Project Design Phase-II
Solution Requirements (Functional & Non-functional)

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

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Image Input and Processing	a. Accept lung X-ray images as input in a standard format. b. Preprocess the input images to normalize intensity, remove noise, and enhance features. c. Handle variations in image sizes, orientations, and resolutions.
FR-2	Model Training and Testing	a. Train a machine learning or deep learning model using a diverse dataset of labeled lung X-ray images. b. Implement appropriate algorithms, such as CNNs, for COVID-19 detection. c. Conduct model testing and evaluation using independent test datasets to measure accuracy, sensitivity, specificity, and other performance metrics. d. Perform model optimization techniques, such as hyperparameter tuning and regularization, to improve the model's performance.
FR-3	COVID-19 Classification	a. Utilize the trained model to classify lung X-ray images into COVID-19 positive, non-COVID lung diseases, or healthy lung categories. b. Assign probability scores or confidence levels to the classification outputs. c. Handle the classification of multiple lung X-ray images in a batch or real-time streaming scenario.
FR-4	User Interface	a. Develop a user-friendly interface for healthcare professionals to interact with the system. b. Enable easy uploading and retrieval of lung X-ray images for analysis.
FR-5	Integration	Integrate the CovidVision system with existing healthcare systems or diagnostic tools, allowing seamless incorporation into the clinical workflow.
FR-6	Security and Privacy	Implement appropriate security measures to protect patient data and ensure compliance with privacy regulations. b. Safeguard the confidentiality and integrity of the processed lung X-ray images and associated metadata. c. Implement user authentication and access control mechanisms to restrict system usage to authorized personnel.

Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The system has an intuitive and easy-to-use interface for healthcare professionals, requiring minimal training and technical expertise.
NFR-2	**Security**	The system employs secure transmission protocols when exchanging data between the user interface, backend, and external systems.
NFR-3	**Reliability**	The system has a high degree of reliability, ensuring consistent and dependable performance under varying conditions.
NFR-4	**Transparency**	The system scales to accommodate increased data volume and user demand without significant performance degradation.
NFR-5	**Access Control**	The system enforces appropriate access controls to restrict system usage to authorized personnel and protect against unauthorized use.
NFR-6	**Scalability**	The system scales to accommodate increased data volume and user demand without significant performance degradation.
NFR-7	**Data Privacy**	The system adheres to privacy regulations and protects patient data from unauthorized access, ensuring confidentiality and data integrity.
NFR-8	**Transparency**	The system provides clear explanations and visualizations to enable healthcare professionals to understand the basis for the classification decisions.
NFR-9	**Explainability**	The system offers insights into the features, patterns, or regions within the lung X-ray images that contribute to the COVID-19 detection, fostering trust and collaboration.
NFR-10	**Accuracy**	The system achieves high accuracy in classifying COVID-19 cases from lung X-ray images, minimizing false positives and false negatives.
NFR-11	**Reliability**	The system has a high degree of reliability, ensuring consistent and dependable performance under varying conditions.