Life Expectancy Post Thoracic Surgery Using Machine Learning

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Abstract - The aim is to propose a life expectancy rate and examine the mortality after thoracic surgery which takes into account the different importance of various features which can have an effect in the end result. The data of the patients collected after diagnosis have been used as the dataset. Various metrics which affect the result have been analyzed with the help of random forest and decision tree algorithms to better understand the consequences of post- surgery. Particular metrics have been selected according to their weightage on the main outcome for prediction. Thus, it enables us to have better comprehension with various algorithms and also some important parameters are selected for the construction of a better model. In addition, we have several classification features such as presence of pain before surgery, hemoptysis before surgery, cough before surgery, whether the patient is a smoker, whether the patient has asthma, and a few others. This classification model predicts whether the patient will survive for a year-long period or not with better selection of the data features.

Keywords: Thoracic surgery, Machine learning, Random forest, Decision trees.

I INTRODUCTION

Many times, the name Thoracic Surgery is used as a substitute for Cardiothoracic Surgery, Adult Cardiac Surgery but for those who have set aside, Thoracic Surgery should be substituted with General Thoracic Surgery. Approximately 80% of Thoracic Surgery is a kind of surgery for some sort of cancer. The collection of detailed clinical data on clinical features in any hospital setting is a key principle for the medical practitioner to assess and teach the function of analyzing the causes of the disease. But because of detaining the traditional medical records of patients on paper, doctors could not find a detailed analysis of the large number of individual medical records. As cited, our feature set includes continuous data and categorization depending on the patient's health conditions during surgery.

II LITERATURE SURVEY

Woolf SH and H, Schoomaker, "Life expectancy and mortality rates in the United States",1959-2017

US life expectancy has not kept pace with that of other wealthy countries and is now decreasing. The analysis focused on midlife deaths (ages 25-64 years), stratified by sex, race/ethnicity, socioeconomic status, and geography (including the 50 states). Published research from January 1990 through August 2019 that examined relevant mortality trends and potential contributory factors was examined.

Akshaya Ravichandran, Krutika Mahulikar, Shreya Agarwal and Suresh "Post Thoracic Surgery Life Expectancy Prediction Using Machine Learning", International Journal of Healthcare Information Systems and Informatics.

Lung cancer survival rate is very limited post-surgery irrespective of if it is small cell or non-small cell. A lot of work has been carried out by employing machine learning in life expectancy prediction post thoracic surgery for patients with lung cancer. Many machine learning models like multi-layer perceptron (MLP), SVM, naïve Bayes, have been applied for post thoracic surgery life expectancy prediction based on data sets from UCI.

A S. Desuky and L M. El Bakrawy, "Improved Prediction of Postoperative Life Expectancy after Thoracic Surgery", *Advances in Systems Science and Application*, vol. 16,no. 2, 2016

Monitoring health outcomes is essential to enhance quality initiatives, healthcare management and consumer education. Thoracic Surgery is the data collected for patients who underwent major lung resections for primary lung cancer. The application of machine learning techniques for predicting post-operative life expectancy in the lung cancer patients is an area with little research and few concrete recommendations.

Nicolai P. Ostberg, Mohammad A. Zafar and John A. Elefteriades, "Machine learning: principles and applications for thoracic surgery",202029, 2020

There is seemingly endless interest in applying machine learning (ML) to medicine today. Almost daily, new research is published heralding the use of ML to improve clinical care, from improving disease prediction and screening to automated diagnosis across a variety of different specialties, particularly in the fields of cancer, neurology and cardiovascular medicine. Some even believe that ML algorithms will one day replace the diagnostic thinking that physicians perform on a daily basis, including replacing specialists such as radiologists, although many experts believe that this fear is unfounded .

Harry Etienne, Sarah Hamdi et al., "Artificial intelligence in thoracic surgery: past present perspective and limits". *IJCTA*, vol. 5, no. 2, 2017.

Artificial intelligence (AI) technology is becoming prevalent in many areas of everyday life. The healthcare industry is concerned by it even though its widespread use is still limited. Thoracic surgeons should be aware of the new opportunities that could affect their daily practice, by direct use of AI technology or indirect use *via* related medical fields (radiology, pathology and respiratory medicine).

III METHODOLOGY

Methodology-1: Collect a large dataset of patients, including demographic information, medical history, surgical details, post operative outcomes**.**

Methodology-2: Create new features that may be useful for predicting life expectancy. we can create a feature that represents the patient's overall health status and the complexity of their surgery.

Methodology-3: It can be used to predict the risk of developing complications after surgery so that they can be closely monitored.

Methodology-4: It is important to be able to interpret the machine learning model so that clinicians can understand how it works and make informed decisions about its use.

Methodology-5: To identify patients who are at high risk of death after surgery. These patients could be offered additional support and care to improve their chances of survival.

IV PROBLEM STATEMENT

The problem statement of life expectancy prediction for post thoracic surgery using machine learning involves developing a predictive model that utilizes patient data, surgical parameters, and other relevant factors to accurately estimate the expected lifespan following thoracic surgery, assisting clinicians in making informed decisions and providing personalized postoperative care plans. It also predicts the life expectancy post thoracic Surgery of a Lung Infected person. This will guide the physicians on whether or not Thoracic surgery can be taken as the medication option for the treatment of lung cancer infected person.

V PROJECT GOALS

The goals of life expectancy post thoracic surgery can vary depending on the specific surgical procedure, the underlying condition being treated, and the overall health of the individual. Thoracic surgery refers to procedures involving the chest, including the lungs, esophagus, and other thoracic organs

VI APPLICATIONS

The Application of Life expectancy post thoracic surgery using machine learning are:

- Risk Stratification
- Treatment Planning
- Personalized Medicine
- Long-Term Follow-Up Prediction
- Patient Counselling

VII CONTRIBUTION TO SOCIETY

- In summary, utilizing machine learning to predict life expectancy post thoracic surgery has the potential to transform patient care, enhance clinical decision-making, and contribute to the overall improvement of healthcare outcomes and resource management in society. Analyze vast amounts of patient data to identify patterns and predict potential complications post thoracic surgery. Early detection of complications can lead to timely interventions, improving patient outcomes and reducing the burden on healthcare resources

- Early identification of complications and personalized treatment plans can contribute to a reduction in healthcare costs associated with prolonged hospital stays and additional interventions. Efficient resource allocation and targeted interventions can lead to cost savings for both patients and healthcare systems.

- Thoracic surgery plays a significant role in improving life expectancy and quality of life, allowing individuals to make important contributions to society. Advancements in technology and surgical techniques continue to enhance both survival rates and recovery outcomes. However, ensuring equitable access to quality care remains a challenge.

VIII REFERENCES

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