USING MACHINE LEARNING TO DIAGNOSE CHEST X-RAYS AND INTERPRET PATIENT SYMPTOMS AND MEDICAL HISTORY

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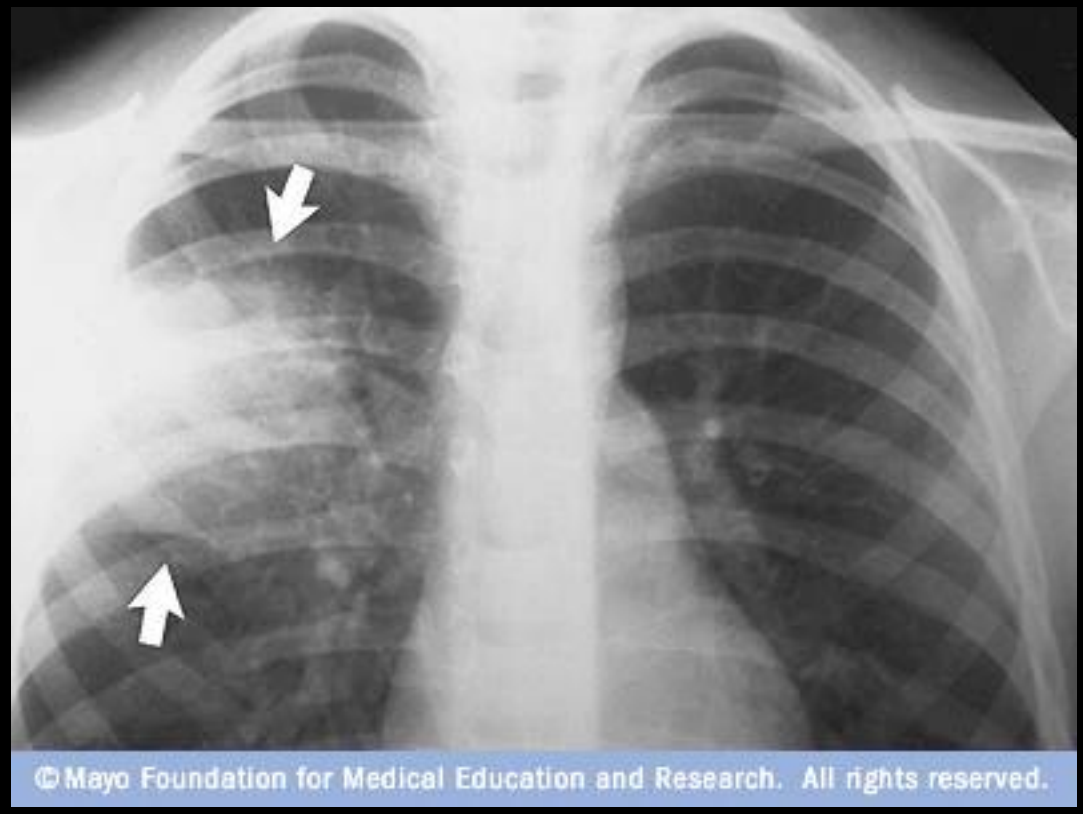
CLASSIFYING IMAGES

CLASSIFYING X-RAYS

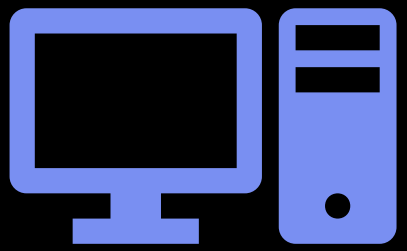


WHY USE MACHINES?

Machines will be able to make these predictions in place of radiologists

Allow for quick and accurate diagnosis

ALGORITHMS HELP MACHINES LEARN



Computers learn from experience

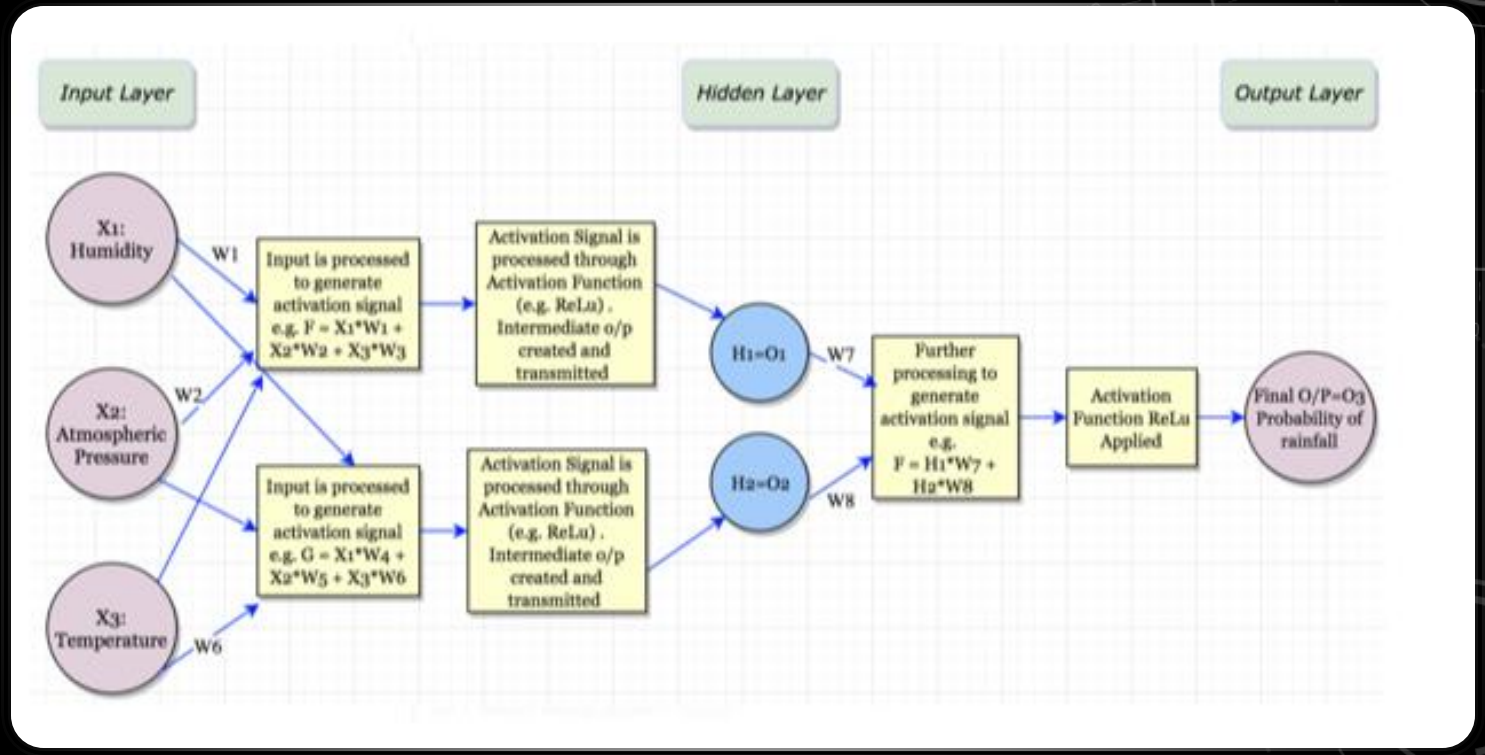
They determine significant features

NEURAL NETWORKS: CONVOLUTIONAL

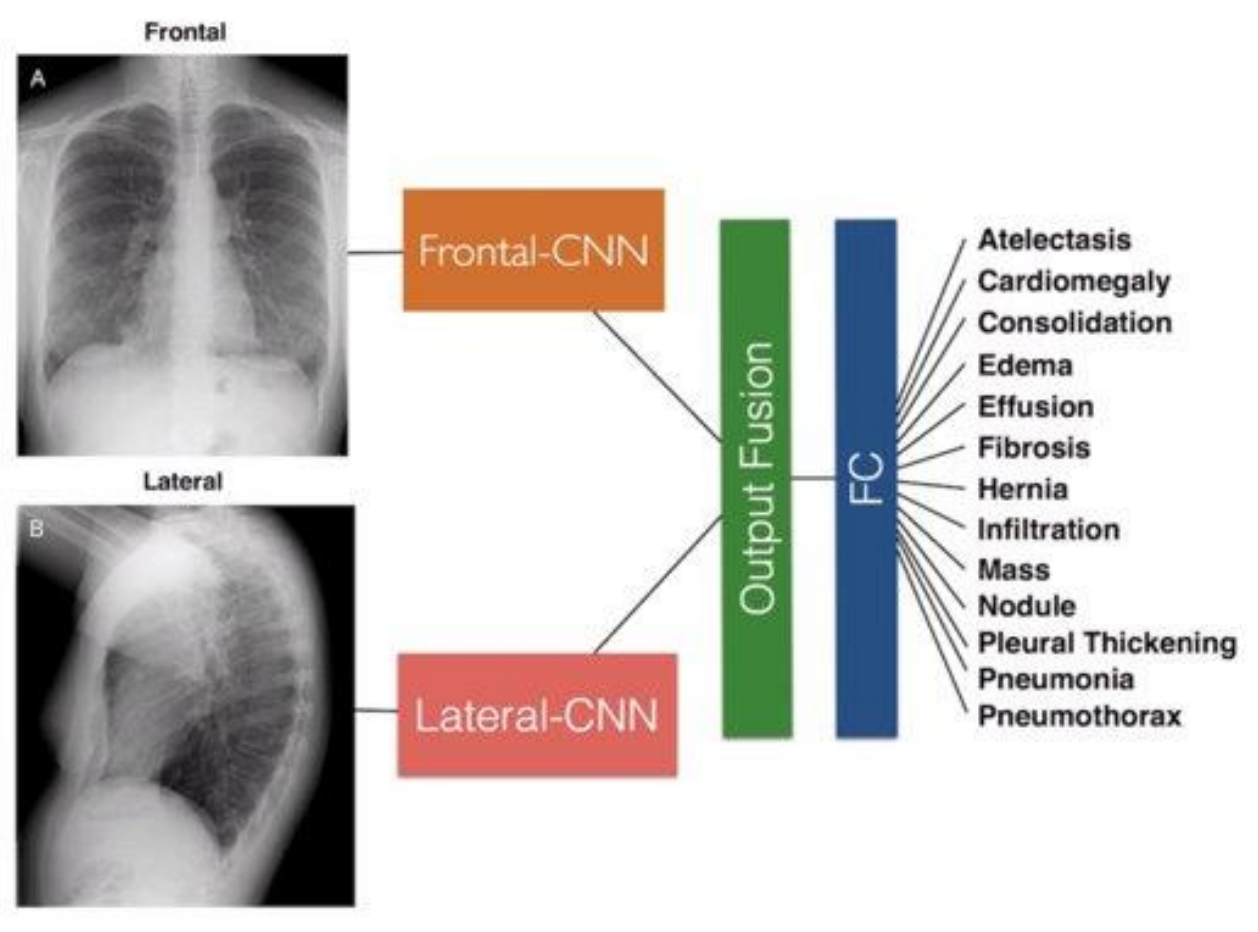
Used for image recognition

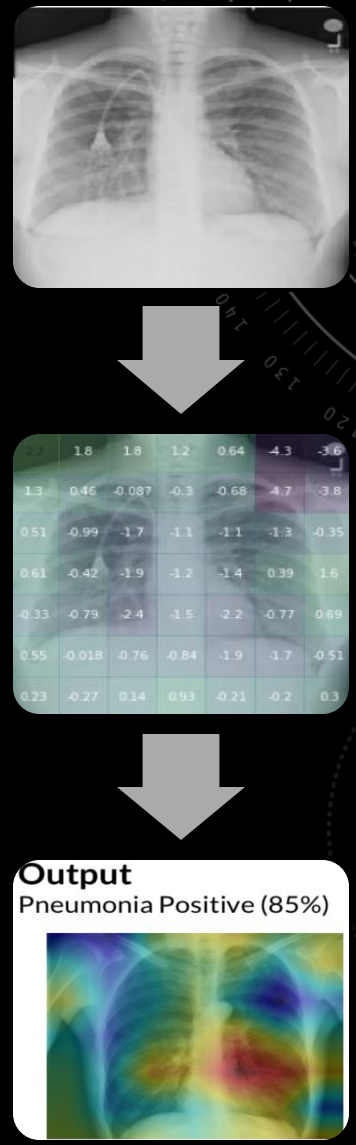
Reduces parameters inputted into the network

Most efficient NN for image recognition



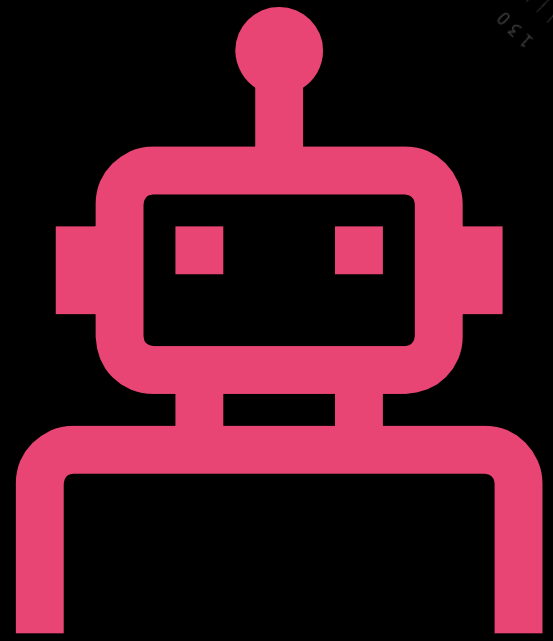
DUALNET: COMBINING TWO NETWORKS





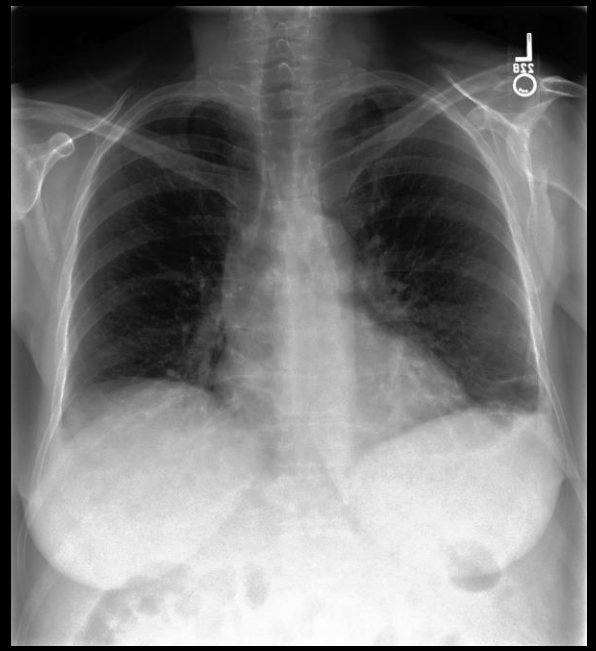
ENHANCING THE MODEL

CLINICAL CORRELATION: PATIENT SYMPTOMS & MEDICAL HISTORY



DATA: MIMIC-CXR

path	view	Consolidation	Pneumonia	Atelectasis	Pneumothorax
valid/p10382575/s07/view1_frontal.jpg	frontal		1	-1	0
valid/p10382575/s07/view2_lateral.jpg	lateral		1	-1	0



DATA: INDIANA UNIVERSITY

TESTING THE MODEL

F1 score of Model vs. Radiologists

	F1 Score (95% CI)
Radiologist 1	0.383 (0.309, 0.453)
Radiologist 2	0.356 (0.282, 0.428)
Radiologist 3	0.365 (0.291, 0.435)
Radiologist 4	0.442 (0.390, 0.492)
Radiologist Avg.	0.387 (0.330, 0.442)
CheXNet	0.435 (0.387, 0.481)

COLLABORATION

Academies of Loudoun

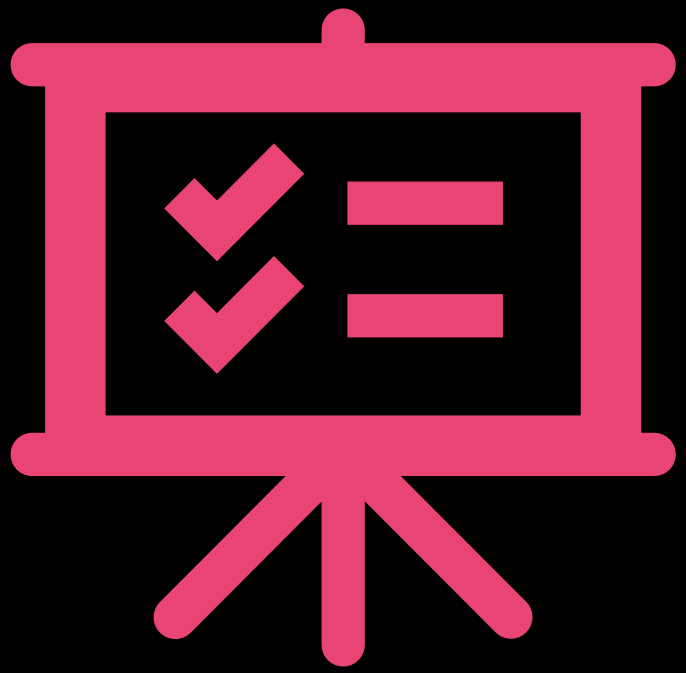
Replicate DualNet using Mimic-CXR dataset

Use natural language processing to interpret radiology reports in the Indiana Dataset

Daegu Science High School

Replicate DualNet using Mimic-CXR dataset

Use Recurrent Neural Network after processing image by Convolutional NN.



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