

## Project Design Phase-II Technology Stack (Architecture & Stack)

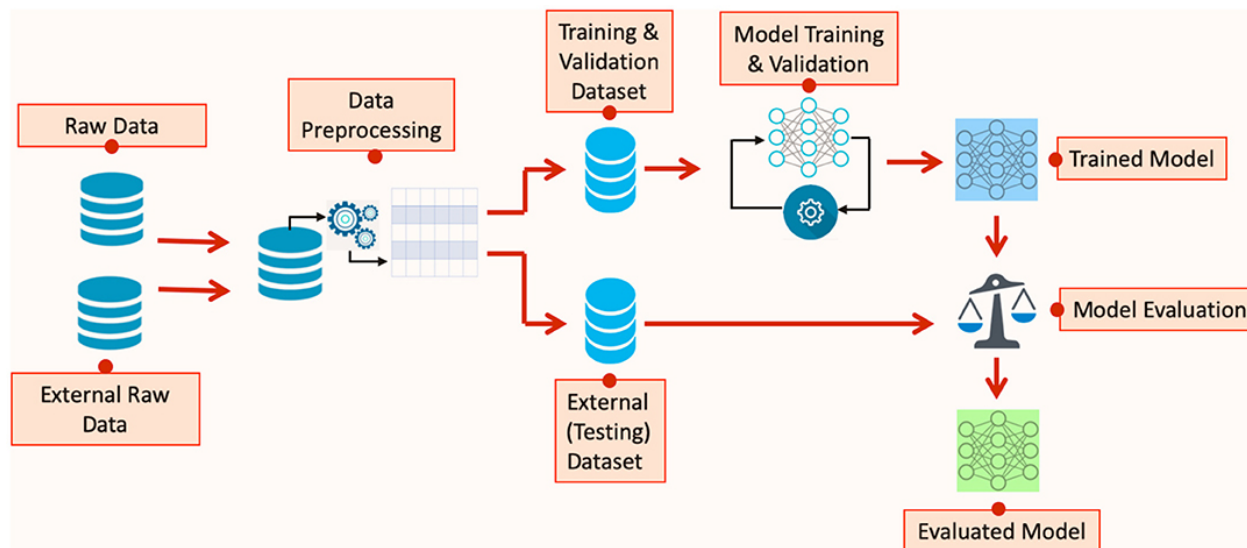
Date	06 May 2023
Team ID	NM2023TMID17493
Project Name	CovidVision: Advanced COVID-19 Detection from Lung X-rays with Machine Learning or Deep Learnings

### Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2

**Example: Order processing during pandemics for offline mode**

**Reference:** <https://developer.ibm.com/patterns/ai-powered-backend-system-for-order-processing-during-pandemics/>



#### Guidelines:

Include all the processes (As an application logic / Technology Block)  
Provide infrastructural demarcation (Local / Cloud)  
Indicate external interfaces (third party API's etc.)  
Indicate Data Storage components / services  
Indicate interface to machine learning models (if applicable)

**Table-1 : Components & Technologies:**

S.No	Component	Description	Technology
1.	Data Collection	This component involves collecting data from various sources such as IoT devices, wearable sensors, thermal cameras, or mobile applications. These devices capture different types of data, including temperature readings, respiratory patterns, heart rate, or symptom reports. The data collected forms the foundation for COVID-19 detection.	<ul style="list-style-type: none"><li>- IoT devices: Arduino, Raspberry Pi.</li><li>- Wearable sensors: Fitbit, Apple Watch.</li><li>- Thermal cameras: FLIR Systems.</li><li>- Mobile applications: Android Studio, iOS SDK</li></ul>
2.	Data Preprocessing	<ul style="list-style-type: none"><li>- Data preprocessing is the step where raw data from different sources is processed and standardized. It involves techniques like filtering, normalization, or feature extraction to ensure data quality and consistency. Preprocessing prepares the data for further analysis and modeling</li></ul>	<ul style="list-style-type: none"><li>- Cloud services: Amazon Web Services (AWS), Google Cloud Platform (GCP), Microsoft Azure.</li></ul>
3.	Machine Learning Models	<ul style="list-style-type: none"><li>- Machine learning models are the core component of the architecture. They are trained using labeled data to recognize patterns and detect COVID-19. Deep learning frameworks such as TensorFlow, PyTorch, or Keras are commonly used for building and training these models. Different types of models like Convolutional Neural Networks (CNNs) for image analysis or Recurrent Neural Networks (RNNs) for time series data can be employed</li></ul>	<ul style="list-style-type: none"><li>- Deep learning frameworks: TensorFlow, PyTorch, Keras.</li><li>- ML algorithms: Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), Support Vector Machines (SVMs).</li></ul>
4.	Feature Extraction and Selection	<ul style="list-style-type: none"><li>- Feature extraction and selection aim to identify the most relevant features from the data. Techniques like Principal Component Analysis</li></ul>	Feature extraction algorithms (e.g., Principal Component Analysis), feature

		(PCA) or Wavelet Transform can be used to extract informative features and reduce the dimensionality of the data.	selection methods (e.g., Recursive Feature Elimination).
5.	Model Training and Evaluation	- This component involves training the machine learning models using labeled data. Training infrastructure, such as GPUs or cloud computing platforms, is used to optimize the model parameters using algorithms	- Components: Training infrastructure (e.g., GPUs, cloud computing), evaluation metrics.
6.	Deployment and Inference	- Trained models are deployed in production environments for real-time inference on new data. They can be deployed on web servers, cloud platforms, or edge computing devices.	- Components: Web servers, cloud platforms, edge computing devices.
7.	Continuous Monitoring and Updating	- This component ensures the system's performance is continuously monitored and maintained.	- Components: Data pipelines, monitoring tools.

**Table-2: Application Characteristics:**

S.No	Characteristics	Description	Technology
1.	Speed and Accuracy	The ability to analyze large amounts of data quickly and accurately.	Image Recognition and Analysis
2.	Risk Factor Identification	The ability to identify patterns and risk factors that might not be immediately apparent to human doctors.	Machine Learning
3.	Real-Time Analysis	The ability to provide real-time analysis of patient data, which can be especially important in a pandemic situation.	Natural Language Processing (NLP)
4.	Automation	The ability to reduce the workload on human doctors and healthcare workers by automating some aspects of COVID-19 detection and diagnosis.	Deep Learning

S.No	Characteristics	Description	Technology
5.	Consistent Diagnoses	The ability to provide more consistent and objective diagnoses by reducing the potential for human error	Chatbots

#### References:

<https://c4model.com/>

<https://developer.ibm.com/patterns/online-order-processing-system-during-pandemic/>

<https://www.ibm.com/cloud/architecture>

<https://aws.amazon.com/architecture>

<https://medium.com/the-internal-startup/how-to-draw-useful-technical-architecture-diagrams-2d20c9fda90d>