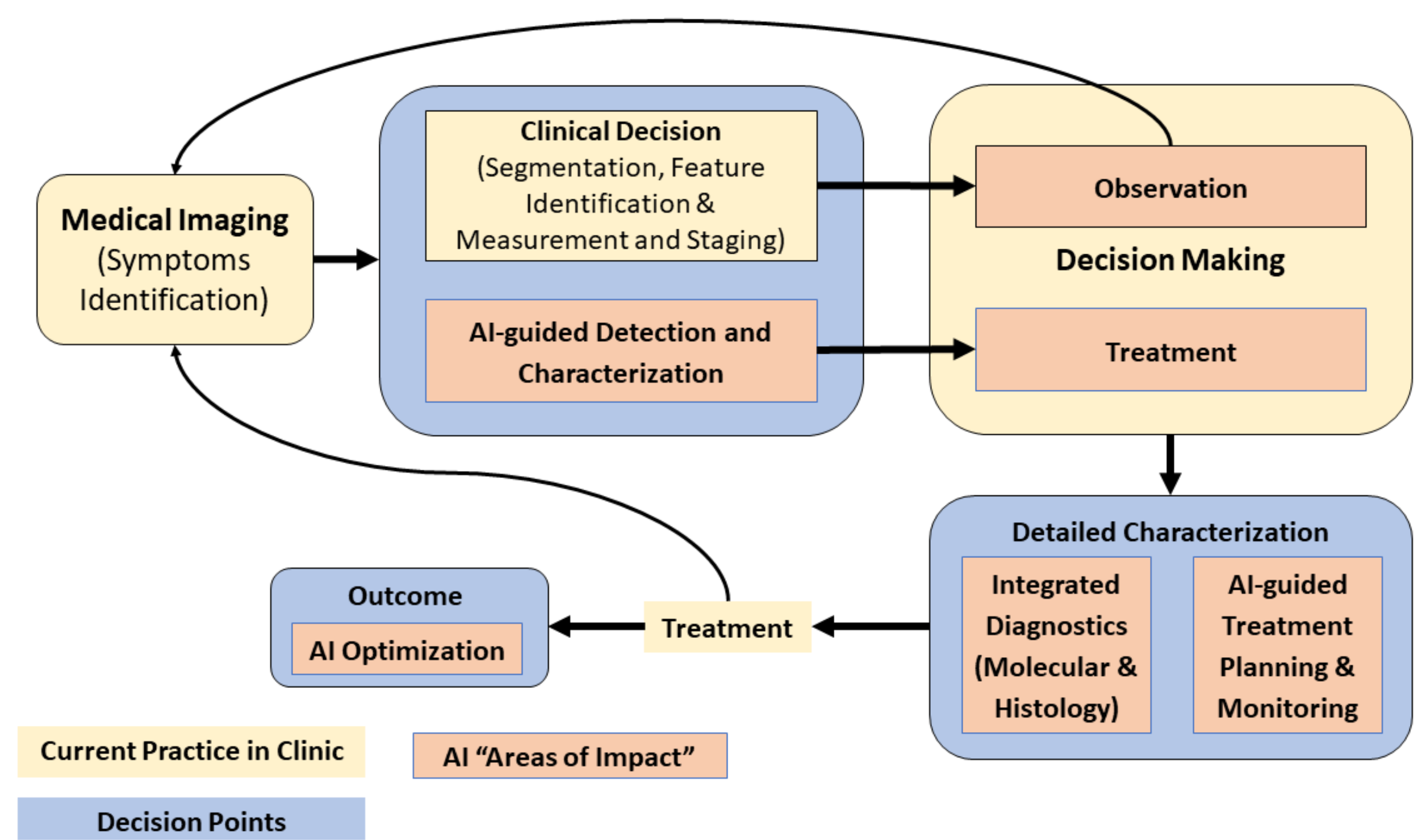


Figure 3: Enhancement in Cancer Clinical Workflow with AI

Introduction

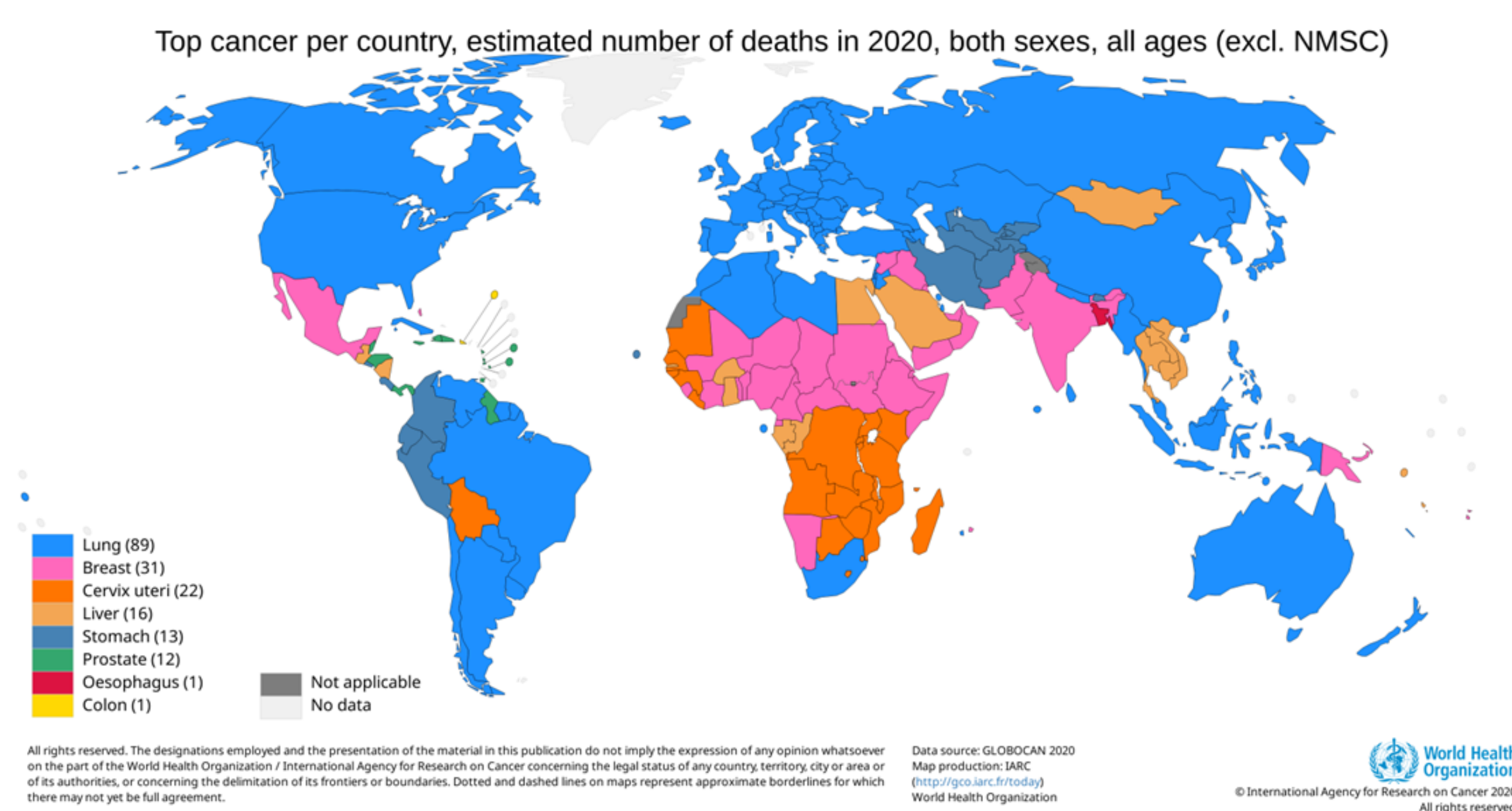


Figure 1: Top Cancer per Country which cause Deaths in 2020

In 2020, 58.3% of cancer deaths were expected to occur in Asia, where 59.5% of the global population lives. While Europe represents 9.7% of the global population, it accounts for 22.8% of cancer incidence and 19.6% of cancer deaths.

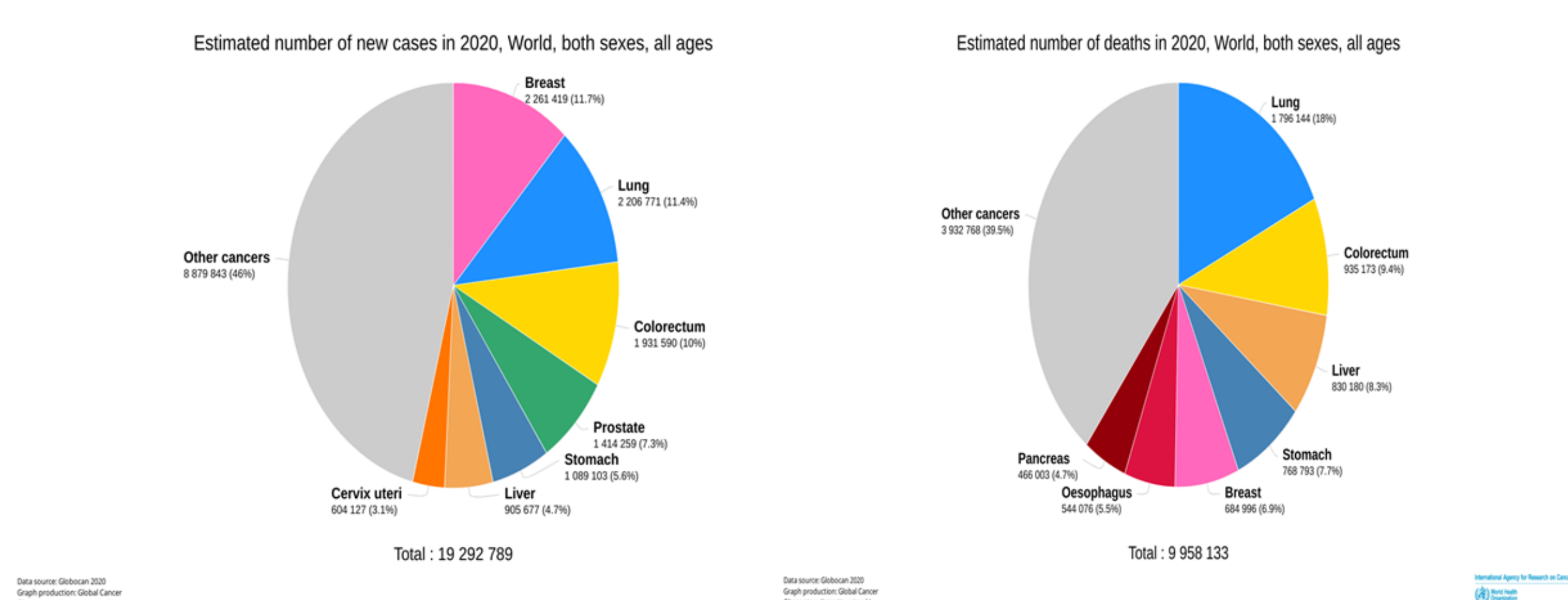


Figure 2: Statistical Cancer Data of 2020 - No. of New Cases and Deaths

- Finding cancer symptoms in organs at an early stage of detection, when therapy will be more successful, is the aim of numerous cancer detection approaches, including imaging, biopsies, and laboratory-generated clinical data. Sadly, despite screening efforts, many false positives and negatives still affect the interpretation of medical images and data for early cancer diagnosis.
- As a result, what causes cancer and how to avoid it is still unknown. Recent developments in machine learning (ML) and artificial intelligence (AI) tech-

Research Objectives

The objectives of this research are as per below:

- The main objective of the research is to do a retrospective and prospective analysis of high occurred cancers (e.g., breast and colorectal) in Poland, various other EU countries, and other parts of the world. This analysis helps to identify lacking points and parameters in existing cancer screening systems in Poland and other parts of the world.
- Second and most important objective of the research is to develop a complete intelligent cancer screening system with the help of artificial intelligence technology which utilizes several types of medical data (e.g., images, lab data) to provide early detection of cancer along with better treatment options.

Proposed AI-based Cancer Screening System

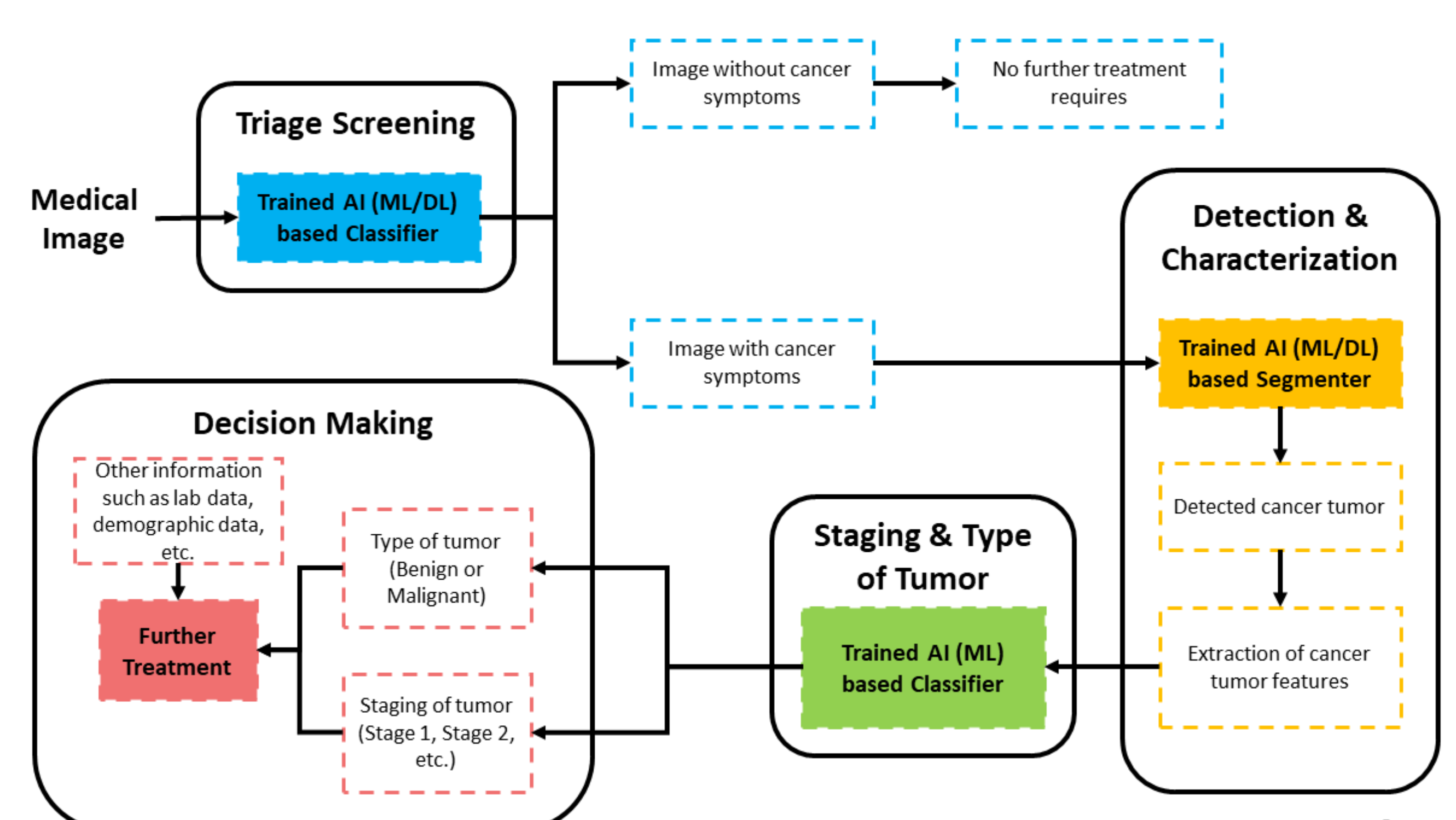


Figure 4: Block Diagram of Proposed AI-based Cancer Screening System

Conclusion

The main outcome of this research will be developing an AI cancer screening system that can help with early cancer detection using various types of medical data. This research helps to improve decision-making time and assists radiologists in making better decisions about diagnosis and further cancer treatment, which enhances the clinic's overall operation.