A

SEMINAR REPORT

ON

"ARTIFICIAL INTELLIGENCE IN BIOMEDICAL"

Submitted to

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

In partial fulfillment of the requirement for the award of

SECOND YEAR

IN COMPUTER ENGINEERING

BY

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UNDER THE GUIDANCE OF

Mr.Shinde V.S.

DEPARTMENT OF COMPUTER ENGINEERING

SHRIRAM INSTITUTE OF ENGINEERING AND TECHNOLOGY (POLY), PANIV

2024-2025

AFFILIATED TO

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

SHRIRAM INSTITUTE OF ENGINEERING AND TECHNOLOGY (POLY), PANIV

CERTIFICATE

This certify that the Seminar report entitled

"ARTIFICIAL INTELLIGENCE IN BIOMEDICAL"

Submitted by

Mr. Akshay Satish Thorat

Is a record of bonafide work carried out by the student in the partial fulfillment of the requirement for the award of Second Year Engineering (Computer Engineering) at Shriram Institute Of Engineering And Technology(Poly),Paniv under the Dr. Babasaheb Ambedkar Technological University, Lonere. This work is done during year 2024-2025.

Date: / /

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Seminar Guide	HOD
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Seal:	Sign of External Examiner	Prof.P.P.Khandare
Date:		Principal

ACKNOWLEDGEMENT

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Introduction

The development of Artificial Intelligence (AI) in healthcare has been a long road with many significant obstacles that at the same time present opportunities for biomedical engineers and medical physicists to assume leadership roles in the implementation of AI in healthcare. Artificial Intelligence or AI- Refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions. Biomedical-Is the application of engineering principles and design concepts to medicine and biology concepts for healthcare purposes. Artificial Intelligence (AI) in biomedicalIts usage of software and complex structure of algorithms to mirror human intelligence in the analysis of composite medical data. Specifically, Artificial Intelligence is the capability for computer algorithms to estimate results without direct human interaction. Since the first introduction of the concept in 1955, artificial intelligence (AI) has been a “moving target” that always covered the most modern computing techniques aimed at achieving things that were previously the exclusive task of humans.What distinguishes AI technology from traditional technologies in health care is the ability to gain information, process it and give a well-defined output to the end-user.All of these advances open questions about how such capabilities can support,or even enhance, human decision making in health and healthcare.AI does this through machine learning algorithms and deep learning. The primary aim of health related AI applications is to analyze relationships between prevention or treatment techniques and patient outcomes.the system deals with medical data and knowledge domain in diagnosing patients conditions as well as recommending suitable treatments for the particular patients. Major disease areas that use AI tools include cancer,neurology and cardiology.The system serves to improve the quality of medical decision making ,increase patients' compliance. AI in techniques in medical applications could reduce the cost,time,human expertise and error.Due to the rapid development of AI software and hardware technologies, AI has been applied in various technical fields mainly in biomedical .This progress provides new opportunities and challenges as wells as directions for the future of AI in biomedical..

Abstract

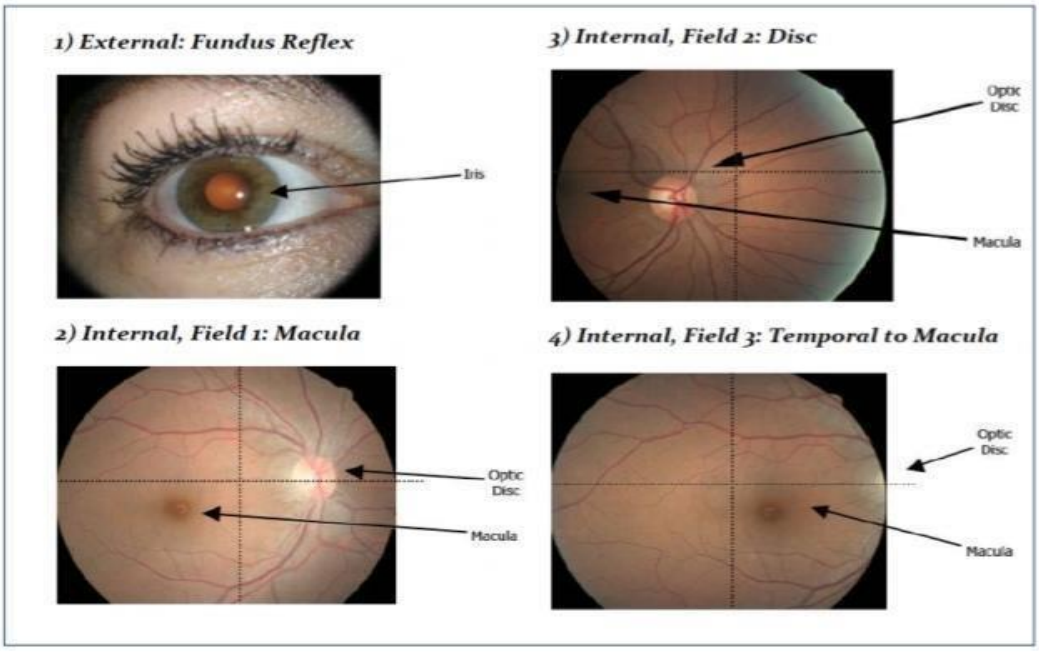
Artificial Intelligence is the theory and development of computer systems that are able to perform tasks that would require human intelligence. AI in healthcare is the use of algorithms and software to approximate human cognition in the analysis of complex medical data. It mainly refers to doctors and hospitals accessing vast data sets of potentially life- saving information. This includes treatment methods and their outcomes, survival rates, and speed of care gathered across millions of patients, geographical locations and innumerable and sometimes interconnected health conditions. Algorithms are already outperforming radiologists at spotting malignant tumours, and guiding researchers in how to construct cohorts for costly clinical trials. Imaging, on the other hand has become an essential component of many fields in medicine, biomedical applications, biotechnology and laboratory research by which images are processed and analysed. Putting together AI and imaging, the tools and techniques of artificial intelligence are useful for solving many biomedical problems and using a computer based equipped hardware software application for understanding images, researchers and clinicians can enhance their ability to study, diagnose, monitor, understand and treat medical disorders.

Scope Of Project

The scope of a Artificial Intelligence in Biomedical includes several key features and functionalities:

To conclude, we would say that this journal paper focuses on Artificial Intelligence & Its Approaches in Biomedical Image Processing and insights on the working and understanding of the concepts of AI and how a medical image is segmented using several models. The models presented are introduced, described and what methods of classification are used by them is also presented along with the better understanding of their methodology. Each model is also represented in terms of an example figure for their proper understanding. And the conclusion is driven. These models are not defined in-depth as the paper concerns on literature review and not on deep defining of models. Apart from the above mentioned models, there are several other methods like Gaussian Filters & Gabor Filter in Artificial Neural Network Analysis; Clustering Techniques in Data Mining etc. for image segmentation. Radiologists can easily diagnose cancers, heart disease, tumors and musculoskeletal disorders more accurately by using special AI techniques in medical imaging analysis tools.

Control Flow



Use of Technology

MACHINE LEARNING:

The value of machine learning in healthcare is its ability to process huge data sets beyond the scope of human capability, and then reliably convert analysis of that data into clinical insights that aid physicians in planning and providing care, ultimately leading to better outcomes, lower costs of care, and increased patient satisfaction.

Applied Machine Learning in Healthcare

Machine learning in medicine has recently made headlines. Google has developed a machine learning algorithm to help identify cancerous tumors on mammograms. Stanford is using a deep learning algorithm to identify skin cancer. A recent JAMA article reported the results of a deep machine-learning algorithm that was able to diagnose diabetic retinopathy in retinal images. It's clear that machine learning puts another arrow in the quiver of clinical decision making.Still, machine learning lends itself to some processes better than others.

Algorithms can provide immediate benefit to disciplines with processes that are reproducible or standardized. Also, those with large image datasets, such as radiology, cardiology, and pathology, are strong candidates. Machine learning can be trained to look at images, identify abnormalities, and point to areas that need attention, thus improving the accuracy of all these processes. Long term, machine learning will benefit the family practitioner or internist at the bedside. Machine learning can offer an objective opinion to improve efficiency, reliability, and accuracy.

Requirement

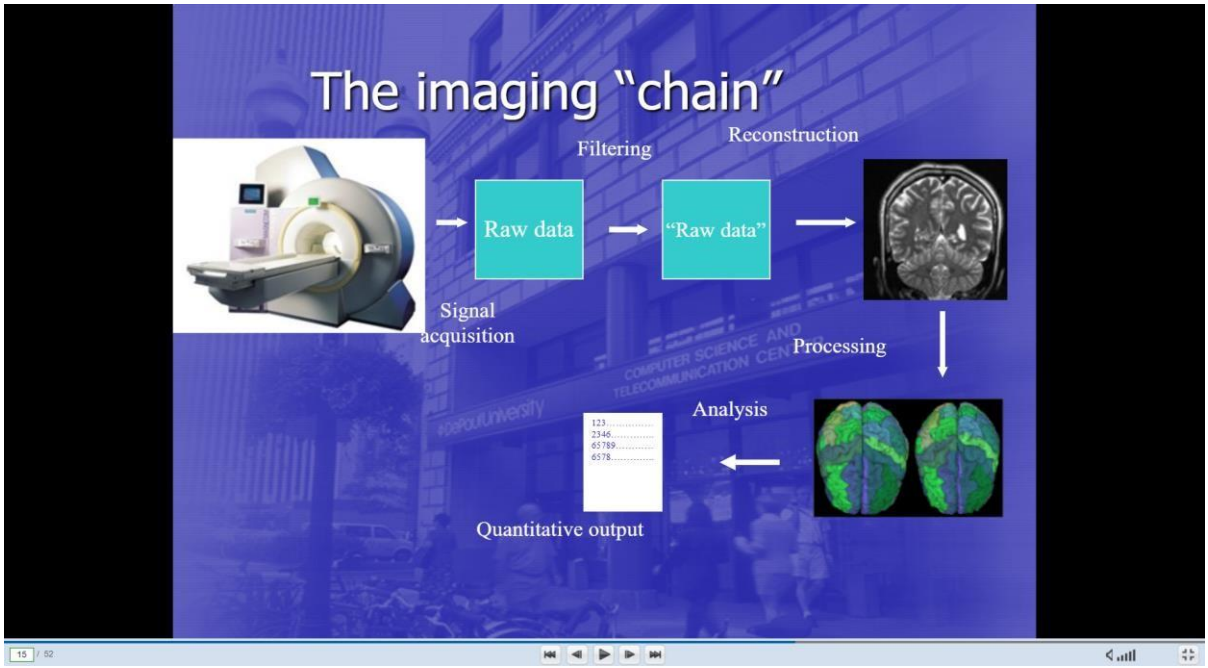
Software requirements:

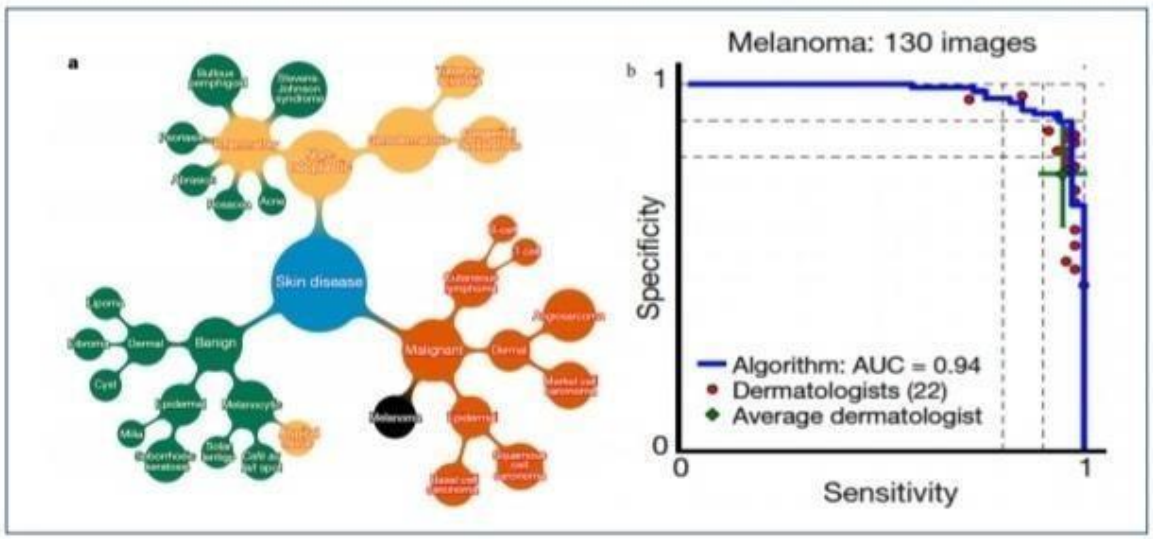
- **Operating System:** Windows 11.
- **Coding Language:** python, java.
- **Text Editor :** VS Code.

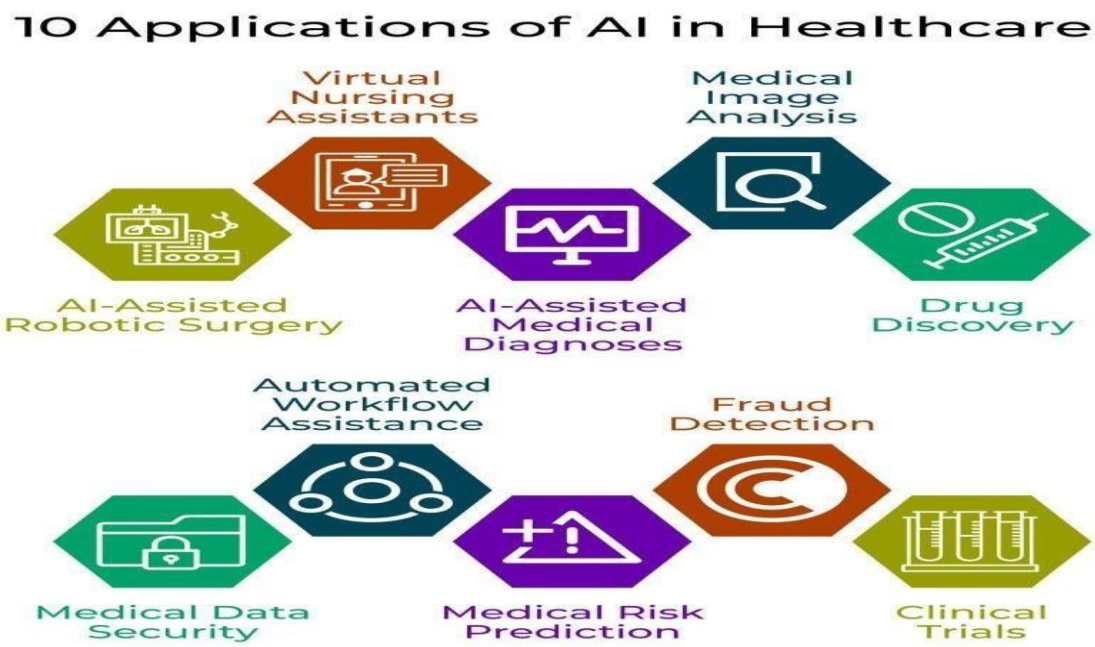
Hardware Requirements:

- **Processor :** Intel core i5
- **Memory :** 8GB RAM
- **Hard Disk :** 1TB

Output


The imaging "chain"
Filtering
Reconstruction
Raw data
"Raw data"
Signal acquisition
Processing
Analysis
Quantitative output


a
Skin disease
Benign
Malignant
Melanoma
b
Melanoma: 130 images
Specificity
Sensitivity
1
0
0
1
Algorithm: AUC = 0.94
Dermatologists (22)
Average dermatologist


10 Applications of AI in Healthcare
Virtual Nursing Assistants
Medical Image Analysis
AI-Assisted Robotic Surgery
AI-Assisted Medical Diagnoses
Drug Discovery
Automated Workflow Assistance
Fraud Detection
Medical Data Security
Medical Risk Prediction
Clinical Trials

Advantages

1.Job stability: According to the United States Bureau of Labor Statistics, the healthcare industry is projected to grow 18 percent from now until 2026, much faster than the average for all occupations. This projected growth is mainly due to an aging population and a greater demand for healthcare services. Plus, it doesn't matter where you are in the world, there will always be people in need of help. In a shaky economy and world of uncertainty, having this much job security is a huge advantage.

2.Great pay and benefits: As of May 2017, the median annual wage for healthcare practitioners and technical occupations (such as registered nurses, physicians and surgeons, and dental hygienists) was $64,770 – almost double the median annual wage for all occupations. Typically, the more training you have, the better the wages will be. For example, the average base pay for a neurosurgeon is $489,839 per year.

3.Fast-paced workday: It's likely that your career in healthcare will be highly stimulating with a constantly changing atmosphere (bye, bye 9-5 desk job). What your workday looks like depends on your specialty but be prepared to work face-to-face with patients and be on your feet most of the day. The medical field is full of excitement, and you'll never live the same day twice.

Disadvantages

1.Injuries and errors—The most obvious risk is that AI systems will sometimes be wrong, and that patient injury or other health-care problems may result. If an AI system recommends the wrong drug for a patient, fails to notice a tumor on a radiological scan, or allocates a hospital bed to one patient over another because it predicted wrongly which patient would benefit more, the patient could be injured. Of course, many injuries occur due to medical error in the health-care system today, even without the involvement of AI. AI errors are potentially different for at least two reasons. First, patients and providers may react differently to injuries resulting from software than from human error. Second, if AI systems become widespread, an underlying problem in one AI system might result in injuries to thousands of patients—rather than the limited number of patients injured by any single provider's error.

2.Data availability—Training AI systems requires large amounts of data from sources such as electronic health records, pharmacy records, insurance claims records, or consumergenerated information like fitness trackers or purchasing history. But health data are often problematic. Data is typically fragmented across many different systems. Even aside from the variety just mentioned, patients typically see different providers and switch insurance companies, leading to data split in multiple systems and multiple formats. This fragmentation increases the risk of error, decreases the comprehensiveness of datasets, and increases the expense of gathering data—which also limits the types of entities that can develop effective health-care AI.

Future Scope

The scope of a Password Generator System includes several key features and functionalities:

To conclude, we would say that this journal paper focuses on Artificial Intelligence & Its Approaches in Biomedical Image Processing and insights on the working and understanding of the concepts of AI and how a medical image is segmented using several models. The models presented are introduced, described and what methods of classification are used by them is also presented along with the better understanding of their methodology. Each model is also represented in terms of an example figure for their proper understanding. And the conclusion is driven. These models are not defined in-depth as the paper concerns on literature review and not on deep defining of models. Apart from the above mentioned models, there are several other methods like Gaussian Filters & Gabor Filter in Artificial Neural Network Analysis; Clustering Techniques in Data Mining etc. for image segmentation. Radiologists can easily diagnose cancers, heart disease, tumors and musculoskeletal disorders more accurately by using special AI techniques in medical imaging analysis tools.

Conclusion

As we take stock of how far AI has come, and how it has driven advances in digital health technology, it's easy to be excited by the future. Many questions still remain—how to preserve the security and privacy of medical data, for example, or the unexpected hazards of constant biomedical surveillance.

But with the prevalence of smartphones, wearable devices, AI assistants, and autonomous robots, all of them brimming with medical applications, the future of digital health looks bright. AI integrations have the potential to detect diseases earlier, track epidemics more effectively, laser-target treatment options, and connect patients to their doctors in ways that a presmartphone generation never thought possible.

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- Vivek Taware

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