



Medical Imaging and Diagnostics Lab

(AI Based Solutions Provider)



COMSATS University
Islamabad



NATIONAL CENTRE OF
ARTIFICIAL INTELLIGENCE

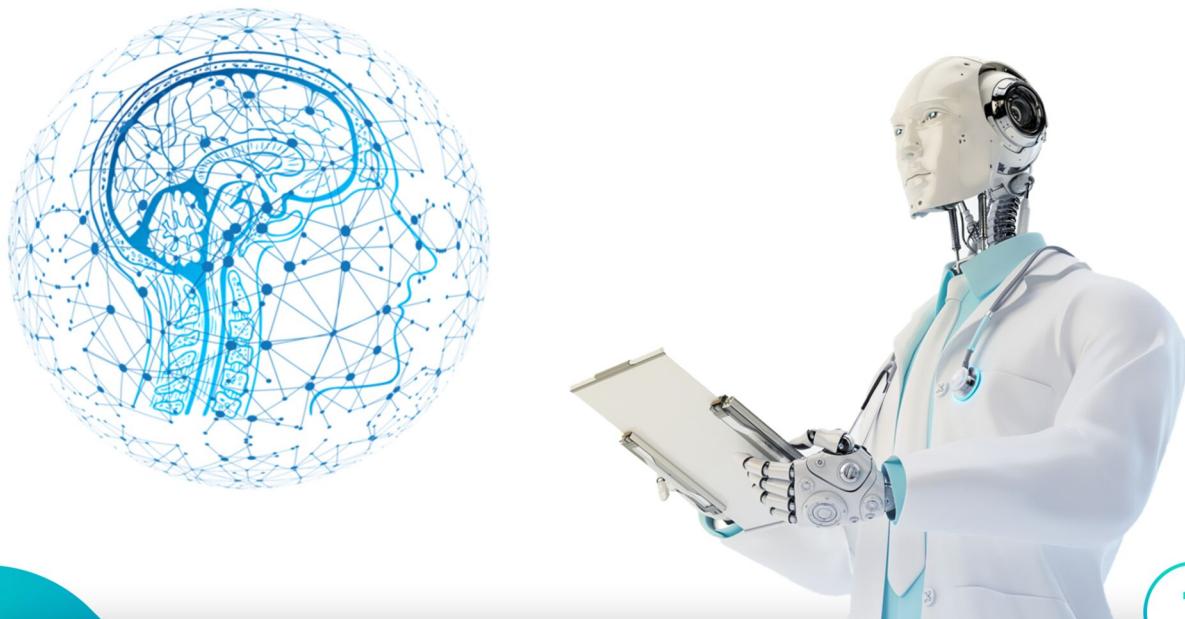
Intorduction of Medical Imaging and Diagnostics Lab (MID), NCAI

The MID lab established at COMSATS University Islamabad is centered around use of AI for developing end-to-end Computer Aided Diagnostics systems that can be commercialized and deployed at different end user sites. With the advent of medical imaging technology, digital graphical representation of different parts of the body are readily available in different modalities, such as MRI, CT-Scan, and X-ray. That, along with the development in computer hardware technology, has made it possible for computer scientists to apply machine learning / pattern recognition techniques to classify images as either indicating a disease or not. That can be specifically useful for the detection of deadly diseases such as cancer and tuberculosis. Machines have an advantage over human expertise when it comes to identifying small changes in pixel values that are visually rather impossible to see, that may indicate the presence or absence of the disease. This project is an exercise in this direction to automate the disease detection process with achievement of high accuracy to be completed in a reasonably short amount of time, making it virtually online.

Products of MID Lab

The MID lab at COMSATS University Islamabad is focusing on medical image processing, with special emphasis on Brain Tumor, Breast Cancer and Tuberculosis (TB) detection and diagnosis. The CAD systems development covers a wide array of diseases and image modalities. Three products have been developed in a very short span of time by the research and developers team of MID Lab as follows.

- **Tashkhees:** Use of mammograms for breast cancer detection
- **TDS:** Use of chest X-ray for tuberculosis (TB) identification
- **BrainViz:** Use of MRI for brain tumor detection



Tashkhees (Breast Cancer Diagnostics)

Introduction

Breast Cancer is the second worldwide leading cause of death among women. Mammography plays a vital role in the early detection of breast cancer. Digital mammography generates digital mammogram pictures. These images are stored in computers to review by the radiologist. In recent years, to aid the radiologist in the analysis of mammograms, computer-aided diagnostic (CAD) systems were developed to aid the automation of breast cancer detection, localization, and classification of malignant and benign lesions in various modalities i.e. MRI, CT scans, ultrasound, etc. The breast cancer group has developed a tool for early diagnosis of breast cancer using mamographs.

Product properties

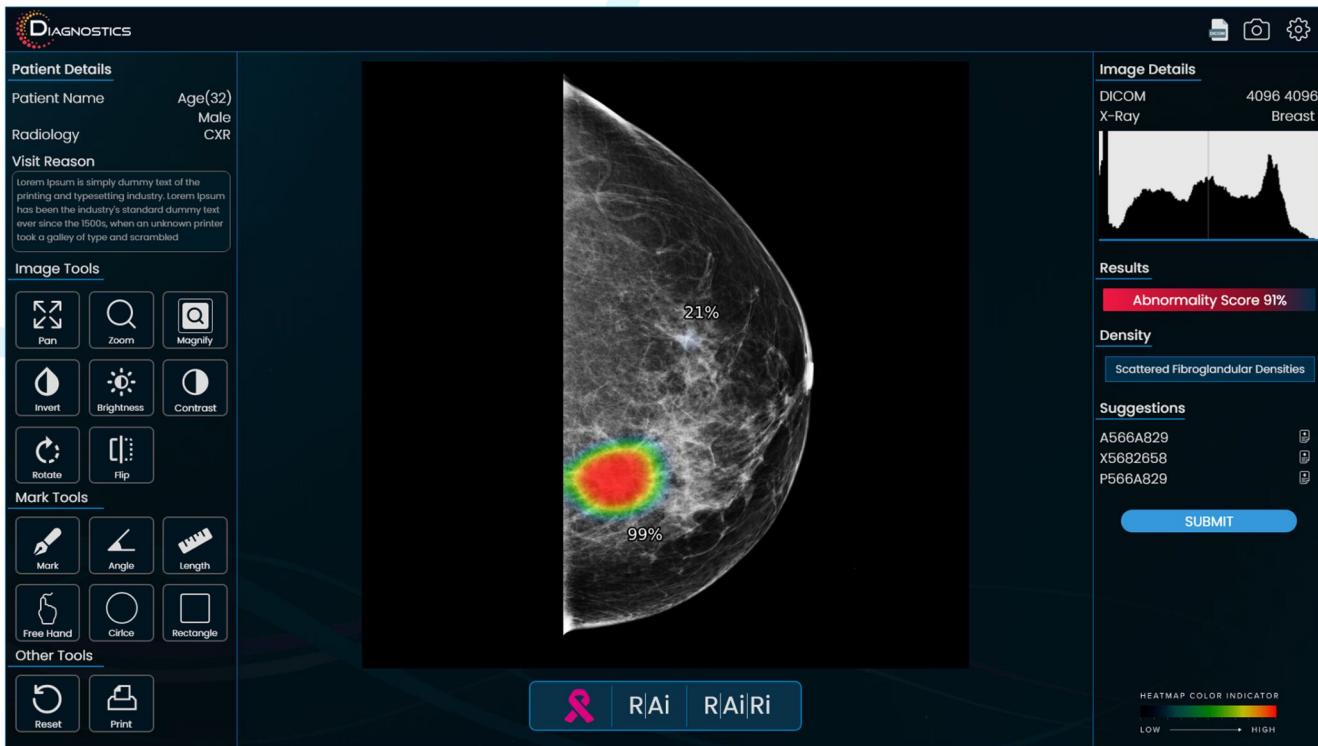
- It takes a digital image of a mammogram
- Removes pictorial muscles
- Does some preprocessing to remove the noise from the mammograms,
- After that, an artificial intelligence-based model classifies the mammogram as cancerous or non-cancerous.
- Finally it tells about the density estimation and localization which has the accuracy of more than 90%.

Product Details:



Tashkhees
AI DIAGNOSTICS TOOL

Product Visuals



Tuberculosis Diagnostic System (TDS)

Introduction

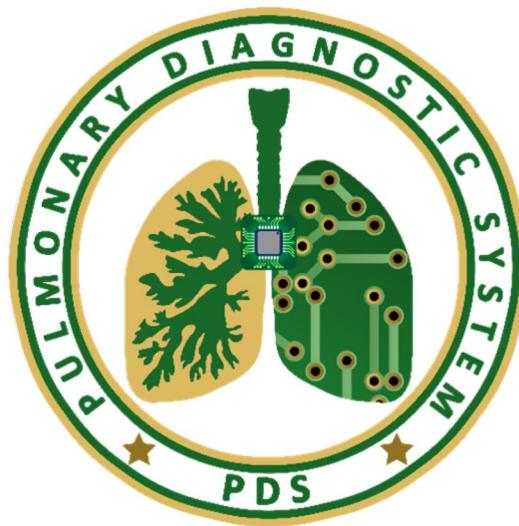
TB identification group deals with the development of AI-based CAD systems to automate the identification of TB and other common lung diseases. Their key focus is on developing reliable, trustworthy, and fair AI models for dependable medical imaging diagnostics. The group has developed computer aided diagnostic tool for the early diagnosis of tuberculosis. The group is also working on automatic textual report generation for the detected diseases.

Product properties

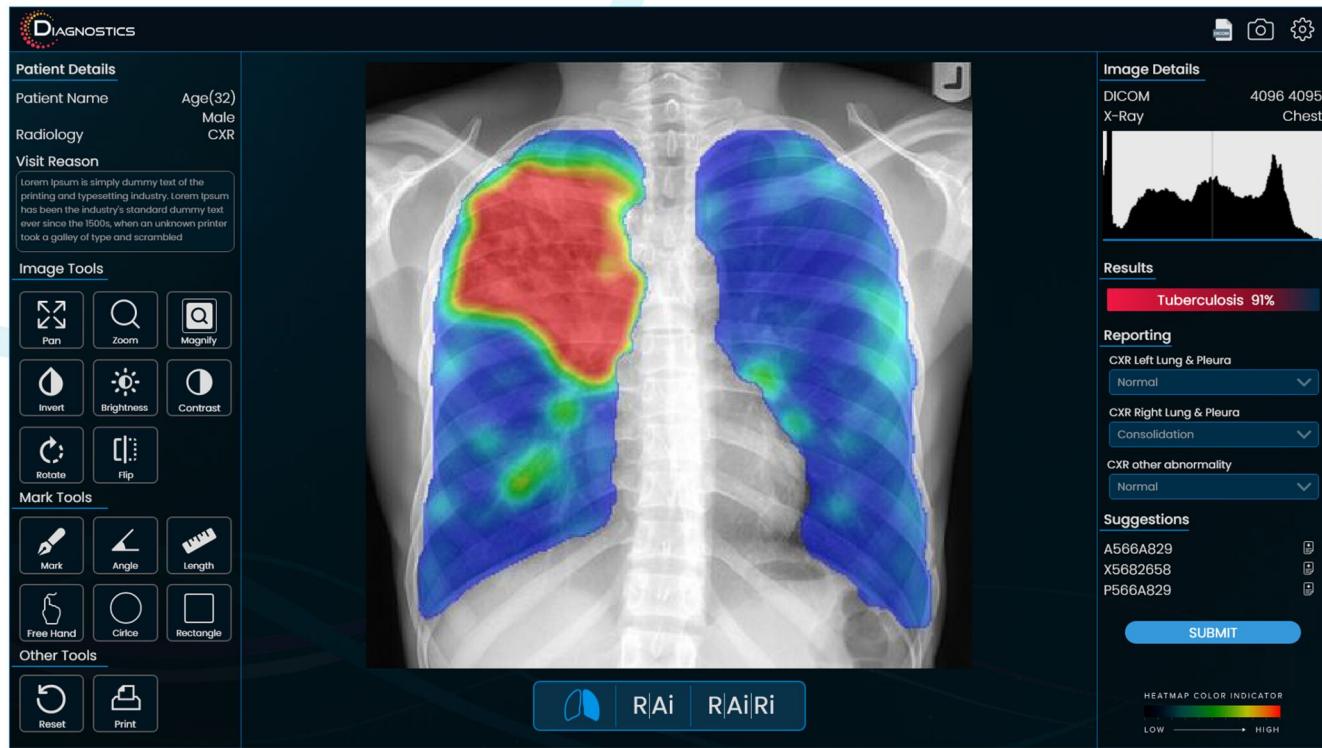
A toolkit/web-product named “Tuberulosis Diagnostic System (PDS)” has been developed for chest X-ray and CT-scan based TB, COVID-19, Pneumonia, and other lungs diseases detection and their visual attribution.

- It takes a digital X-ray
- Do preprocesing and augmentation on the input images
- Perform classification between healthy, tuberculosis and sick(non tb) images.
- TDS acheived the classification accuracy of 98.18%.
- It can detect the infected region with 61.74% average precision of bounding boxes that overlap at least 50% with the ground truth bounding boxes

Product Details:



Product Visuals



BrainViz

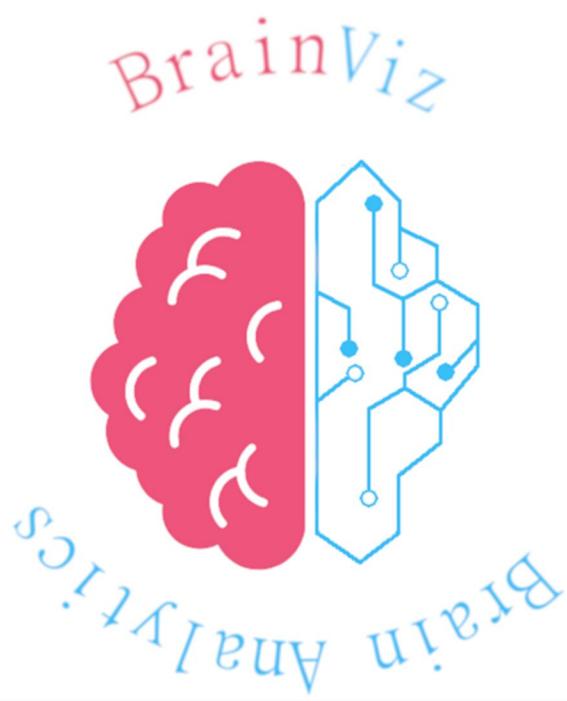
Introduction

With their creative approach, the brain tumor group has developed a system that can identify tumorous regions such as Edema, Necrotic Core or Enhancing Tumors in brain MRIs with high precision. Their approach to state-of-the-art technology development is inspired by the radiologist's ability to segment and diagnose brain tumors in MRIs using their experience and knowledge of anatomy.

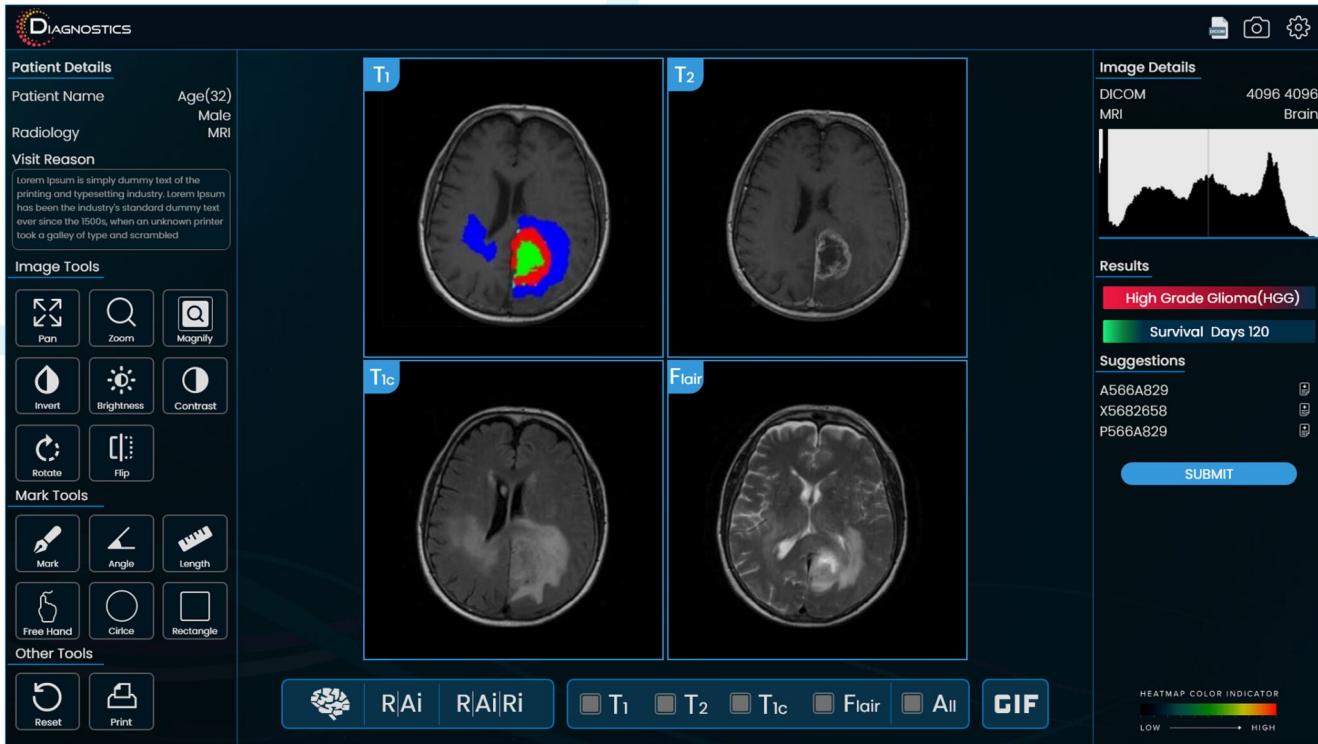
Product properties

- It takes an MRI image.
- Preprocesses the image.
- Segments-out the 3 different classes of Glioma Tumor.
- Also gives the patient overall survival in days.
- It has an accuracy of more than 90%.

Product Details:



Product Visuals



AI Based DICOM Viewer

The MID LAB team has developed an AI-based DICOM viewer that includes AI-based diagnostics for tuberculosis, breast cancer, and brain tumours, as well as common image manipulation features. The features of the DICOM viewer are listed below.

Image Manipulation Tools

- PAN
- Zoom
- Magnify
- Invert
- Brightness
- Rotate
- Flip
- Histogram

Mark/Annotation Tools

- Mark
- Angle
- Length
- Free Hand
- Circle
- Rectangle

Ai Diagnostics and Report Generation

- Classify and detect disease with high accuracy
- Report suggestion w.r.t to diagnosed disease
- Manual reporting templates
- Generates complete report
- Annotation support



WHY US?

- We are providing a one-stop solution by integrating AI and PACS into a DICOM viewer,
- Removing the obstacles of manual image analysis as well as the physical burden on doctors/radiologists
- Early diagnosis and prognosis will be easier due to the increased number of cases/day.
- The solution is also budget-friendly as it will cut down on the cost of installing separate DICOM viewer and PACS. We are providing all in one package.

AI Diagnostics

- Accuracy is high as compared to manual Diagnosis.
- AI Diagnosis is fast and it gives results in a second
- Can work on multiple modalities
- Cost is less as compared to Manual Diagnosis
- Once trained can handle multiple cases in one time.

Manual Diagnostics

- Chance of errors are high, and accuracy can be challenged
- Manual diagnosis takes more time
- High workload and fatigue





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