

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

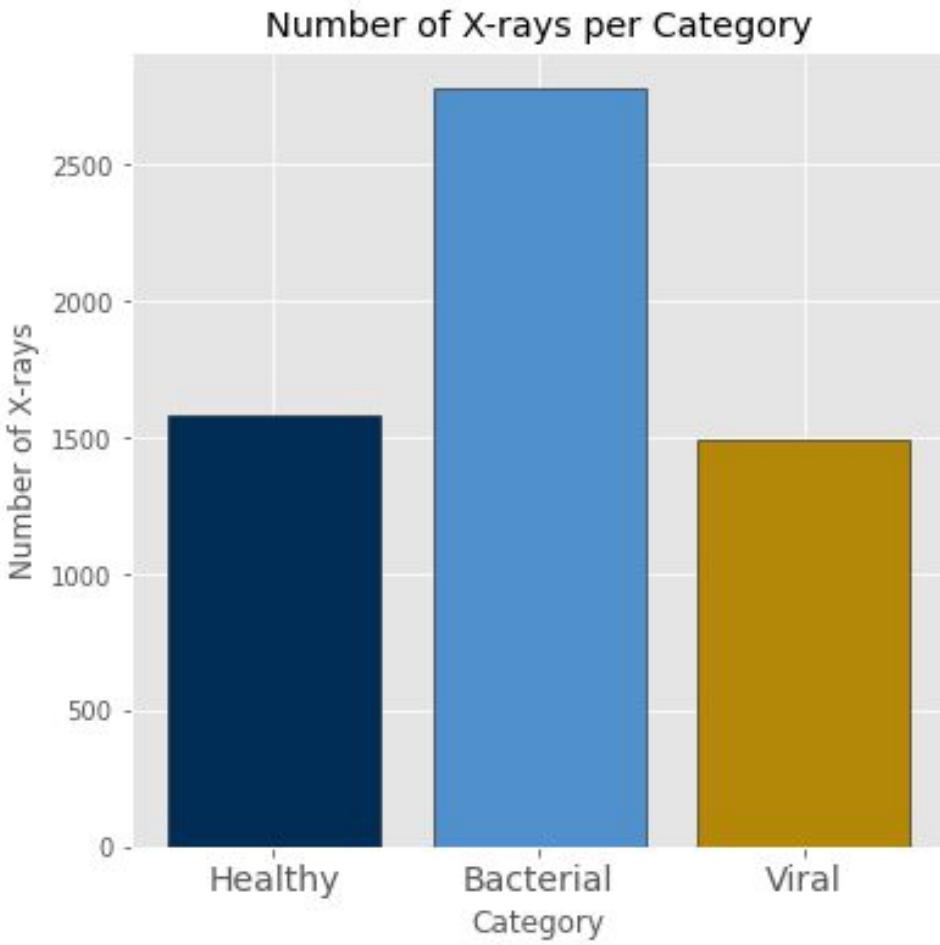
Goal: Create a model that can detect pneumonia from a chest X-ray



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.

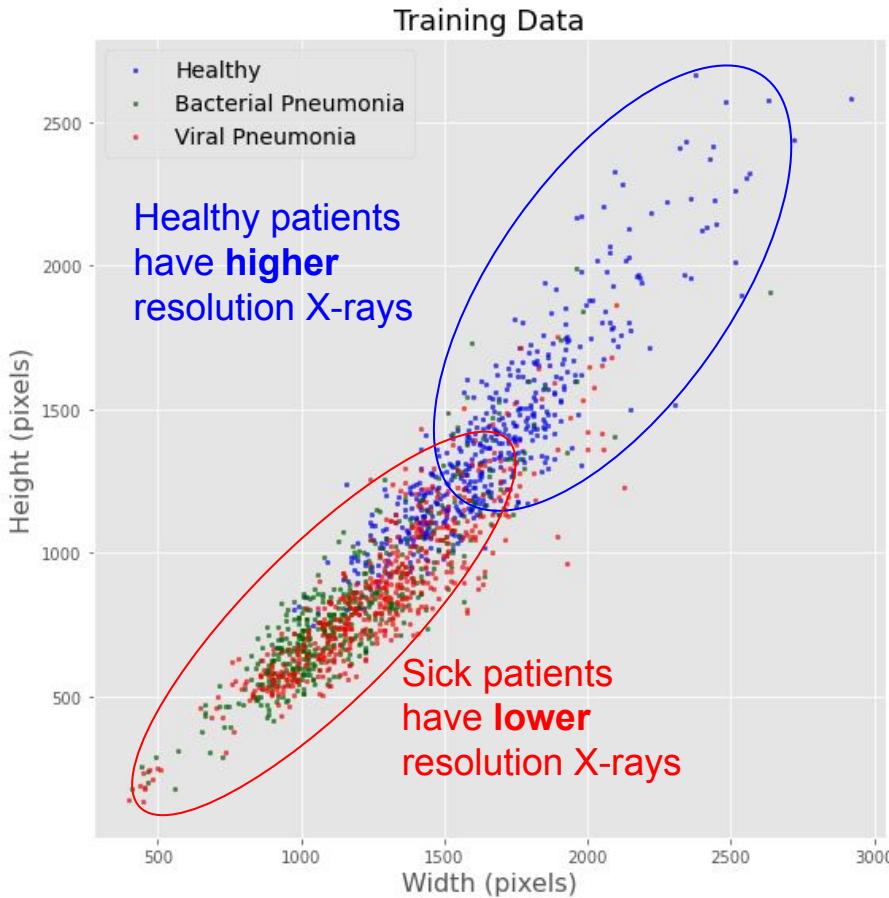


Data

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

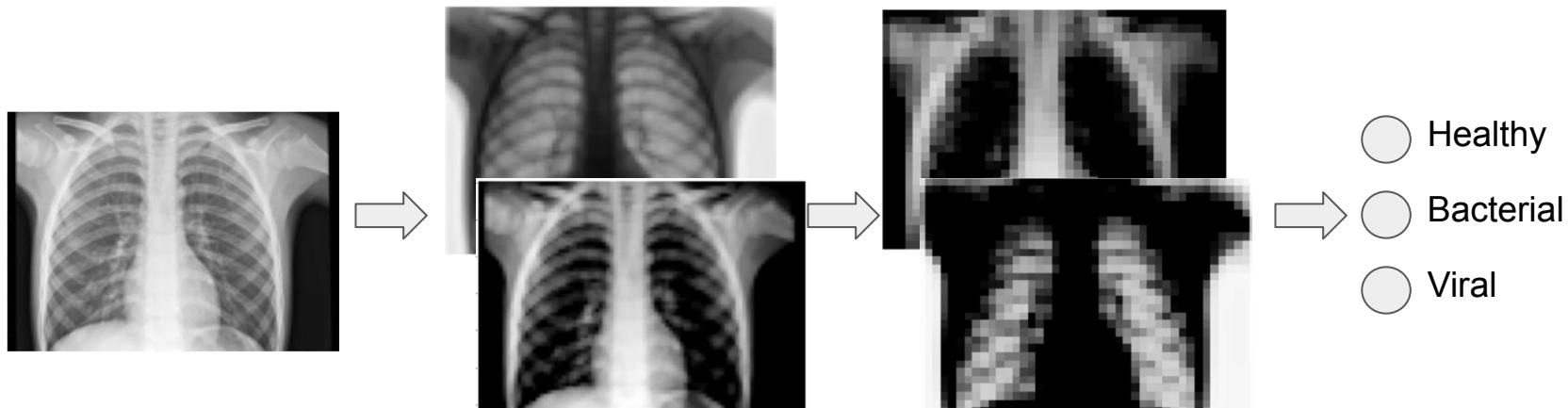


Model

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



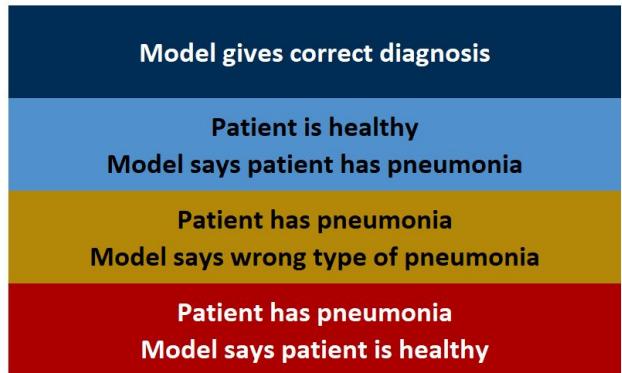
Results

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



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?

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

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