AI early diagnosis can save thousands of patients

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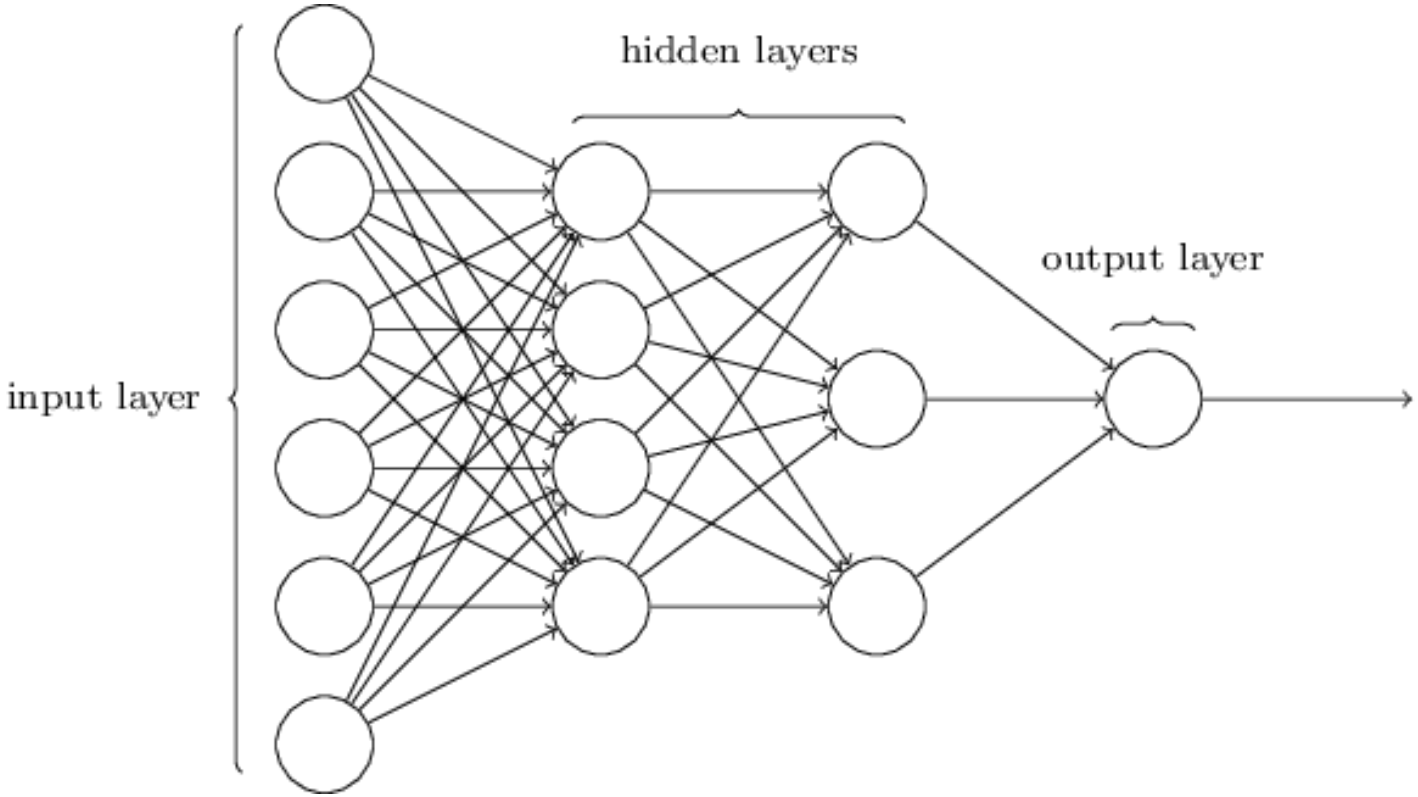
504 992 428

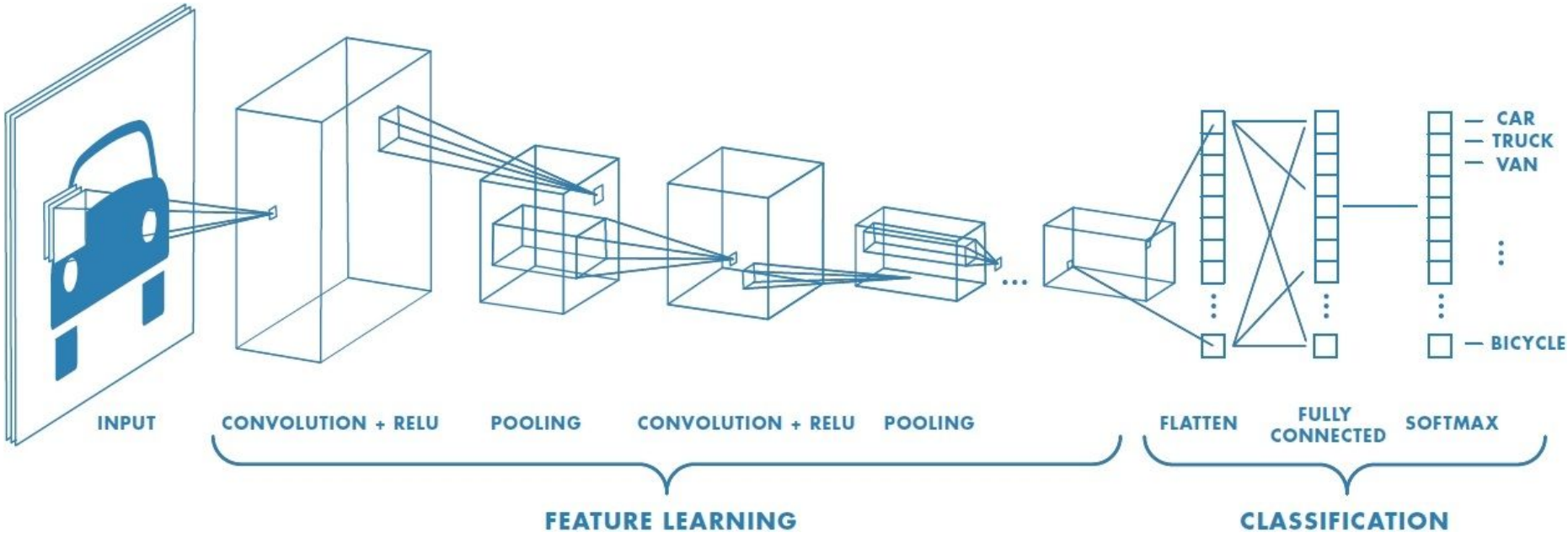
Deep Learning

“Deep Learning brings machine learning closer to its original gole: Artificial Intelligence”

NEURAL NETWORKS



CONVOLUTIONAL NEURAL NETWORKS



1

Heart and Cancer Patients

Article by Pallab Ghosh, BBC 2018

The systems will save millions of people and billions of pounds by enabling the diseases to be picked up much earlier.

“

The Current State

- Best doctors get it wrong in one in five cases
- Patients sent home undiagnosed
- Undergo an unnecessary operation

How does the AI system help?

Test Data

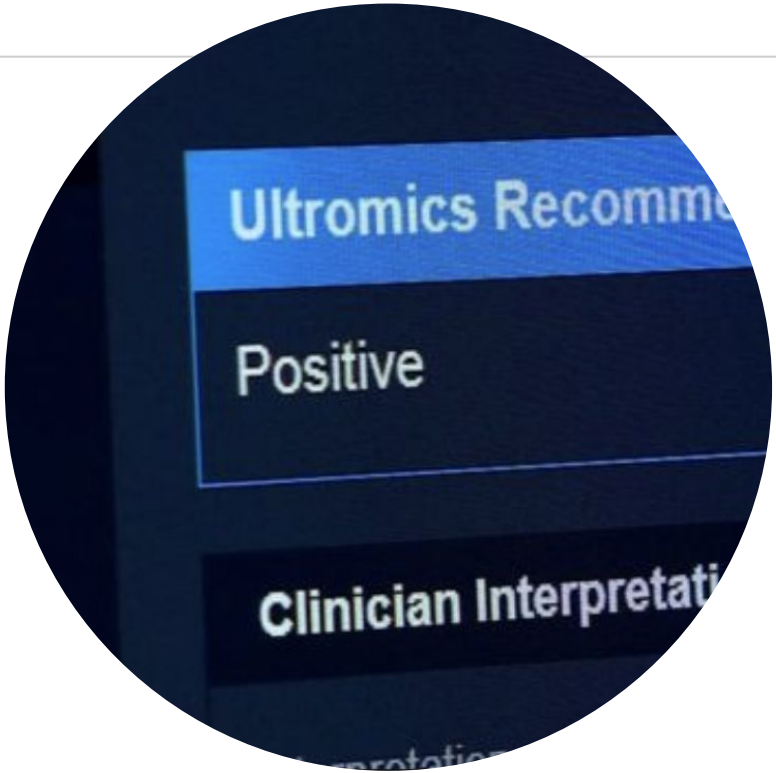
Trained on hundreds of thousands of MRI scans. Thus, can pick up subtle hints way better than even doctors with decades of experience.

Pixels

Since convolutional networks break the image into pixels and process those pixels, they can pick up telling stuff such as shaded areas, lumps etc which can be missed by the naked eye.

Transfer Learning

The low level feature detectors can be used to detect other diseases just as well.



“Greatly outperformed fellow heart specialists”

The system was tested in clinical trials in 6 cardiology units. The trials indicate that the system can do a lot better than consultants.

15% - 18 % better diagnosis

That is a lot of people

300,000,000$

That’s a lot of money

100%

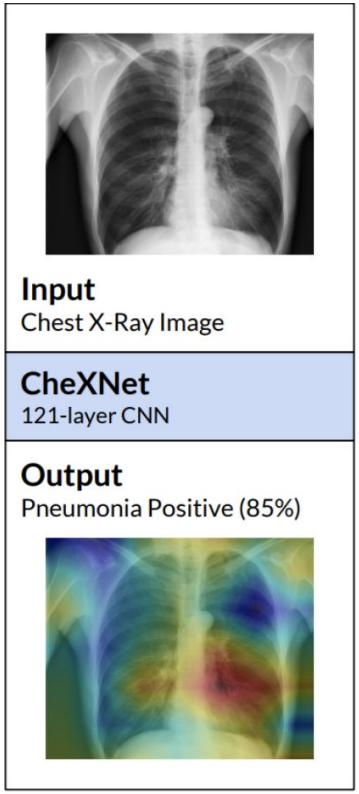
Total success!

2

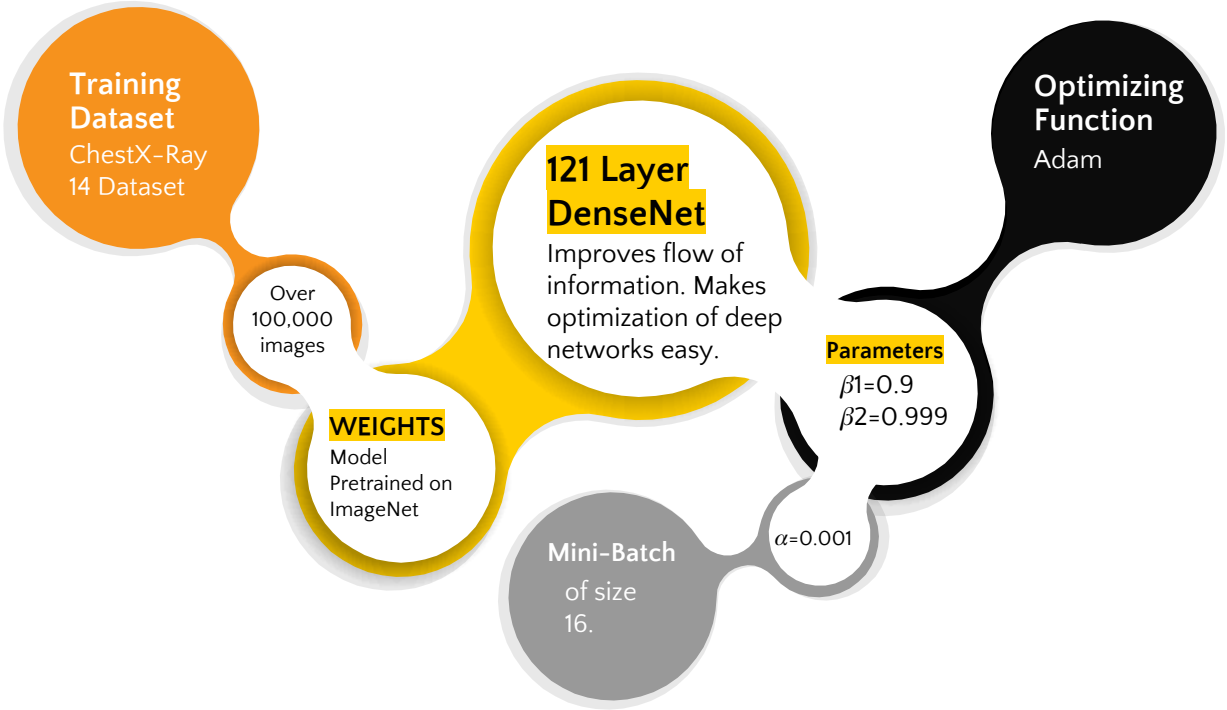
CheXNet

Radiologist-Level Pneumonia Detection on Chest X-Rays with Deep Learning, 25 December 2017

Gist of the Paper



Convolutional Network Architecture and Training



Results

Pathology	Wang et al. (2017)	Yao et al. (2017)	CheXNet (ours)
Atelectasis	0.716	0.772	**0.8094**
Cardiomegaly	0.807	0.904	**0.9248**
Effusion	0.784	0.859	**0.8638**
Infiltration	0.609	0.695	**0.7345**
Mass	0.706	0.792	**0.8676**
Nodule	0.671	0.717	**0.7802**
Pneumonia	0.633	0.713	**0.7680**
Pneumothorax	0.806	0.841	**0.8887**
Consolidation	0.708	0.788	**0.7901**
Edema	0.835	0.882	**0.8878**
Emphysema	0.815	0.829	**0.9371**
Fibrosis	0.769	0.767	**0.8047**
Pleural Thickening	0.708	0.765	**0.8062**
Hernia	0.767	0.914	**0.9164**

CheXNet vs. Radiologists

	F1 Score (95% CI)
Radiologist 1	0.383
Radiologist 2	0.356
Radiologist 3	0.365
Radiologist 4	0.442
Radiologist Average	0.387
CheXNet	0.435

Limitations

Patient History

Both systems currently predict whether the patient has a disease or not by looking at X-Rays, MRIs etc. They did not take into account patient histories which allow doctors to make much better decisions.

Test Data

The model was trained on frontal radiographs but it has been shown that 15% of accurate diagnosis require the lateral view.

Thanks!

Any questions ?

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