

Diagnosing Pneumonia with a Convolutional Neural Network

Problem

Pneumonia is a lung disease

It is the leading cause of child mortality worldwide

Developing countries lack experts who can diagnose the illness

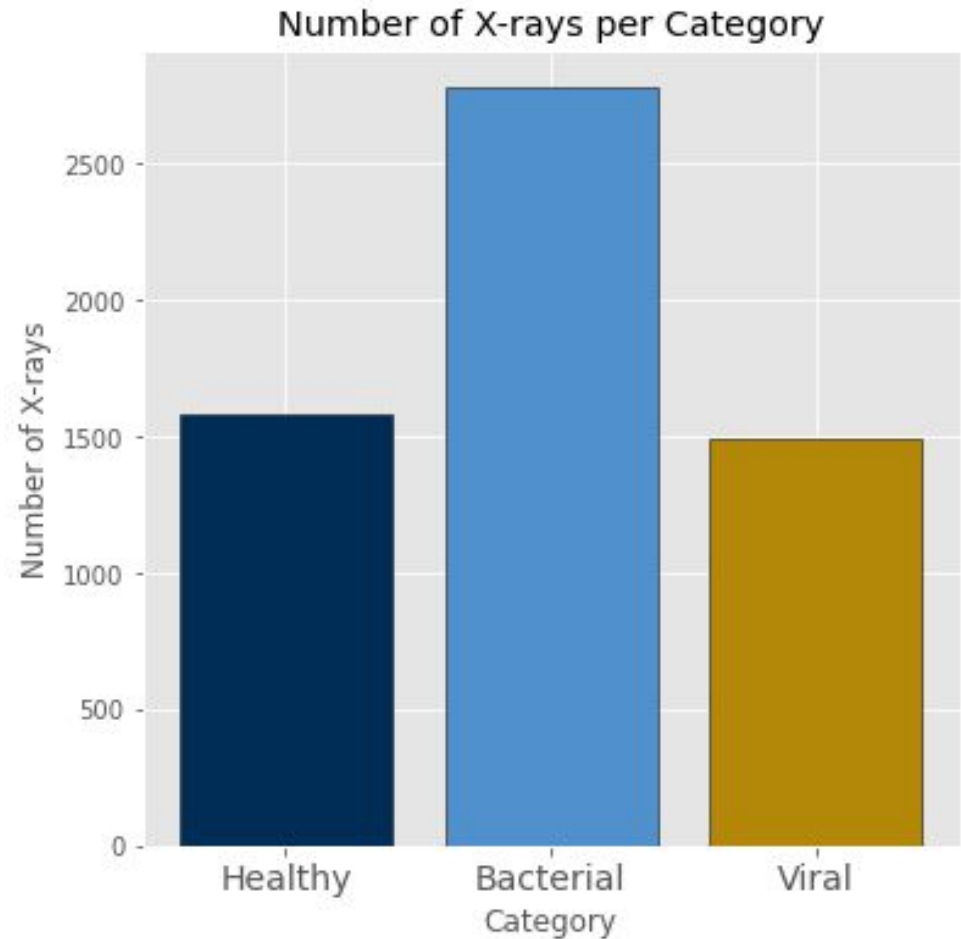
Goal: Create a model that can detect pneumonia from a chest X-ray



Data

Contains 5,856 chest X-rays of patients between 1 and 5

Each X-ray was classified by two medical experts. A third verified their work.

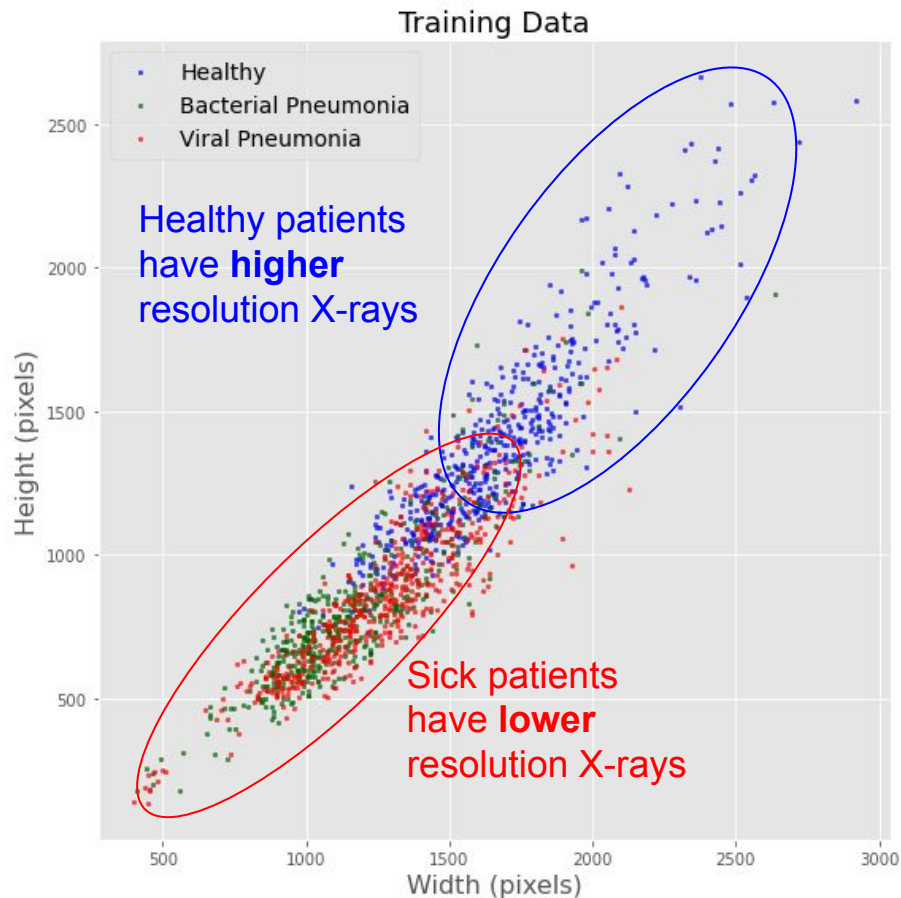


Data

Contains 5,856 chest X-rays of patients between 1 and 5

Each X-ray was classified by two medical experts. A third verified their work.

X-rays of healthy patients tended to be higher resolution

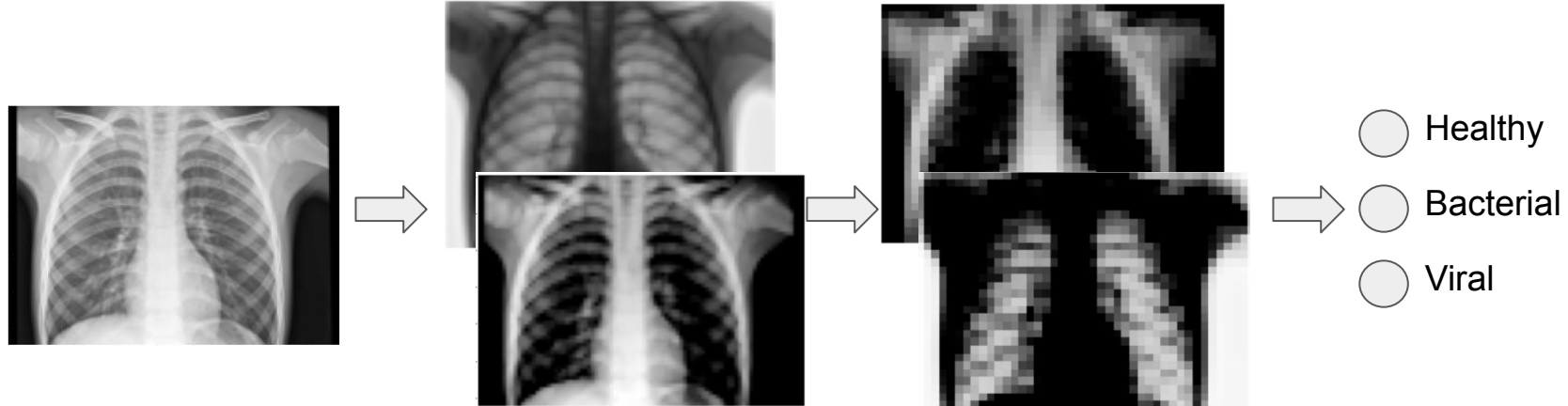


Model

Used a Convolutional Neural Network (CNN)

1500 X-rays (500 of each class) were used to train the model

All images were downsampled to a common size



Results

Accuracy: **82.5%** (Overall)

Accuracy: **91.8%** (Healthy vs. Pneumonia)

Worst Case Scenario: Wrong diagnosis for sick patient (circled in table to right)

This happened for **19%** of sick patients

Model gives correct diagnosis				
Patient is healthy Model says patient has pneumonia				
Patient has pneumonia Model says wrong type of pneumonia				
Patient has pneumonia Model says patient is healthy				
Actual Diagnosis	Healthy	200	10	24
	Bacterial	13	195	34
	Viral	4	24	120
		Healthy	Bacterial	Viral
Predicted Diagnosis				

Recommendations

1. Incorporate the model into software used to visualize the X-rays.

Make it easy to use

Recommendations

1. Incorporate the model into software used to visualize the X-rays.
2. Doctors should closely monitor patients after beginning treatment.

The model is not perfect. A patient might have bacterial pneumonia when the model says it is viral.

Recommendations

1. Incorporate the model into software used to visualize the X-rays.
2. Doctors should closely monitor patients after beginning treatment.
3. Collect more uniform data.

The X-rays for healthy patients tended to be larger.

All images were taken in Guangzhou, China.

Thank You

Any Questions?

Email: david.eric24@gmail.com

GitHub: @davidetrics

GitHub For This Project: <https://github.com/davidetrics/PneumoniaDiagnosisWithCNN>

LinkedIn: <https://www.linkedin.com/in/david-schenck-57183b264/>