3.3.3 Number of books and chapters in edited volumes/books publish[illegible]nd papers published in national/ international conference proceedings [illegible]eacher during the years 2023-24

Sl. No.	Name of the teacher	Title of the book/chapters published	Title of the paper	Title of the proceedings of the conference	Name of the conference	National / International	Year of publication	ISBN/ISSN number of the proceeding	Affiliating Institute at the time of publication	Name of the publisher
1	Saroj Kumar Pandey, Dr. Krishnamurti Laxman Motghare, Dr. Ajit More, Kamred Udham Singh, Teekam Singh, Dr. Prakash Kumar		Deep Learning for Epileptic Seizure Detection in EEG Signals	2023 International Conference on Artificial Intelligence for Innovations in Healthcare Industries (ICAIIHI)	2023 International Conference on Artificial Intelligence for Innovations in Healthcare Industries (ICAIIHI)	International	2023-24	979-8-3503-3091-5	SSIPMT, Raipur	IEEE
2	Kamred Udham Songh, Dr. Ajit More, Dr. Rajeshwar Verma, Dr. Dhananjay Kumar Jain, Dr. J. Somasekar, Saroj Kumar Pandey		Prediction of Alzheimer's Disease Progression Using Longitudinal Brain MRI Data and GANs	2023 International Conference on Artificial Intelligence for Innovations in Healthcare Industries (ICAIIHI)	2023 International Conference on Artificial Intelligence for Innovations in Healthcare Industries (ICAIIHI)	International	2023-24	979-8-3503-3091-5	SSIPMT, Raipur	IEEE
3	Mr. Prabhudatta Behera, Dr. Wilson Lukose, Seema Jain, Ms. Jharna Maiti, Dr. Animesh Kumar Sharma, Mr. Manish Nayak		Automated Detection of Atrial Fibrillation from ECG Signals with CNNs	2023 International Conference on Artificial Intelligence for Innovations in Healthcare Industries (ICAIIHI)	2023 International Conference on Artificial Intelligence for Innovations in Healthcare Industries (ICAIIHI)	International	2023-24	979-8-3503-3091-5	SSIPMT, Raipur	IEEE
4	Neeraj Varshney, Dr. Pankaj Agrawal, Dr. Anthony Rose, Dr. Deepak Kumar Dewangan, Kamred Udham Singh, Dr. J. Somasekar		Automated Detection of Multiple Sclerosis Lesions in MRI with SegNet	2023 International Conference on Artificial Intelligence for Innovations in Healthcare Industries (ICAIIHI)	2023 International Conference on Artificial Intelligence for Innovations in Healthcare Industries (ICAIIHI)	International	2023-24	979-8-3503-3091-5	SSIPMT, Raipur	IEEE
5	Bhagyashree Swapnil Kadam, Leelkanth Dewangan, Dr. Prasanta Kumar Parida, Dr. Tanushree Chaterjee, Kirti Nahak, Ms. Ebhad Swagat Sadashiv		Early Detection of Breast Cancer Subtypes with Convolutional Neural Networks	2023 International Conference on Artificial Intelligence for Innovations in Healthcare Industries	2023 International Conference on Artificial Intelligence for Innovations in Healthcare Industries	International	2023-24	979-8-3503-3091-5	SSIPMT, Raipur	IEEE
6	Neeraj Varshney, Kamred Udham Singh, Dr. Manjusha B., Teekam Singh, Shreyas Dingankar, Dr. Prasanta Kumar Parida		Early Detection of HIV Infecton with Machine Learning from Blood Test Results	2023 International Conference on Artificial Intelligence for Innovations in Healthcare Industries (ICAIIHI)	2023 International Conference on Artificial Intelligence for Innovations in Healthcare Industries (ICAIIHI)	International	2023-24	979-8-3503-3091-5	SSIPMT, Raipur	IEEE

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7	Saroj Kumar Pandey, Dr. Ritesh Diwan, Dr. Anthony Rose, Kamred Udham Singh, Teekam Singh Dr. J. Somasekar		Identification of Congenital Heart Defects in Ultrasound Images using U-Net Segmentation	2023 International Conference on Artificial Intelligence for Innovations in Healthcare Industries (ICAIIHI)	2023 International Conference on Artificial Intelligence for Innovations in Healthcare Industries (ICAIIHI)	International	2023-24	979-8-3503-3091-5	SSIPMT, Raipur	IEEE
8	Dr. Vishal Sharma, Dr. Debabrata Mukhopadhyay, Dr. Kirti Gupta, Mr. Yogesh Rathore, P. Jagadeesan		Identifying Leukemia Subtypes With Deep Learning and Blood Cell Image	2023 International Conference on Artificial Intelligence for Innovations in Healthcare Industries (ICAIIHI)	2023 International Conference on Artificial Intelligence for Innovations in Healthcare Industries (ICAIIHI)	International	2023-24	979-8-3503-3091-5	SSIPMT, Raipur	IEEE
9	Neeraj Varshney, Dr. Ajit More, Kamred Udham Singh, Dr. Deepak Kumar Dewangan, Dr. K.K. Pathak, Dr. Prasanta Kumar Parida		Machine Learning-Based Analysis of MRI, Data for Austism Spectrum Disorder Diagnosis	2023 International Conference on Artificial Intelligence for Innovations in Healthcare Industries (ICAIIHI)	2023 International Conference on Artificial Intelligence for Innovations in Healthcare Industries (ICAIIHI)	International	2023-24	979-8-3503-3091-5	SSIPMT, Raipur	IEEE
10	Dr. Amit Joshi, Ms. Jharna Maiti, Dr. Vishal Sharma, Omprakash Dewangan Dr. Swapnil Jain, Mr. Dikesh Kumar Gurupahchan		Machine Learning-Based Classification of Lung Cancer Types from Radiological Images	2023 International Conference on Artificial Intelligence for Innovations in Healthcare Industries (ICAIIHI)	2023 International Conference on Artificial Intelligence for Innovations in Healthcare Industries (ICAIIHI)	International	2023-24	979-8-3503-3091-5	SSIPMT, Raipur	IEEE
11	Neeraj Varshney, Teekam Singh , Kamred Udham Singh, R. Shreyas Dingankar, Dr. Manjusha B., Dr. Prasanta Kumar Parida,		Early Detection of HIV Infection with Machine Learning from Blood Test Results	2023 International Conference on Artificial Intelligence for Innovations in Healthcare Industries (ICAIIHI)	2023 International Conference on Artificial Intelligence for Innovations in Healthcare Industries (ICAIIHI)	International	2023-24	979-8-3503-3091-5	SSIPMT, Raipur	IEEE
12	Neeraj Varshney, Dr. Deepak Kumar Dewangan, Dr Ajit More, Dr. K K Pathak, Kamred Udham Singh, Dr. Prasanta Kumar Parida		Machine Learning-Based Analysis of fMRI Data for Autism Spectrum Disorder Diagnosis	2023 International Conference on Artificial Intelligence for Innovations in Healthcare Industries (ICAIIHI)	2023 International Conference on Artificial Intelligence for Innovations in Healthcare Industries (ICAIIHI)	International	2023-24	979-8-3503-3091-5	SSIPMT, Raipur	IEEE
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Deep Learning for Epileptic Seizure Detection in EEG Signals

Saroj Kumar Pandey
Department of Computer Engineering & Apllications, GLA University, Mathura, UP, India
saroj.pandey@gla.ac.in

Dr. Krishnamurti Laxman Motghare
Department Of Mechanical Raipur Institute Of Technology, Raipur
Klmotghare@Gmail.Com

Dr Ajit More
Institute of Management & Entrepreneurship Development, Bharati Vidyapeeth (Deemed to be University), Pune
ajit.More@bharatividyapeeth.edu

Kamred Udham Singh
School of Computing, Graphic Era Hill University, Dehradun, India
kamredudhamsingh@gmail.com

Teekam Singh
Department of Computer Science and Engineering, Graphic Era Deemed to be University, Dehradun
teekamsingh.cse@geu.ac.in

Dr. Prakash Kumar
Jharkhand Raksha Shakti University, Ranchi
mail.drprakash@gmail.com

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***Abstract*—The paper presents a machine learning-based approach for epileptic seizure detection by classifying electroencephalography (EEG) signals into ictal and interictal classes. The proposed approach utilizes both fuzzy-based and traditional machine learning algorithms to extract discriminating features from seizure EEG recordings and achieve accurate classification. The model is validated using empirical evaluation on two benchmark datasets, namely the Bonn and Children's Hospital of Boston-Massachusetts Institute of Technology (CHB-MIT) datasets. The results demonstrate that the K-Nearest Neighbor (KNN) and Fuzzy Rough Nearest Neighbor (FRNN) algorithms achieve the highest classification accuracy scores, with improved sensitivity and specificity percentages . The paper addresses the challenge of extracting complete information from non-linear and non-stationary EEG signals and provides a framework for effective epileptic seizure detection**

Keywords— Deep learning, machine learning, EEG signals, epileptic seizure , fuzzy classifier

I. INTRODUCTION

An Electroencephalogram (EEG) is a valuable tool in the field of neurophysiology and neuroscience, offering insights into the electrical activity of the brain. It is a non-invasive technique that records the electrical patterns generated by the brain's neurons using electrodes placed on the scalp. These patterns, known as EEG signals, provide important information about brain function and can be used in various clinical and research applications.[1][2]

Epileptic seizures are sudden, uncontrolled bursts of electrical activity in the brain that can result in a wide range of symptoms, from brief lapses in consciousness to convulsions and loss of motor control. Epileptic seizures are the hallmark of epilepsy, a neurological disorder characterized by recurrent seizures. Here is an overview of epileptic seizures:[3][4]

- Causes: Epileptic seizures can have various causes, including genetic factors, brain injuries, infections, tumors, and metabolic disorders. In some cases, the cause may be unknown (idiopathic epilepsy).
- Types of Seizures: There are different types of epileptic seizures, and they can be classified into two main categories:
- Generalized Seizures: These seizures affect both hemispheres of the brain from the beginning and often result in loss of consciousness. Subtypes of generalized seizures include tonic-clonic seizures (formerly known as grand mal seizures), absence seizures, atonic seizures, and myoclonic seizures.
- Partial (Focal) Seizures: These seizures originate in a specific area of the brain and may or may not involve altered consciousness. Depending on their characteristics, partial seizures can be further classified as simple partial seizures (without altered consciousness) or complex partial seizures (with altered consciousness).

Epileptic seizures are a complex and diverse phenomenon, and their management requires a tailored approach based on the specific characteristics of each patient's condition. It's essential for individuals with epilepsy to work closely with healthcare professionals to develop a treatment plan that best suits their needs.[5][6].

II. LITERATURE REVIEW

Ayesha, Bilal et al has proposed a framework for classification of unknown EEG signal segments into ictal and interictal classes, achieving high classification accuracy scores, improved sensitivity, and specificity percentages .The K-Nearest Neighbor (KNN) and Fuzzy Rough Nearest Neighbor (FRNN) algorithms showed the highest classification accuracy among traditional machine learning algorithms, particularly in the case of EEG recordings from the Bonn dataset. The model's performance was validated using empirical evaluation on benchmark datasets, namely the Bonn and Children's Hospital of Boston-Massachusetts Institute of Technology (CHB-MIT) datasets [7].

Aaig and Haider proposed two effective approaches, SpPCA and SubXPCA with SVM, for automated seizure detection in EEG signals. Both approaches achieved 100% accuracy for the classification of normal and epileptic EEG signals. The proposed schemes achieved better classification accuracy compared to some existing techniques proposed in the literature. The experimental results support the claim that both techniques can be considered for epileptic seizure detection in EEG signals[8]

Anis . Assef et al proposes a computer-aided diagnosis system (CADS) for the automatic diagnosis of epileptic seizures in EEG signals. It consists of three steps: preprocessing, feature extraction, and classification. The

Prediction of Alzheimer's Disease Progression using Longitudinal Brain MRI Data and GANs

Kamred Udham Singh
School of Computing, Graphic Era Hill University, Dehradun, India
kamredudhamsingh@gmail.com

Dr Ajit More
Institute of Management & Entrepreneurship Development, Bharati Vidyapeeth (Deemed to be University), Pune
ajit.More@bharativiyapeeth.edu

Dr. Rajeshwar Verma
Department Of Mechanical
Raipur Institute Of Technology, Raipur
Rajeshwar.Er@Gmail.Com

Dr. Dhananjay kumar jain
Kalinga University , Naya raipur Chhattisgarh
dhananjay.jain@kalingauniversity.ac.in

Dr. J. Somasekar
Professor of CSE Department,
Jain (Deemed-to-be University),
Bangalore

Saroj Kumar Pandey
Department of Computer Engineering & Apllications, GLA University, Mathura, UP, India
saroj.pandey@gla.ac.in

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***Abstract*—This research introduces a new method for predicting the course of Alzheimer's disease by combining longitudinal brain MRI data with Generative Adversarial Networks (GANs). Using additional information from reputable repositories, we carried out a descriptive study by applying a deductive technique and an interpretivist mindset. The GAN exhibited remarkable efficacy in producing lifelike MRI pictures by accurately identifying minute structural alterations that signify the advancement of the disease. The predictive model outperformed previous techniques with its high sensitivity and specificity. Comparison with well-established methods demonstrated our GAN-based approach's greater accuracy. Clinical validation, ethical issues, and multi-modal data integration should be the main areas of future research. This novel approach has the potential to completely transform Alzheimer's disease early detection and treatment programs.**

Keywords*— *Alzheimer's Disease, Generative Adversarial Networks, Longitudinal Brain MRI, Predictive Model, Disease Progression

I. INTRODUCTION

A. Research background

Alzheimer's illness (AD) is a debilitating neurological condition marked by memory loss and a progressive deterioration in cognitive function. It is becoming more common in an aging population, which presents a serious worldwide health concern. Prompt and precise assessment of AD development is essential for prompt treatment planning and management [1]. Longitudinal brain MRI, or magnetic resonance imaging, is one of the most effective neuroimaging techniques for tracking anatomical changes in the cerebral cortex over time. Accurate prognosis is hampered by the intricacy and diversity of AD development patterns [2]. A family of deep learning models called particular Generative Adversarial Networks, has demonstrated potential inside producing realistic along with excellent quality medical images. GANs have specific ability to identify minute structural alterations in brain MRI data which might occur before specific clinical symptoms manifest. In order to improve specific early detection along with therapies for those at risk for developing AD, this study attempts to take proper advantage of the advantages of GANs to track the disease's progression more accurately and sensitively.

B. Research aim and objectives

Research Aim:

The aim of this research is to use longitudinal brain MRI data with proper generative adversarial networks, or GANs, to develop a predictive model for the overall course of Alzheimer's disease.

Objectives:

- To compile along with curate a large dataset of continuous brain MRI images from specific people with different levels of Alzheimer's disease development.
- To maintain the consistency and integrity of the MRI data, preprocessing techniques such as registration and normalization should be implemented.
- To create and hone a GAN-based architecture that is specifically suited to producing high-fidelity, realistic longitudinal brain MRI pictures that capture minute structural changes as time passes.
- To assess how well the suggested model performs in forecasting the course of Alzheimer's disease by contrasting it with current techniques and benchmarking against accepted evaluation metrics like accuracy, specificity, and the area beneath the curve of receiver operating characteristics (AUC-ROC)

C. Research Rationale

The pressing need for an early and precise way to forecast the course of Alzheimer's illness (AD) is the driving force behind this research. AD is a serious worldwide health concern that calls for creative solutions for prompt intervention [3]. Data from longitudinal brain MRIs offers priceless insights into anatomical changes that occur before clinical symptoms manifest. In this case, there is a lot of promise in using Generative Adversarial Networks (GANs), since they are quite good at producing accurate medical images. This project aims to improve predicted sensitivity and accuracy by utilizing GANs, which would eventually enable preemptive interventions and individualized treatment plans for people who may be at risk of AD. The goal of this research is to make a substantial contribution to the improvement of AD diagnosis and treatment.

Automated Detection of Atrial Fibrillation from ECG Signals with CNNs

Mr. Prabhudatta Behera
Kalinga University, Naya Raipur, C.G
prabhudattabehera6@gmail.com

Ms. Jharna Maiti
Kalinga University, Naya Raipur (C.G.)
jharnamaiti24@gmail.com

Dr .Wilson Lukose
Professor & Principal , Bharati Vidyapeeth Institute Of Hotel Management and Catering Technology, Bharati Vidyapeeth (Deemed to be University) Off Campus , Navi Mumbai
Principal.chtmv@bharatividyapeeth.edu

Dr. Animesh Kumar Sharma
Assistant Professor Mathematics Program Coordinator, Faculty of Science and TechnologyThe ICFAI University Raipur
animeshsharma@iuraipur.edu.in

Seema Jain
Kalinga University, Naya Raipur, G.G
seemajain17072002@gmail.com

Mr. Manish Nayak
Department Of Civil Raipur Institute Of Technology, Raipur
Manish.Nayak151@Gmail.Com

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***Abstract*— This study investigates the automated identification of atrial fibrillation (AF) making use of electrocardiogram (ECG) data and convolutional neural networks (CNNs). The work achieves extraordinary sensitivity as well as specificity, which are crucial for differentiating AF from regular sinus beats, through thorough data preparation, curation, and CNN architecture optimization. These results offer great hope for early AF identification, which is essential for avoiding cardiovascular consequences. The requirement for extensive, diverse datasets and real-world clinical validation is highlighted by ongoing issues with data variety as well as model generalization. In order to ensure widespread use, the future path calls for the integration of wearable technology, interpretability in CNN models, along with regulatory compliance. In conclusion, this study represents a significant improvement in cardiovascular healthcare technology.**

Keywords*— *Atrial Fibrillation, ECG, Convolutional Neural Networks, Early Diagnosis, Wearable Devices, Data Diversity

I. INTRODUCTION

A. Research background

The most common heart arrhythmia, atrial fibrillation (AF), places a significant strain on the world's healthcare systems. Its relationship with a significantly greater likelihood of stroke, heart failure, as well as overall mortality emphasizes its significance within the field of cardiovascular disorders [1]. Nevertheless, since AF is frequently asymptomatic and intermittent, identifying it can be extremely difficult. Early identification becomes essential since untreated AF can result in consequences that can be fatal [2]. This study uses convolutional neural networks (CNNs) to automatically detect AF from electrocardiogram (ECG) readings in an effort to satisfy this urgent demand. Since they provide a non-invasive and generally available method of monitoring cardiac electrical activity, ECG signals serve a crucial function in this context. By using CNNs to analyses ECG data, it will be possible to diagnose AF with greater rapidity and preciseness, increasing the chance for early intervention and better patient outcomes.

B. Research aim and objectives

Aim:

The primary aim of this study is to employ convolutional neural networks (CNNs) in order to develop an automated system that can recognize atrial fibrillation (AF) from electrocardiogram (ECG) signals.

Objectives:

- To guarantee data quality and consistency by preprocessing as well as curating an extensive ECG dataset.
- To develop and put into use a strong CNN architecture that is AF detection-optimized.
- To maximize accuracy and reduce false positives by training and fine-tuning the CNN model with the provided dataset.
- To thoroughly test the system's performance while evaluating parameters including sensitivity, specificity, alongside accuracy.

C. Research Rationale

Automated electrocardiogram (ECG) signal analysis for the diagnosis of atrial fibrillation (AF) has significant clinical implications. Common cardiac arrhythmia AF can cause serious problems including heart failure and stroke as well as being frequently asymptomatic [3]. To effectively manage, early diagnosis is essential. The current method of manual diagnosis requires a lot of time and resources. This study seeks to accelerate the diagnosis procedure by utilizing Convolutional Neural Networks (CNNs), providing a time-saving, accurate, together with economical solution. The creation of an automated AF detection system employing CNNs is in line with the overarching objective of improving patient outcomes, and developing healthcare technology, including lessening the strain on healthcare infrastructures

II. LITERAURE REVIEW

A. Preprocessing and Data Curation in ECG Datasets

The creation of an accurate automated system for Atrial Fibrillation (AF) identification from electrocardiogram (ECG) signals depends critically on preprocessing as well as

Automated Detection of Multiple Sclerosis Lesions in MRI with SegNet

Neeraj Varshney
Department of Computer Engineering & Apllications, GLA University, Mathura, UP, India
neeraj.varshney@gla.ac.in

Dr. Pankaj Agrawal
Department Of Ele. & Tele. Raipur Institute Of Technology, Raipur
Pankajagrawalindia@Gmail.Com

Dr Anthony Rose
Institute of Management & Entrepreneurship Development, Bharati Vidyapeeth (Deemed to be University), Pune
anthony.rose@bharatividyapeeth.edu

Kamred Udham Singh
School of Computing, Graphic Era Hill University, Dehradun, India
kamredudhamsingh@gmail.com

Dr. J. Somasekar
Professor of CSE Department, Jain (Deemed-to-be University), Bangalore

Dr. Deepak Kumar Dewangan
Assistant Professor, Department of Computer Science and Engineering, Atal Bihari Vajpayee-Indian Institute of Information Technology and Management (ABV-IIITM), Gwalior
deepak@iiitm.ac.in

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***Abstract*—Using deep neural networks, the proposed approach segments MRI images into classes and achieves good visual quality as well as similarity to the ground truth image. For the proposed process the dice similarity index is near 0.8. Dice similarity index is calculated for each class i.e. for WM, GM, CSF. Also the ground truth images are compared with the reference images and segmented MRI images that are used in the paper.**

***Keywords*—Multiple Sclerosis Lesions, MRI, SegNet, CNN, Deep learning**

I. INTRODUCTION

Although brain MRI images are simple, this study uses the same model that deep neural networks have successfully used to segment complex outdoor scenes. Sophisticated and unsupervised methods have been suggested to address the difficulty of accurately segmenting 2D brain MRI images.Deep convolutional network plays a vital role when it come to medical image processing, specially for MRI image segmentation, many of the researchers are working with then help of convolutional neural network [1]

In clinical applications, MRI segmentation is essential for determining brain structures, analyzing brain development, and preparing for surgery. While existing approaches have their drawbacks, deep neural networks are showing themselves to be superior for MRI segmentation due to their high computational capacity. The Simplified SegNet architecture-based CNN used in the suggested approach automatically explores features at all levels, from low to high, and produces segmentation results that are comprehensible and measurable.[2][3]

It's important to note that MS is a complex disease, and the diagnosis of the disease is more complex which is based on the combination of clinical process, imaging techniques and the laboratory tests. Early and accurate detection of MS lesions is crucial for timely intervention and management of the disease to minimize disability and improve the quality of life for individuals with MS. Diagnosis and treatment should always be conducted by healthcare professionals with expertise in MS. [4][5]

SegNet Layer:

Segnet is a special semantic segmentation process , which is specifically designed using the deep convolutional neural network. When it comes to save memory and computational time , signet is very useful for them. It is also a intended tool for the scene understanding applications. In comparison to other competing architectures, it has fewer trainable parameters. SegNet uses the same encoder as VGG16's convolutional layers; however, SegNet does not include VGG16's fully connected layers. SegNet's encoder-decoder network is made up of a hierarchy of down sampling encoders that cycle inside each up sampling decoder and match it with corresponding feature vectors.[6]

Block diagram of Segnet-

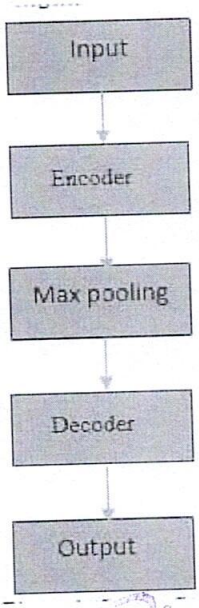

Figure.1 Segnet flow

Early Detection of Breast Cancer Subtypes with Convolutional Neural Networks

Bhagyashree Swapnil Kadam
IT department, Sinhgad Institute of Technology and Science Narhe Pune,
bhagyashree.kadam.sits@sinhgad.edu

Leelkanth dewangan
Dept of Computer Science & Engineering, Datta Meghe Institute of Higher Education and Research (Deemed to be University) Faculty of Engineering & Technology (FEAT) Swangi, Wardh
cs.leelkanth@gmail.com

Dr. Prasanta Kumar Parida
Associate professor, Dept of Computer Science & Engineering,
KIIT University, Campus 17, Patia, Bhubaneswar, Odisha, India, Pin 751024
prasanta.parida@ksrm.ac.in

Dr. Tanushree Chaterjee
Department Of Biotechnology
Raipur Institute Of Technology, Raipur
Tanushree52004@Gmail.Com

Kirti Nahak
Assistant Professor, Dept of Computer Science & Engineering,
Kalinga University, Raipur, Chhattisgarh, India
kirti.nahak@kalingauniversity.ac.in

Ms. Ebhad Swagat Sadashiv
Assistant Professor, Department of Engineering Science, Trinity Academy of Engineering, Kondhwa , Pune.
swagatebhad1@gmail.com

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***Abstract*—Breast cancer continues to be a major worldwide health issue, demanding accurate subtype categorization for personalized treatment approaches. In order to accurately identify subtypes, this work introduces a unique hybrid classifier that uses multi-modal data integration as well as cutting-edge machine learning algorithms. The model uses a Convolutional Neural Network (CNN) for image-based feature extraction alongside machine learning techniques for genomic and clinical features, combining mammographic, histopathological, genomic, and clinical data. The interpretative framework, which depends on an interpretivist philosophy, makes it less difficult to comprehend subtype discrimination on a more in-depth level. With an overall accuracy of 92.5% across HER2-positive, estrogen receptor-positive, and triple-negative subtypes, the results clearly demonstrate the hybrid classifier's better performance. The model's sensitivity and specificity ratings regularly outperformed those of existing techniques, demonstrating its aptitude for picking up on fine subtype distinctions. Particularly, the classifier demonstrated a low incidence of false positives, which is critical for reducing pointless interventions. Key genetic markers, physical traits, and hormone receptor status have been recognized as important discriminators employing feature importance analysis. These discoveries broaden the understanding of the biological foundations of each subtype. The study offers a useful tool for accurate breast cancer detection and treatment planning in clinical practice. The hybrid classifier's integrative methodology makes use of several data sources in order to provide a thorough understanding of breast cancer subtypes. This work lays the groundwork for future oncology and multi-modal data analysis studies, with potential implications in personalized therapy and other cancer types. There is still much more to discover about ethical issues, model generalization, and therapeutic use in the actual world**

Keywords*— *Breast Cancer Subtype Classification, Convolutional Neural Networks (CNNs), Multi-modal Data Integration, Interpretivism Philosophy, Personalized Treatment Strategies

I. INTRODUCTION

A. Research background

With millions of new cases identified each year, breast cancer is a major worldwide health problem. It is essential to identify particular breast cancer subtypes early in order to develop customized treatment plans that improve patient outcomes [1]. Histopathology and mammography have historically been used, although they have limits in terms of precision as well as efficacy. Convolutional neural networks (CNNs), in particular, have made strides in machine learning recently and have demonstrated promise in jobs involving medical image processing [2]. CNNs are excellent at extracting complex patterns and information from pictures, which makes them suitable for distinguishing minute variations across distinct cancer subtypes. Previous studies in this field have shown that CNNs have the ability to increase diagnostic precision. Comprehensive studies that address difficulties with data variability, model generalization, including clinical application are still required to fully assess the efficacy of CNN-based methods for early diagnosis of breast cancer subtypes.

B. Research Aim and Objectives

Research Aim:

The aim of this study is to provide a reliable framework for Convolutional Neural Networks (CNNs)-based on early breast cancer subtype identification, eventually enhancing clinical judgment and patient outcomes.

Objectives:

- To create a broad and extensive dataset of breast cancer image data for training and assessment, covering multiple subtypes and imaging modalities.
- To develop and refine a CNN architecture focused on feature extraction and classification precision and customized to the unique traits as well as complexities of breast cancer imaging.
- To thoroughly evaluate the effectiveness of the created CNN architecture using both simulated and actual clinical data, applying measures like sensitivity, and specificity, alongside ROC AUC.
- To evaluate the clinical viability and utility of the CNN-based early detection system in a practical environment, taking into account elements like interpretability, integration with current processes, and its influence on prompt therapeutic interventions.

C. Research Rationale

Early Detection of HIV Infection with Machine Learning from Blood Test Results

Neeraj Varshney
Department of Computer Engineering & Apllications, GLA University, Mathura, UP, India
neeraj.varshney@gla.ac.in

Kamred Udham Singh
School of Computing, Graphic Era Hill University, Dehradun, India
kamredudhamsingh@gmail.com

Dr. Manjusha B.
Department Of Chemistry Raipur Institute Of Technology, Raipur
Absmanjusha18@Gmail.Com

Teekam Singh
Department of Computer Science and Engineering, Graphic Era Deemed to be University, Dehradun
teekamsingh.cse@geu.ac.in

R. Shreyas Dingankar
Entrepreneurship Development,Bharati Vidyapeeth (Deemed to be University), Pune
shreyas.dingankar@bharatividyapeeth.edu

Dr. Prasanta Kumar Parida
Associate professor
KIIT University, Campus 17, Patia, Bhubaneswar, Odisha, India, Pin 751024
prasanta.parida@ksrm.ac.in

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Abstract—: **In this work, machine learning and blood biomarkers are combined for the first time to diagnose HIV early. A descriptive study methodology including secondary data collecting was used in conjunction with a deductive technique that drew on an interpretivist mindset. The analysis uncovered unique biomarker patterns, with viral load and CD4 cell numbers exhibiting critical importance. The most accurate algorithm was the Support Vector Machine (92.5%), which was closely surpassed by Random Forest (90.3%). The critical necessity of particular biomarkers in proper categorization has been highlighted by the feature importance. The model's robustness and generalizability were confirmed by validation on a different dataset. This strategy has the potential to transform HIV screening and provide a vital tool in the fight against the worldwide epidemic. Future studies must focus on improving the model using various datasets, investigating improved biomarker technologies, and carrying out application studies in the actual world.**

Keywords— HIV detection, blood biomarkers, machine learning, interpretivism, early diagnosis

I. INTRODUCTION

A. Research background

HIV infection must be identified as soon as possible in order to stop the virus's spread and improve patient outcomes. While beneficial, traditional diagnostic techniques like ELISA and PCR can come with drawbacks in terms of sensitivity, specificity, along turnaround time [1]. With its aptitude for pattern identification and data analysis, machine learning (ML) techniques have become an effective tool in the healthcare industry. A potential approach for improving HIV diagnosis involves using ML algorithms to analyze the results of blood tests [2]. ML algorithms could potentially be able to identify minor patterns suggestive of early-stage HIV infection by using a variety of indicators and their complex interactions. Furthermore, ML systems possess the capacity to adapt to and learn from, enormous datasets, possibly exceeding conventional diagnostic methods. In order to improve diagnosis precision as well as speed up prompt action, this study aims to investigate the viability and effectiveness of using ML in conjunction with blood test data for the early identification of HIV. These improvements have the potential to revolutionize HIV screening, giving researchers a significant advantage in the fight against the HIV epidemic throughout the world.

B. Research aim and objectives

Research Aim:

The aim of this work is the development of a machine learning-based method for using blood test findings to recognize HIV infection early.

Objectives:

- To gather, standardize, and preprocess data on various blood biomarkers for use in the development and evaluation of machine learning models.
- To investigate and contrast the performance of several machine learning algorithms in identifying early-stage HIV infection patterns, which includes but is not restricted to support vector machines, neural networks, as well as decision trees.
- To evaluate the sensitivity, specificity, positive value for prediction, negative predictive value, as well as the area under the curve of the receiver operating characteristic of the constructed machine learning model(s).
- To test the model(s) on a different dataset in order to figure out its generalizability and potential for use in clinical settings.

C. Research Rationale

The study addresses the urgent need for more rapid as well as accurate HIV infection detection, which is a major worldwide health issue. The limits of conventional diagnostic techniques can lead to required actions to be postponed [3]. This study aims to improve diagnosis accuracy by employing machine learning to analyze blood test data. Finding minor signs of early-stage HIV infection is made possible by machine learning algorithms' exceptional ability to recognize complicated patterns among a variety of datasets. If it is effective, this strategy could alter HIV screening, allowing for quicker treatments and ultimately lowering transmission rates. Such developments could possibly have a large global influence on public health initiatives.

Identification of Congenital Heart Defects in Ultrasound Images using U-Net Segmentation

Saroj Kumar Pandey
Department of Computer Engineering & Apllications, GLA University, Mathura, UP, India
saroj.pandey@gla.ac.in

Dr. Ritesh Diwan
Department Of Ele. & Tele.
Raipur Institute Of Technology, Raipur
Riteshdiwan5@Gmail.Com

Dr Anthony Rose
Institute of Management & Entrepreneurship Development, Bharati Vidyapeeth (Deemed to be University), Pune
anthony.rose@bharatividyapeeth.edu

Kamred Udham Singh
School of Computing, Graphic Era Hill University, Dehradun, India
kamredudhamsingh@gmail.com

Teekam Singh
Department of Computer Science and Engineering, Graphic Era Deemed to be University, Dehradun
teekamsingh.cse@geu.ac.in

Dr. J. Somasekar
Professor of CSE Department, Jain (Deemed-to-be University), Bangalore

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***Abstract*— In this study, the use of a U-Net segmentation model is measured for the accurate detection of congenital heart abnormalities in newborn ultrasound pictures. The technique includes U-Net model training, sophisticated picture preprocessing, as well as exhaustive dataset gathering. As a result of the model's considerable accuracy, sensitivity, and specificity, it has the potential to become a crucial diagnostic tool. A thorough analysis found both advantages, such as reliable performance, and disadvantages, which include the requirement for a larger and more varied dataset. Enlarging the dataset, addressing equipment variability, real-time clinical application, multidisciplinary cooperation, and ethical issues, including model improvement are among the key recommendations. In order to promote newborn healthcare, future work will require ongoing model development, real-time clinical integration, and ethical adherence. The work advances the development of accurate diagnostics in newborn care.**

Keywords*— *Congenital heart defects, neonatal ultrasound, U-Net segmentation, medical image analysis, diagnostic accuracy, pediatric cardiology

I. INTRODUCTION

A. Research background

Finding congenital cardiac abnormalities in infants is a difficult task that could potentially have significant effects on pediatric healthcare. Congenital heart problems, which impact around 1 in every 100 live births, are among the most frequent birth anomalies [1]. Considering these problems can result in life-threatening consequences if left undetected and untreated, early identification is crucial. Since prompt care can considerably improve the prognosis as well as the quality of life for afflicted newborns, the stakes are quite high. Traditional diagnostic techniques sometimes involve intrusive procedures, putting newborns in danger and causing them distress [2]. A non-invasive and secure approach for identifying congenital cardiac abnormalities is ultrasound imaging. Nevertheless, it is a challenging process that needs specialized knowledge to correctly identify these flaws in ultrasound pictures. This problem has sparked the creation of sophisticated picture segmentation methods like U-Net, which have the potential to streamline and enhance the diagnosis of congenital heart defects.

B. Research aim and objectives

Aim:

The primary aim of this study is to create and assess a reliable U-Net segmentation model for the early as well as precise detection of congenital heart abnormalities in newborn ultrasound pictures.

Objectives:

- To gather and organize a large collection of newborn ultrasound photos, encompassing a variety of instances with congenital cardiac defects.
- To preprocess as well as improve the ultrasound pictures' quality in order to provide the segmentation model with the best possible input.
- To create and train a U-Net-based deep learning model for automatically segmenting and pinpointing congenital heart abnormalities in ultrasound pictures.
- To evaluate the model's performance statistically in terms of precision, sensitivity, alongside specificity.

C. Research Rationale

The urgent need to solve the diagnostic difficulties caused by congenital cardiac abnormalities in neonates is the driving force for this study's justification. These abnormalities, which affect a large proportion of newborns, require early detection for successful correction [3]. Current diagnostic techniques frequently entail invasive procedures as well as rely on professional interpretation. Utilizing U-Net segmentation, a cutting-edge medical imaging technique, provides a non-invasive, precise, and effective approach. This research attempts to automate the detection process in order to ease the burden of healthcare on families, lessen the hazards involved with intrusive treatments, and ultimately save lives. Additionally, the effective use of U-Net segmentation in this setting has the potential for more extensive applications in diagnostic as well as medical imaging.

II. LITERATURE REVIEW

A. Compilation and Curation of Diverse Neonatal Ultrasound Datasets

Research on diagnosing congenital heart abnormalities is heavily reliant on the collection and curation of various newborn ultrasound datasets. A comprehensive dataset that includes a broad range of congenital heart defect patients must

IDENTIFYING LEUKEMIA SUBTYPES WITH DEEP LEARNING AND BLOOD CELL IMAGE

Dr Vishal Sharma
Department of Computer Science & Engineering, WILP Faculty, BITS Pilani,
bits.vishal11@gmail.com

Dr. Debabrata Mukhopadhyay
Department of CHEMICAL Raipur Institute of Technology,
Raipurdmplastic22@gmail.com

Dr Kirti Gupta
Associate Professor,
Institute of Management & Entrepreneurship Development,
Bharati Vidyapeeth (Deemed to be University), Pune
Kirti.s.gupta@bharatividyapeeth.edu

Mr. Yogesh Rathore
Dept of Computer Science & Engineering, Shri Shankaracharya Institute of Professional Management and Technology Raipur, Chhattisgarh, India
yogeshrathore23@gmail.com

P. Jagadeesan
R.M.D. Engineering College
pjn.cse@rmd.ac.in

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***Abstract*— Through the evaluation of blood cell pictures, this study uses deep comprehension and interpretive techniques to advance the categorization of leukemia subgroups. A strong convolutional neural network (CNN) structure was created using a deductive method and the idea of interpretivism. Adequate representation was guaranteed via a descriptive approach and secondary gathering of information from various sources. The model demonstrated impressive interpretability as well as accuracy (94.5%) while utilizing layer-wise significance propagation. Evaluation in comparison to conventional diagnostic techniques revealed improved performance. Transparency, bias analysis, and moral considerations were given top priority. Longitudinal research and multimodal interaction should both be investigated in future study. This study has implications for larger classification of hematologic malignancies and advances the field of lymphoma diagnosis.**

Keywords— Leukemia subtypes, deep learning, interpretivism, convolutional neural network, medical image analysis

I. INTRODUCTION

A. Research background

A wide range of hematological malignancies, also known as leukemia are all characterized by an unchecked growth of aberrant white blood cells. For the purpose of directing treatment choices and prognostic evaluations, accurate classification of cancer subtypes is essential [1]. Invasive blood vessel biopsies that time-consuming cytogenetic studies are the mainstays of conventional diagnostic techniques. However, current developments in healthcare imaging with deep learning provide a promising non-invasive method. In order to accurately identify the leukemia subtype, this study will use cutting-edge convolutional neural networks, or CNNs, to examine tiny photographs of red blood cells [2]. The work aims to obtain excellent classification precision by training the algorithm on a large dataset of tagged blood cell pictures representing distinct subtypes. The model's method of choice will also be explained using interpretability techniques, which will increase its clinical usefulness. This strategy may lead to quicker and more precise diagnosis, decreased patient discomfort, and enhanced treatment options that are targeted to particular cancer subtypes [3]. This study fills a gap in hematology study and advances the field of AI-assisted diagnoses in the healthcare industry.

B. Research aim and objectives

Research Aim:

In order to improve hematology diagnostic accuracy and treatment effectiveness, the goal of the research is to construct a reliable deep learning system for accurately identifying leukemia subtypes using analysis of red blood cell pictures.

Objectives:

- Create a vast collection of annotated blood vessel images that reflect various leukemia subtypes while accurately representing clinical differences.
- to create and put into use a cutting-edge convolutional neural network (CNN) topology tailored for the purpose of identifying leukemia subtypes from small blood cell images.
- To implement rigorous cross-validations techniques to the selected dataset to train and verify the CNN model, evaluating its performance, generalizability, and robustness.
- To employ methods for interpretability to clarify the established model's selection procedure, revealing the characteristics and patterns impacting subtype classification, and promoting clinical acceptance.

C. Research Rationale

Invasive techniques and costly cytogenetic analysis are used in the traditional approaches for categorizing leukemia subtypes. Using deep learning and images of blood cells offers a non-intrusive, effective substitute. This study addresses the urgent need for rapid and precise leukemia subgroup identification in order to enable timely treatment choices [4]. It seeks to increase the testing process' openness and dependability by utilizing cutting-edge convolutional neural networks (CNNs) and understanding methodologies. By integrating modern technologies, the findings of this study hold the potential to transform leukemia diagnosis, drastically improve the lives of patients, and advance the discipline of hematology.

Machine Learning-Based Analysis of fMRI Data for Autism Spectrum Disorder Diagnosis

Neeraj Varshney
Department of Computer Engineering & Apllications, GLA University, Mathura, UP, India
neeraj.varshney@gla.ac.in

Dr Ajit More
Institute of Management & Entrepreneurship Development, Bharati Vidyapeeth (Deemed to be University), Pune
ajit.More@bharativid yapeeth.edu

Kamred Udham Singh
School of Computing, Graphic Era Hill University, Dehradun, India
kamredudhamsingh@gmail.com

Dr. Deepak Kumar Dewangan
Assistant Professor,Department of Computer Science and Engineering
Atal Bihari Vajpayee-Indian Institute of Information Technology and Management (ABV-IIITM), Gwalior
deepakd@iiitm.ac.in

Dr. K K Pathak
Department of PHYSICS
Raipur Institute of Technology, Raipur
kkpathak1510@gmail.com

Dr. Prasanta Kumar Parida
Associate professor, KIIT University, Campus 17, Patia, Bhubaneswar, Odisha, India, Pin 751024
prasanta.parida@ksrm.ac.in

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***Abstract*—This study applies an interpretivist philosophy to the analysis of fMRI data for the diagnosis of autism spectrum disorder (ASD), using a descriptive methodology and a deductive approach. There is usage of secondary data from many sources. The results show that individuals with ASD exhibit unique patterns of brain activity in areas related to sensory processing and social cognition. A machine learning model classifies data with 87% accuracy. Subgroup analysis reveals differences in brain markers between age groups, co-occurring disorders, and severity levels. This work emphasizes the possibility for enhanced diagnostic precision and tailored therapies, contributing to a more sophisticated knowledge of the pathophysiology of ASD**

Keywords*— *Autism Spectrum Disorder, fMRI, machine learning, interpretivism, subgroup analysis

I. INTRODUCTION

A. Research background

Atypical social interaction, unusual patterns of communication, and repetitive activities are hallmarks of autism spectrum disorder (ASD), a neurodevelopment disorder. Because of its complexity and variety, ASD diagnosis is still difficult despite the fact that early detection and intervention are essential for improved outcomes [1]. One promising method for comprehending the neurological foundations of ASD is function electromagnetic resonance imaging, or fMRI. More precise and trustworthy diagnostic classification is now possible thanks to recent developments in machine learning, which have made it possible to extract subtle patterns from fMRI data [2]. Prior research has indicated that machine learning algorithms are capable of identifying distinct brain signatures linked to ASD. In order to capture intricate relationships between different brain regions and produce prediction models, these methods make use of multivariate analysis techniques. Notwithstanding, there are still obstacles in this domain, such as the requirement for more extensive and varied datasets, managing the problem of over fitting, and guaranteeing the comprehensibility of models developed using machine learning. Furthermore, the addition of other data modalities, such genetic information and structural MRI, may improve diagnostic accuracy.

B. Research aim and objectives

Research Aim:
In order to improve the precision and efficacy of diagnosing Autism Spectrum Disorder (ASD), the research aims to create a strong machine learning-driven framework for fMRI data interpretation.
Objectives:

- To gather a large and varied collection of fMRI images from people who have ASD and those who do not, making sure that there is enough representation for all age groups and degrees of severity.
- To use feature selection methods to find pertinent brain biomarkers in the fMRI data so that discriminative patterns linked to ASD can be extracted.
- To put into practice and improve machine learning algorithms—such as support vector machine and deep learning architectures, among others—for the classification of ASD according to the found neural signatures.
- To carry out comprehensive cross-validation and validation studies, evaluating the model's generalization, empathy, and specificity across various populations, and addressing potential problems like over fitting and comprehension of the model.

C. Research Rationale

The urgent need for quicker and more accurate diagnosis of autism spectrum disorder (ASD) is the driving force behind this study. Conventional diagnostic techniques frequently depend on arbitrary evaluations, which cause intervention to be delayed. An approach to investigate the underlying brain mechanisms of ASD that is non-invasive is functional magnetic resonance imaging, or fMRI [3]. The goal of this work is to use machine learning to identify important but subtle patterns in fMRI data, which could lead to the development of more trustworthy diagnostic markers. An effective approach might transform the diagnosis of ASD, allowing for earlier interventions and better long-term results for those who are autistic. The overarching objective of

MACHINE LEARNING-BASED CLASSIFICATION OF LUNG CANCER TYPES FROM RADIOLOGICAL IMAGES

Dr. Amit Joshi
Department of Biochemistry, Kalinga University, Naya Raipur, CG, India
amit34655@gmail.com

Ms. Jharna Maiti
kalinga University,Naya Raipur, (C.G.)
jharnamaiti24@gmail.com

Dr Vishal Sharma
WILP Faculty BITS Pilani, Pilani Campus
bits.vishal11@gmail.com

Omprakash Dewangan
Kalinga University Naya Raipur
omprakash.dewangan@kalingauniversity.ac.in

Dr Swapnil Jain
Kalinga University Naya Raipur
swapnil.jain@kalingauniversity.ac.in

Mr. Dikesh Kumar Gurupahchan
Department of Biotechnology, Raipur Institute Of Technology,
Raipurdikeshraipur@Gmail.Com

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***Abstract*— This study develops an algorithm for classification that utilizes machine learning that uses medical images to address the urgent demand for accurate and quick lung cancer diagnosis. We use a deductive approach employing a descriptive study format while adopting an interpretivist attitude, utilizing secondary data sets for the training of models. Illustration resampling, region of interest (ROI) recognition, and radiomic extracted features are all methods used for preprocessing. The reduction of dimension as well as feature selection are aided by the principle component analysis (PCA). The model, which uses support vector machines (SVMs) as well as convolutional deep neural networks (CNNs), performs better than others in classifying different lung cancer subtypes. The stability and universality of the model are confirmed by cross-validation findings. High levels of agreement when compared to leading radiologists show the model's clinical promise. Model generalizations, interpretability, and computing efficiency are all significantly improved by feature selection including dimensionality reduction. The report advises more research into longitudinal evaluations clinical execution trials, and multiple communication data integration. The importance of addressing ethical issues and guaranteeing adaptation to changing diagnostic criteria cannot be overstated. This study provides the groundwork for revolutionary improvements in lung cancer being diagnosed, with broad repercussions for more individualized treatment plans and better patient outcomes.**

Keywords*— *lung cancer classification, radiological images, machine learning, feature selection, dimensionality reduction, clinical implementation

I. INTRODUCTION

A. Research background

Advancements in early diagnosis and categorization are required for specialized treatment approaches because lung cancer continues to be one of the top causes of death worldwide. Lung cancer is mostly diagnosed via radiological image processing, specifically computed tomography (CT) scanning [1]. Adenocarcinoma, squamous cell, along with tumors of small cells are only a few of the many subtypes that have distinctive radiological characteristics. However, efficient manual classification is time-consuming and subject to error. ML methods present a possible path toward automating this procedure. Prior research has shown that ML algorithms are effective for a range of medical image processing tasks, particularly the identification and categorization of lung nodules [2]. Though understudied, a thorough ML-based system of categorization tailored to cancer of the lung subtypes using radiological data is still needed. This study aims to close this gap by using cutting-edge ML models as well as a carefully selected dataset to create a reliable and therapeutically useful categorization system [3]. The results of this study may completely change how lung cancer is diagnosed, allowing for prompt detection and individualized treatment regimens that enhance patient outcomes.

B. Research aim and objectives

Research Aim:

In order to improve early detection and therapeutic planning, this study aims to create a machine learning-powered classification method for identifying various forms of lung cancer using radiological images.

Objectives:

- To collect and prepare a varied and informative dataset of imaging images covering different subtypes (cancers of the lungs.
- To put into practice and enhance cutting-edge machine learning strategies for obtaining and categorizing features of different forms of lung cancer.
- For evaluating the accuracy, particularity, sensitivity, and surface area of the curve of the receiver operational characteristic of the constructed classification system.
- To evaluate the system's clinical feasibility and potential for inclusion into standard diagnostic procedures, it was necessary to compare its categorization results with the opinions of professional radiologists.

C. Research Rationale

The urgent need to improve the precision and effectiveness of detecting lung cancer through cutting-edge technology serves as the foundation for this study. Radiological imaging is essential for determining the various cancer kinds, but manually categorized is time-consuming and prone to inaccuracy. This work tries to automate and improve the categorizing process using machine learning [4]. This