Project Design Phase-I
Solution Architecture

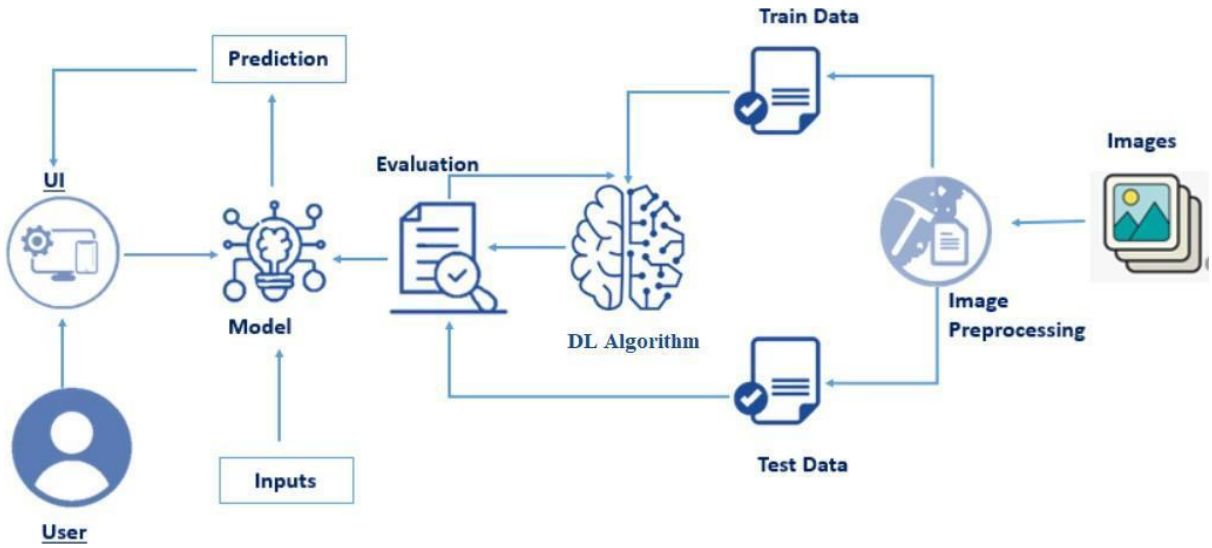
Date	05 May 2023
Team ID	NM2023TMID05813
Project Name	CovidVision: Advanced COVID-19 Detection from Lung X-rays with Machine Learning or Deep Learning
Maximum Marks	4 Marks

Solution Architecture:

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.
- Describe the structure, characteristics, behavior, and other aspects of the software to project stakeholders.
- Define features, development phases, and solution requirements.
- Provide specifications according to which the solution is defined, managed, and delivered.

Solution Architecture diagram for CovidVision: Advanced COVID-19 Detection from Lung X-rays with Machine Learning or Deep Learnings



One of the biggest challenges following the Covid-19 pandemic is the detection of the disease in patients. To address this challenge we have been using the Deep Learning Algorithm to build an image recognition model that can detect the presence of Covid-19 from an X-Ray image of a patient's lungs.

Transfer learning has become one of the most common techniques that has achieved better performance in many areas, especially in medical image analysis and classification.

We used Transfer Learning techniques like Inception V3, Resnet50 , Xception V3 that are more widely used as a transfer learning method in medical image analysis and they are highly effective.

Features:

Pre-processing of X-ray to enhance the contrast and reduce the noise Transfer learning from pre-trained models such as Inception V3, ResNet50, and Xception V3 Fine-tuning the pre-trained models using a smaller dataset of COVID-19 positive and negative images Classification of X-ray images into COVID-19 positive or negative using a deep learning model

Development Phases:

Data collection:

Collect a diverse dataset of chest X-rays, including COVID-19 positive and negative images, from various sources

Data pre-processing:

Pre-process the data to ensure the quality of the images, such as normalization and augmentation

Model selection and training:

Select a pre-trained model, fine-tune it on the dataset, and train it using an appropriate loss function and optimizer

Model evaluation:

Evaluate the model's performance using various metrics, such as accuracy, precision, recall, and F1 score

Model validation:

Validate the model's performance on a separate dataset to ensure its generalizability and robustness

Deployment:

Deploy the model on a cloud platform or local server, and integrate it with a user-friendly interface for healthcare professionals to access and interpret the results

Solution Requirements:

Access to a diverse and high-quality dataset of chest X-rays, including COVID-19 positive and negative images Access to pre-trained models, such as Inception V3, ResNet50, and Xception V3, and the necessary software libraries and frameworks for deep learning Sufficient computational resources, such as GPUs or TPUs, for training and testing the models A robust and scalable cloud platform or local server for deploying the model and integrating it with a user-friendly interface