DIAGNOSING COVID-19

AI-BASED IMAGE ANALYSIS

DEEP INSIGHTS ANALYZER (DIA)

FOR MEDICAL IMAGES

Problem Statement

Improve Reliability from X-Rays + CT Scans to quickly triage patients

China

Accepted analysis from CT scan images whether a patient has a high risk of viral pneumonia from coronavirus or not. Couple of platforms are in action (based on 35k+ scans)

UK/ Europe

NHS is using Chest X-rays instead of CT scans. behold.ai has been issued with a CE Mark certification in the UK & EU for its AI-based red dot platform (based on 30k+ X-Ray images)

US

American College of Radiology has recommended against relying on chest scans to diagnose Covid-19, but FDA has recently approved portable X-ray system AiRTouch for use in Covid-19

Indian Healthcare System Context

[Quick Adoption + De-Risk +Mobility+ Increased Trust]

HYBRID INDIAN DATA SETS

Conduct Research on Covid19 cases [CT Scans + X-Rays]

HIGHER RELIABILITY

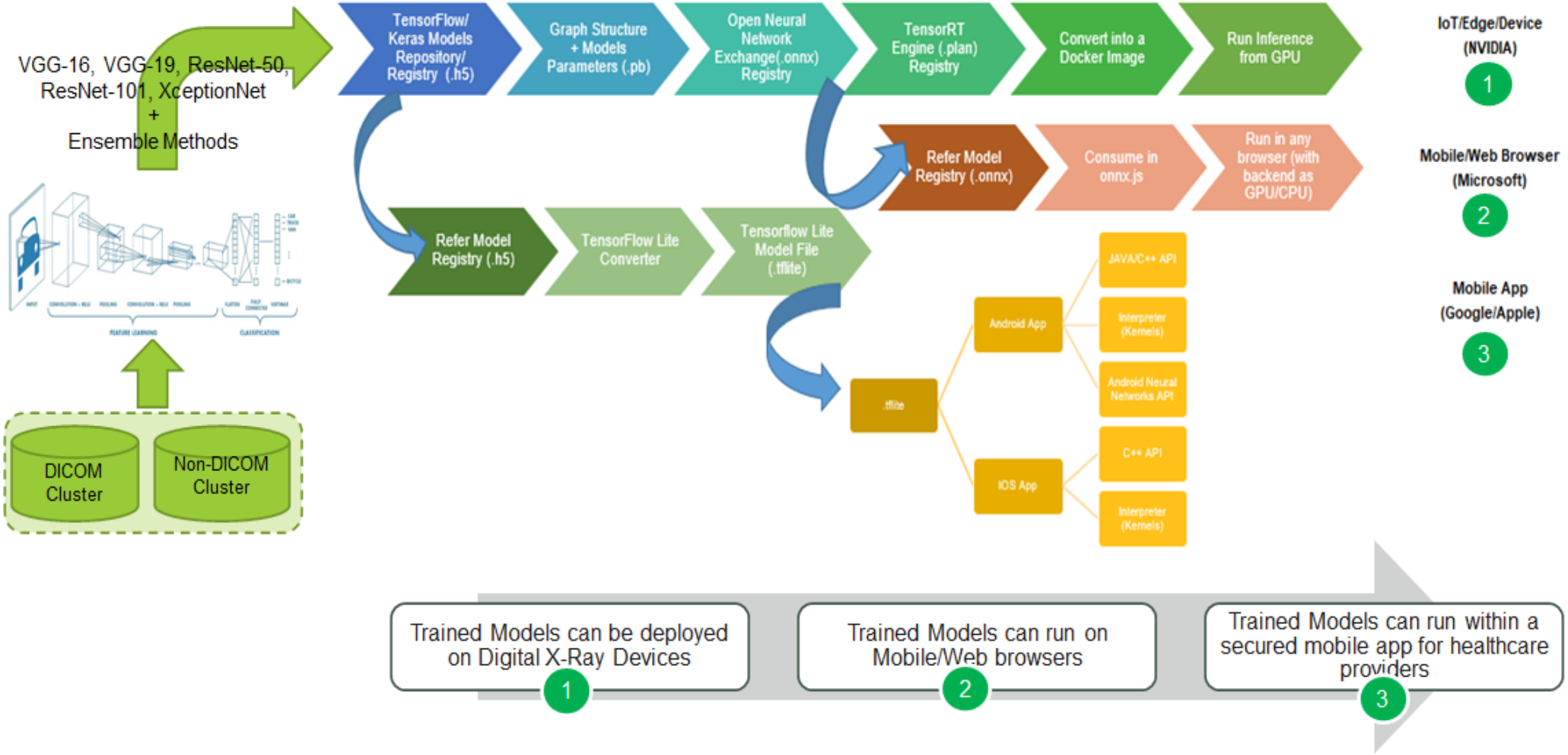
Platform should leverage multiple Deep Learning frameworks & models

LEARNING SYSTEM

Scale the platform into a learning system to reduce biasness

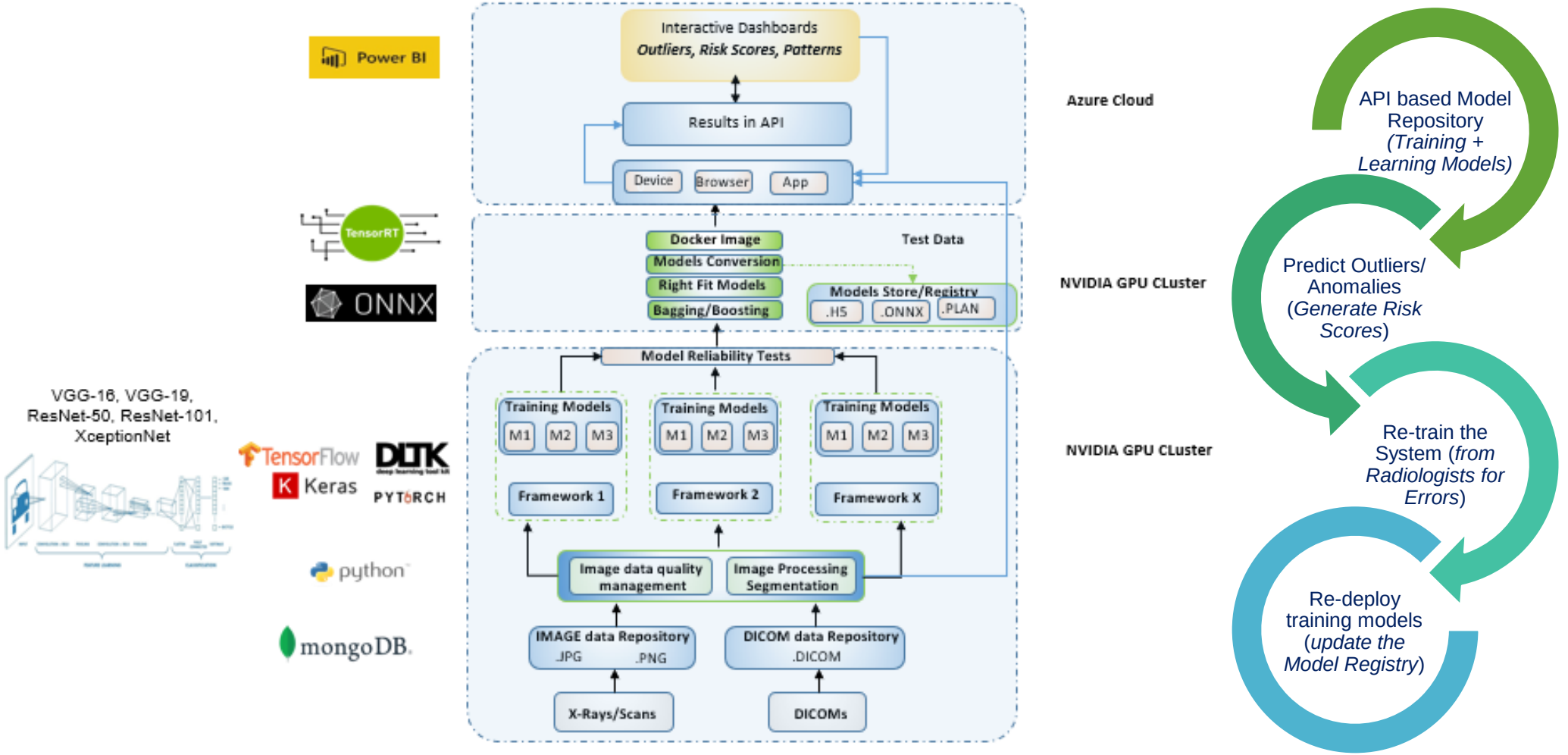
Methodology

Design to Deploy



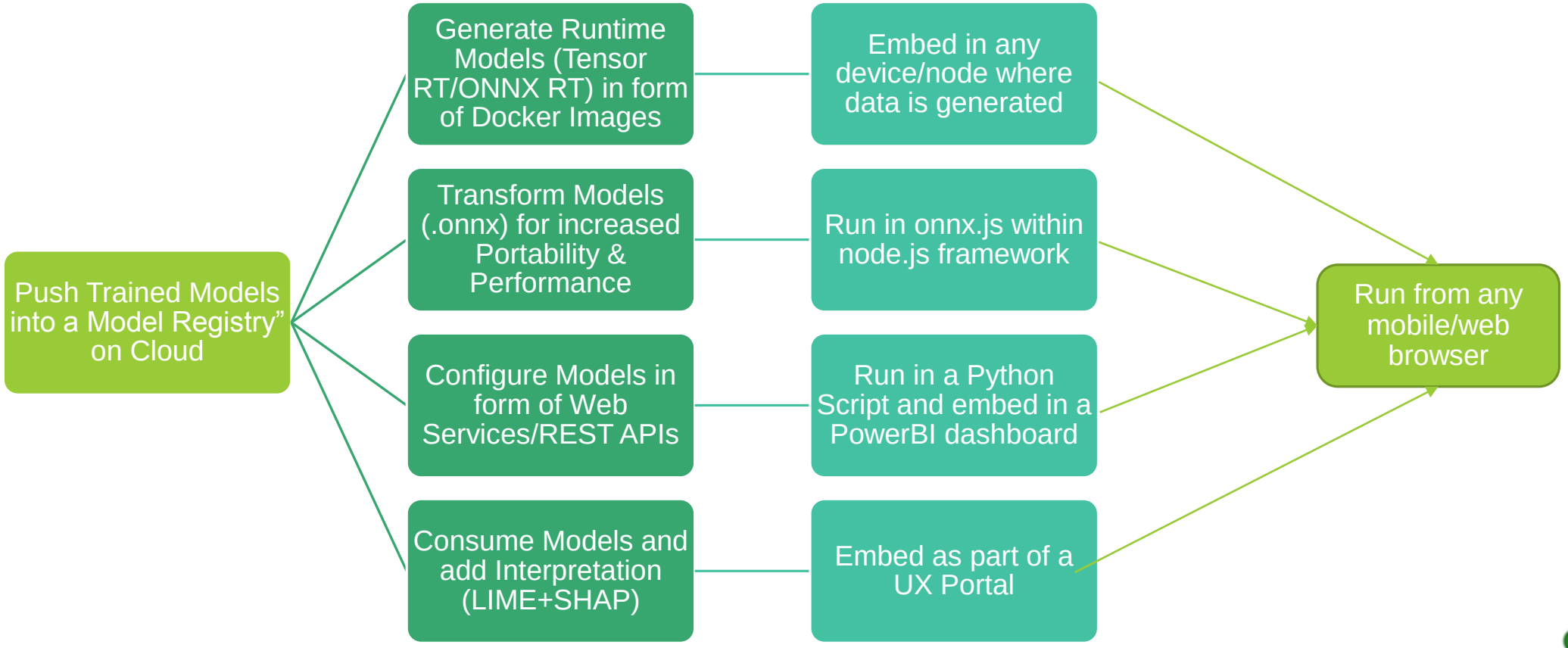
Technical Stack

Building Blocks



Technical Stack

Building Blocks from a Model Consumption perspective



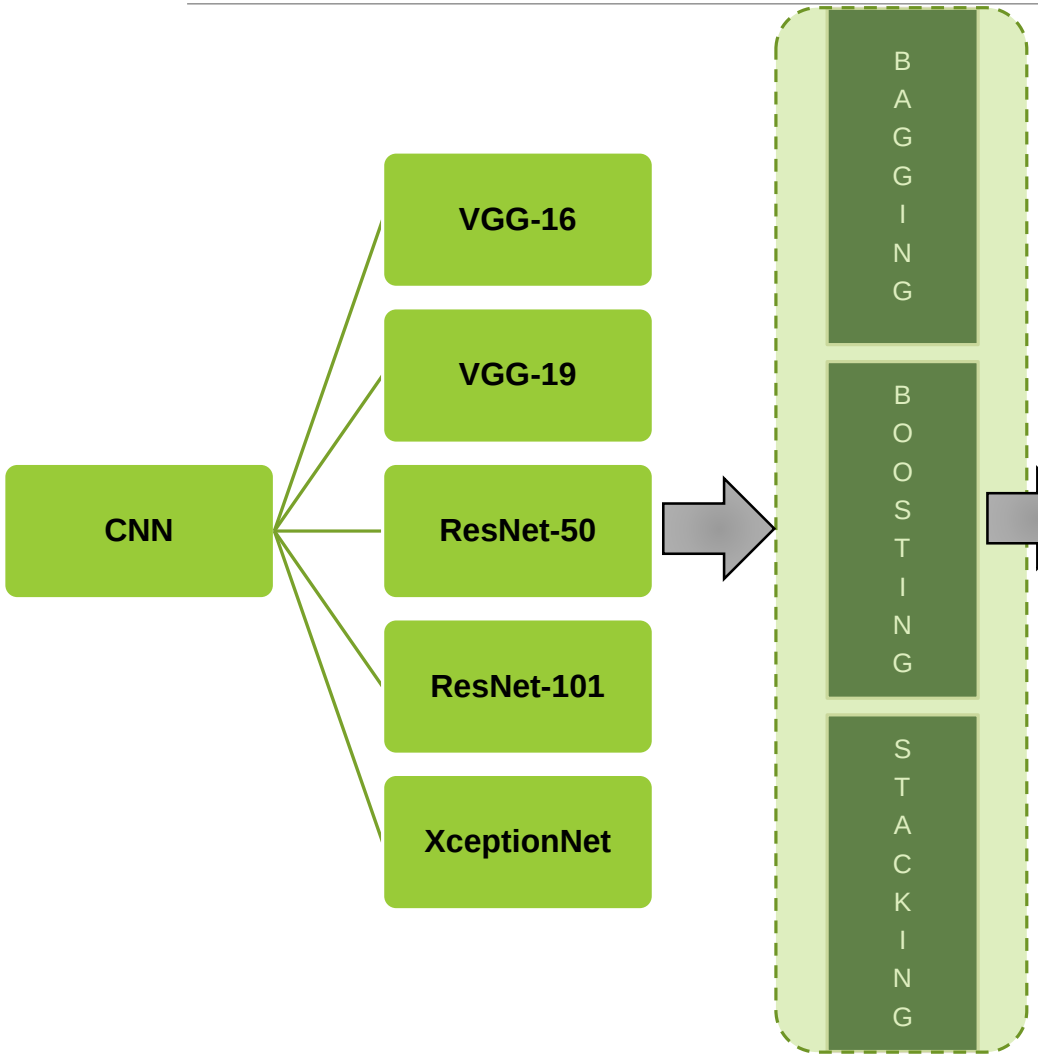
Supplier – Model Repository/Register

Middlemen – Converters and Support Frameworks

Consumer – Any Browser

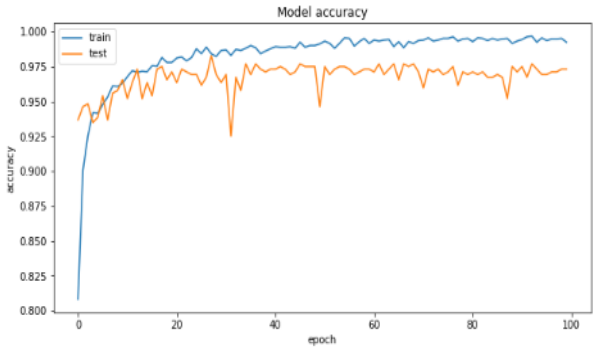
Solution

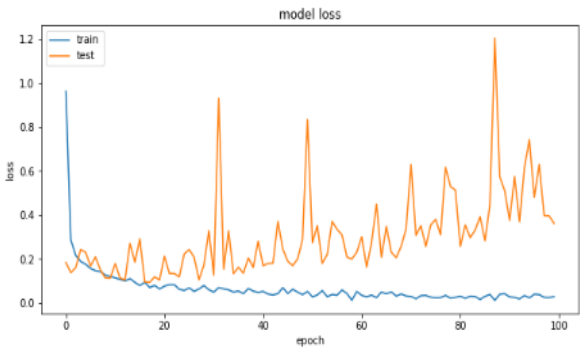
Model Design



VGG-16

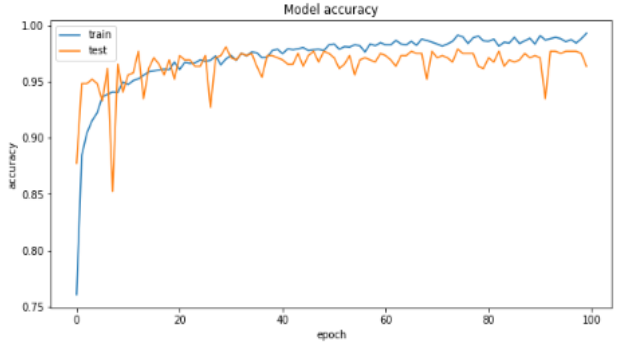
	precision	recall	f1-score	support
Covid-19	1.000	1.000	1.000	5
Normal	1.000	0.963	0.981	27
Viral Pneumonia	0.964	1.000	0.982	27
accuracy			0.983	59
macro avg	0.988	0.988	0.988	59
weighted avg	0.984	0.983	0.983	59

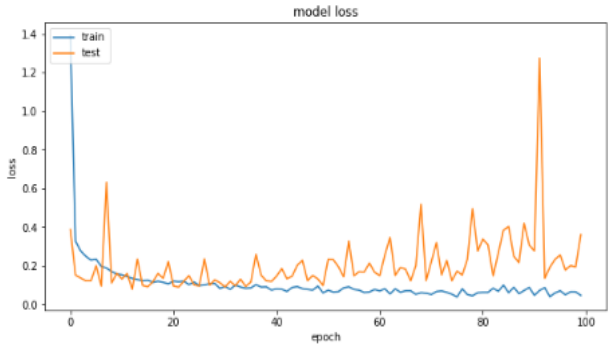




VGG-19

	precision	recall	f1-score	support
Covid-19	1.000	1.000	1.000	5
Normal	1.000	0.926	0.962	27
Viral Pneumonia	0.931	1.000	0.964	27
accuracy			0.966	59
macro avg	0.977	0.975	0.975	59
weighted avg	0.968	0.966	0.966	59

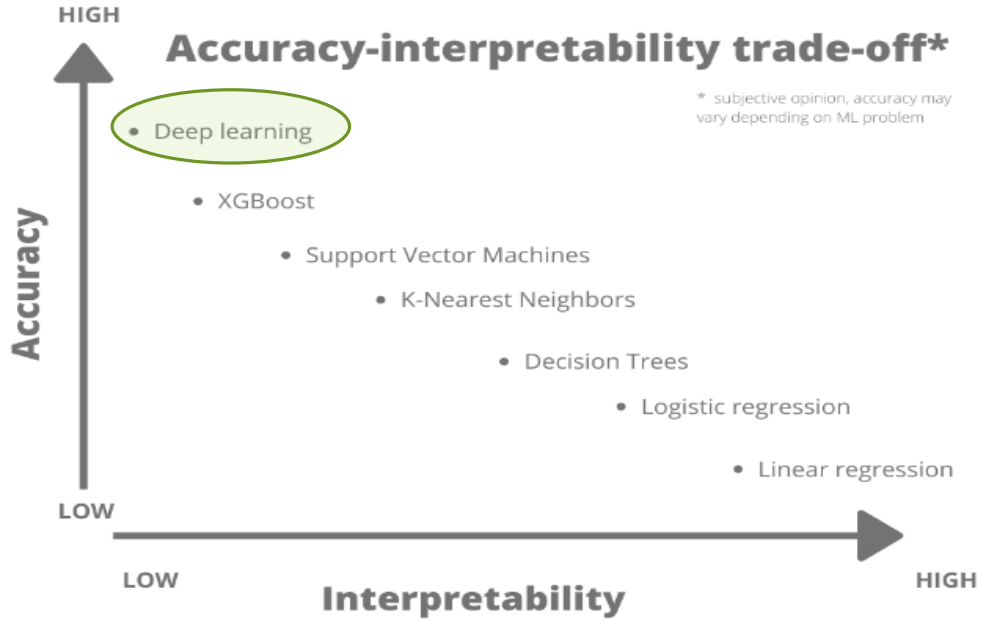


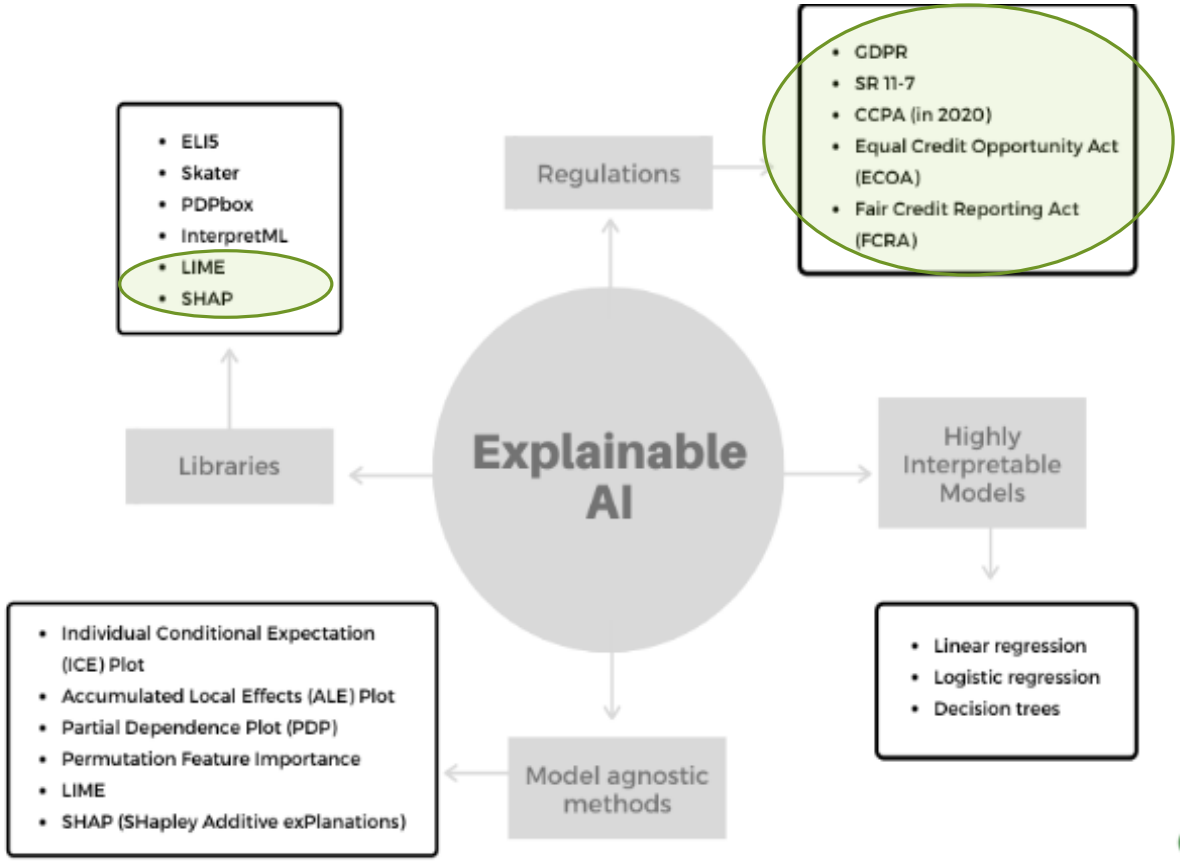


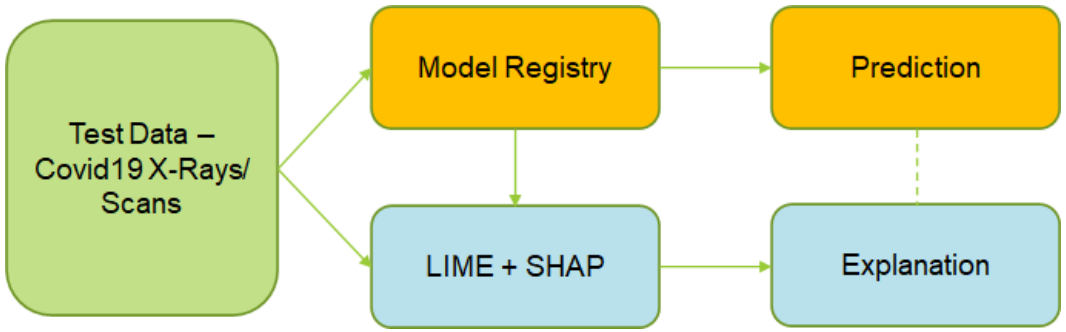
Solution

UX Design using Explainable AI - Context

LIME (Local interpretable model-agnostic explanations)
SHAP (SHapley Additive exPlanations)

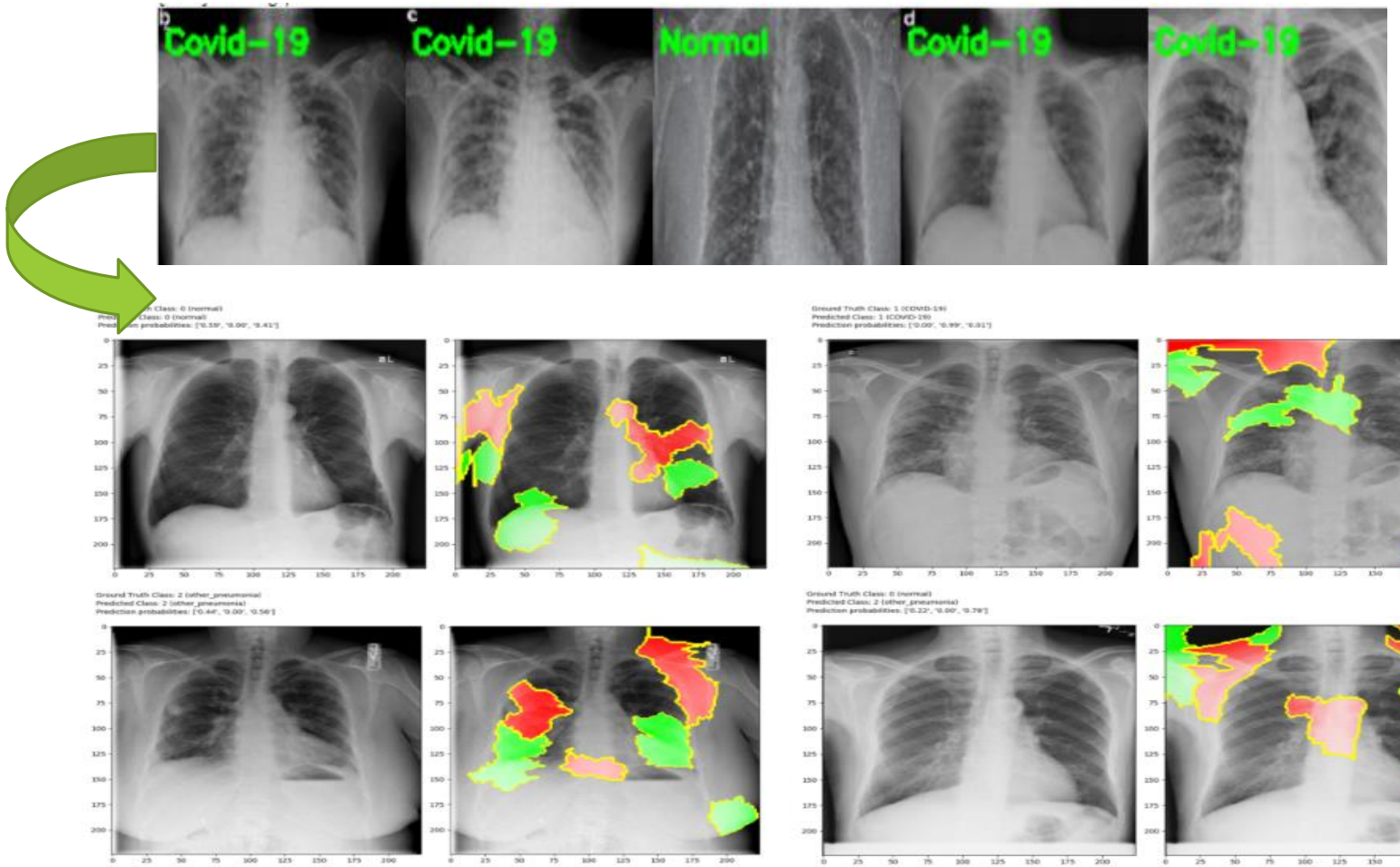






Solution

UX Design using Explainable AI - Snapshots



Running the models in a GPU cluster

LIME (Local interpretable model-agnostic explanations)
SHAP (SHapley Additive exPlanations)

Thank You

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