**Title of the Project**

A Project Report submitted in partial fulfillment of the requirements for the award of the degree of

**Bachelor of Technology**

### in

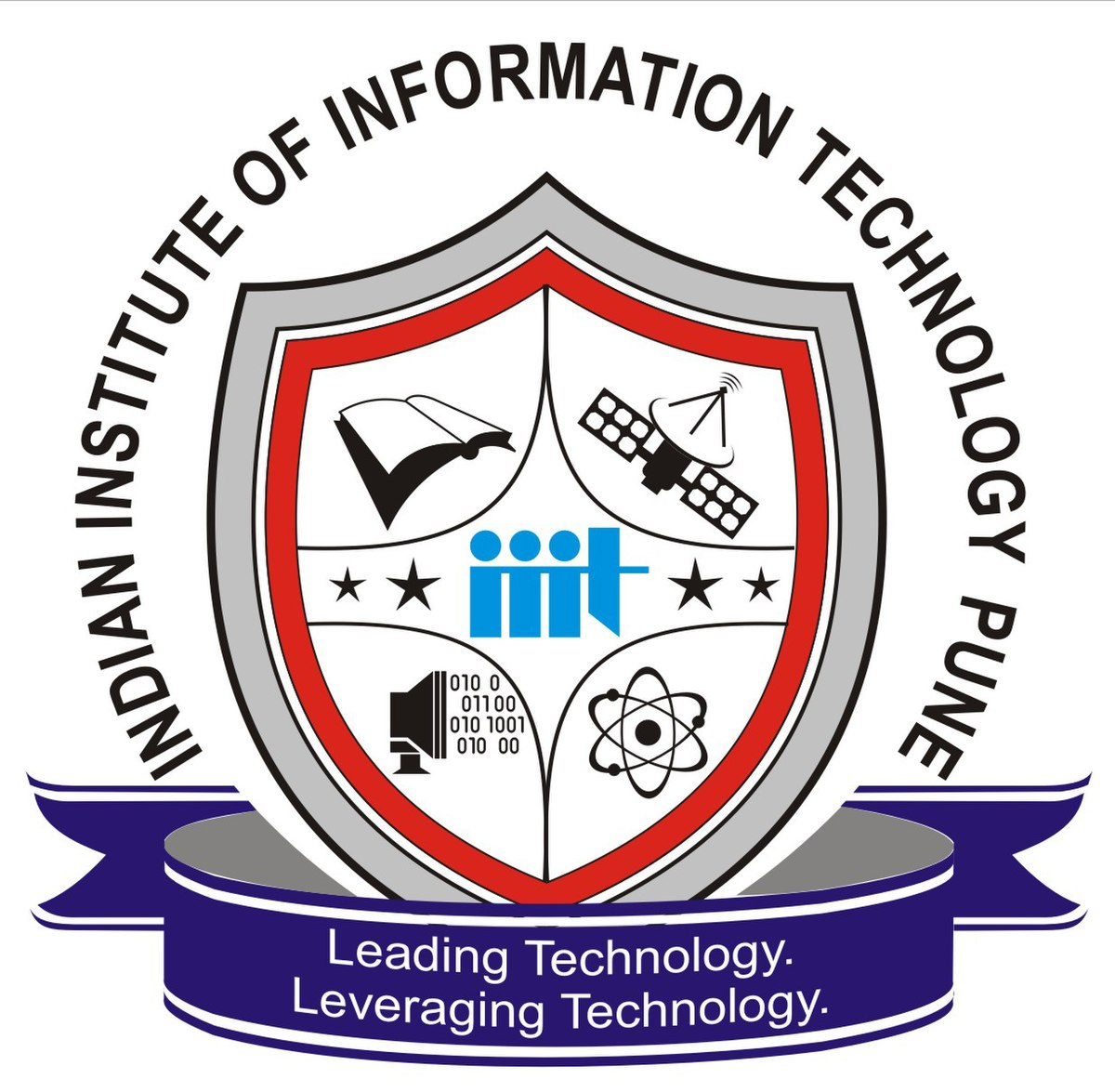
**Computer Science and Engineering/ Electronics and Communication Engineering**

by

### Student’s Name/ Group Members’ Names (with MIS Number in Brackets)

**Under the Supervision of: Supervisor’s Name**

### Semester:

****

#### Department of Computer Science and Engineering/ Department of Electronics and Communication Engineering

#### 

#### Indian Institute of Information Technology, Pune

**(An Institute of National Importance by an Act of Parliament)**

#### November 2024

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#### Supervisor’s Name HoD Name

Project Supervisor Head of the Department

Designation of the Supervisor Assistant Professor

Department of the Supervisor Department of CSE/ECE

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## ACKNOWLEDGEMENT

This project would not have been possible without the help and cooperation of many. I would like to thank the people who helped me directly and indirectly in the completion of this project work.

First and foremost, I would like to express my gratitude to our honorable Director, **Prof. O.G. Kakde**, for providing his kind support in various aspects. I would like to express my gratitude to my project guide **Supervisor’s Name**, **Department of CSE/ECE**, for providing excellent guidance, encouragement, inspiration, constant and timely support throughout this **M.Tech/B.Tech Project**. I would like to express my gratitude to the **Head of Department (Name)**, **Department of CSE**, for providing his kind support in various aspects. I would also like to thank all the faculty members in the **Department of CSE/ECE** and my classmates for their steadfast and strong support and engagement with this project.

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Title

## Abstract

COVID-19 is a novel virus that causes infection in both the upper respiratory tract and the lungs. In the scale of a global pandemic, numbers of cases and deaths have increased daily. CT is scan one of the tests that can give a better picture on the severity of COVID-19. For monitoring various lung diseases,chest X-ray illustrations have proven useful, and they are used to monitor the COVID-19 disease.

In this project, I am going to work on deep-learning-based approaches, namely deep feature extraction, fine-tuning of pretrained convolutional neural networks (CNN), and end-to-end training of a developed CNN model, have been used to classify COVID-19 and normal (healthy) chest X-ray images. For deep feature extraction, pretrained deep CNN models (ResNet18, ResNet50, ResNet101, VGG16, and VGG19) were used. For classification of the deep features, the Support Vector Machines (SVM) classifier was used with various kernel functions, namely Linear, Quadratic, Cubic, and Gaussian. The pretrained deep CNN models were also used for the fine-tuning procedure.

A new LSTM model is proposed in this study with end-to-end training. A dataset containing 180 COVID-19 and 200 normal (healthy) chest X-ray images will be used in the study’s experimentation. Classification accuracy was used as the performance measurement of the study. The experimental works reveal that deep learning shows potential in the detection of COVID-19 based on chest X-ray images. The results of which showed the deep approaches to be quite efficient when compared to the local texture descriptors in the detection of COVID-19 based on chest X-ray images.

The ability to process large numbers of features makes deep learning very powerful when dealing with unstructured data. If the data is too simple or incomplete, it is very easy for a deep learning model to become overfitted and fail to generalize well to new data.

**Keywords:** Covid detection, Artificial Intelligence, Deep Learning

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**Chapter 1**

**Introduction (All Headings: 17 Font Size, Times New Roman)**

## Overview of Work (First Sub-Heading, 14 Times New Roman)

### Subtitle if any (Under Sub-Heading Pointer, 12 Times New Roman)

As the healthcare industry is recently shifting its focus from disease treatment the past to prevention, patients are demanding more effective and safe treatment and personalized treatment from medical care providers.To achieve this, it is necessary to comprehensively analyze and utilize patients’ lifelong data, medical image data, genetic data, medical literature data, and medical records in hospitals. There are limitations in diagnosing patients by analyzing the vast amounts of data through doctors’ cognitive judgment ability and effort, and environmental factors.

## Literature Review

Studies have been actively conducted on AI technologies that assist and replace doctors to analyze patients’ data and support decision-making. Even for the same disease, doctors have huge differences in treatment and lack consistency.

Since healthcare determines a person’s life and diagnoses diseases, its diagnosis ac- curacy is very important. Patients’ confidence is increasing toward AI-based healthcare technology with fast computational power and high accuracy based on diagnosis evidence

Medical imaging technology in AI is one of the fields with the most active research.

Title

To diagnose a disease, medical images collect various parts inside and outside the human body through an image collecting device, and clinical or image medical specialists use the collected images for diagnosis by relying entirely on their visual cognitive ability and judgment..

However, such an existing method is being improved or replaced by AI [16]–[18]. Many studies are actively in progress because AI can recognize the characteristics of image data more accurately and faster than doctors.

In particular, the recent outbreak of an unprecedented COVID-19 pandemic has in- creased the interest in responding to diseases by using new technologies such as AI and data to detect chest diseases, leading to more active related studies.

Line-Feature Analysis algorithm that converts high-quality, high-resolution original images into low-dimension data to reduce the data processing speed for accurate analysis. For the accuracy and reliability of the LFA algorithm proposed in this study, accuracy was measured in an experiment according to the edge detection algorithm, and the performance of the LFA-RNN model was compared with the existing learning model to confirm its performance.

A more detailed conclusion of the reviewed research works for brain tumor detection are discussed in Table 1.

|  |  |  |
| --- | --- | --- |
| **Cancer Type** | **No. of new cases** | **No. of deaths** |
| Brain tumor | 3,08,102 | 2,51,329 |
| Cervical cancer | 6,04,121 | 3,41,831 |
| Breast cancer | 22,61,419 | 6,84,996 |
| Skin cancer (melanoma) | 3,24,635 | 57,043 |
| Skin cancer (non-melanoma) | 11,98,073 | 63,731 |
| Lung cancer | 22,06,771 | 17,96,144 |

Table 1: New cases and deaths for cancers reported in 2020 (Source GLOBO- CAN 2020 [2] )

[**1.3**](#_heading=h.3znysh7)  **Motivation of the Work**

**1.4 Research Gap**

# Chapter 2

# Problem Statement

The biggest motivation of doing this paper is Now a days X-ray and CT in medicine use high-resolution images, they require high specification equipment and huge energy consumption due to high computation in learning and recognition, incurring huge costs to create an environment for operation. Thus, this paper proposes a chest X-ray outlier detection model which will decrease the working time.

**2.1 Research Objectives**

**2.2 Analysis and Design**

# Chapter 3

# Proposed Work

Hybrid methods can be said to combine different single techniques to generate a way with greater flexibility and capability than single methods. Due to their tremendous potential and capability for enhancing estimation and optimizing performance, hybrid approaches are growing in popularity. Machine learning algorithms work effectively in the detection of the masses and classification. Deep learning methods provide pre-trained models for feature extraction and Lately, Deep Learning is gaining much popularity due to its supremacy in terms of accuracy when trained with a huge amount of data. Therefore, in this paper, a deep hybrid model combining two classifiers Convolution Neural Network (CNN) and Support Vector Machine(SVM) is proposed.

**3.1 Methodology of work**

Skin cancer is also one of the dangerous growing diseases and manual detection of these cancer cells takes time to cure. Skin cancer is increasing nowadays and most common among people so the detection of the cancers using different methods became crucial. Every day approximately 9,500 cases are registered in the U.S with people suffering from skin cancer. Approximately 20 Americans die every day and most of them are suffering from melanoma skin cancer. Skin cancers are categorized into 6 different types as shown in Fig. 3 and among them Melanoma is the most dangerous, unpredictable and life threatening skin cancer which will spread all over the body and cause severe damage to skin. It is mostly affected among females of age 15 to 29 [57].

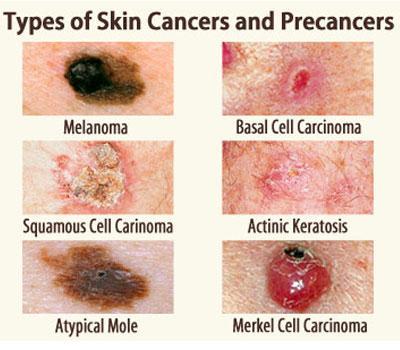


Fig. 3: Types of Skin Cancers and Pre-cancers [3]

**3.2 Hardware & Software specifications**

**3.3 Dataset Description**

# Chapter 4

# Results and Discussion

Our Research proposes a chest X-ray outlier detection model using dimension reduction and edge detection. Unlike the existing dimension reduction techniques, the proposed algorithm uses its own data as the standard for dimension reduction and always applies a consistent classification criterion.

In the existing techniques, classification criteria changed according to the number of learning data, class distribution, and type. However, this may degrade the performance of recognition by reanalyzing the classification criteria and using inefficient classification when applied to additional learning data and daily life data.

Moreover, it realizes the prediction of response to different treatment modalities because it can predict the pattern of cardiovascular complications.

Hence, considering their properties and multiple advantages, ELMs are recom- mended for such problems. However, it should be noted while AI speeds up the methods to conquer COVID-19, real experiments should happen because a full understanding of advantages and limita- tions of AI-based methods for COVID-19 is yet to be achieved, and novel approaches have to be in place for problems of this level of complexity.

The RNN, as alternatively called Auto Associative or Feedback Network, falls in the category of LSTM in which a directed cycle is made through connections between units. Being a widely appreciated DL family, RNNs have succeeded to present promising results in a lot of machine learning and computer vision tasks. One important task to use this model, however, is the quantification of qualitative inputs such as country and location.

Title

Updating the model is possible because of the real-time data by LSTM with real-time learning capability. Utilization of the proposed LSTM model provides the opportunity of proposing the epidemiological model of the virus in different locations. The main objective of the proposed structure is to improve the accuracy and speed of recognition and classification of the issues caused by the virus by utilizing DL-based methods.

# Chapter 5

# Conclusion and Future Scope

The introduced conceptual structures and platforms in the research field of AI-based techniques, which are suitable for dealing with COVID-19 issues, have been studied in this paper. Different techniques have been developed, incorporating COVID-19’s diagnostic systems, such as RNN, LSTM, GAN, and ELM. The geographical issues, high-risk people, and recognizing and radiology were the main problems with COVID-19 and have been studied and discussed in this work. Also, we showed a mechanism for selecting the appropriate models of estimation and prediction of desired parameters using a number of clinical and non-clinical datasets. Considering these platforms assists AI experts to analyze huge datasets and help physicians train machines, set algorithms or optimize the analyzed data for dealing with the virus with more speed and accuracy. We discussed that they are desirable because of their potential for creating a workspace while AI experts and physicians could work side by side. However, it should be noted while AI speeds up the methods to conquer COVID-19, real experiments should happen because a full understanding of advantages and limitations of AI-based methods for COVID-19 is yet to be achieved, and novel approaches have to be in place for problems of this level of complexity.

# References

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