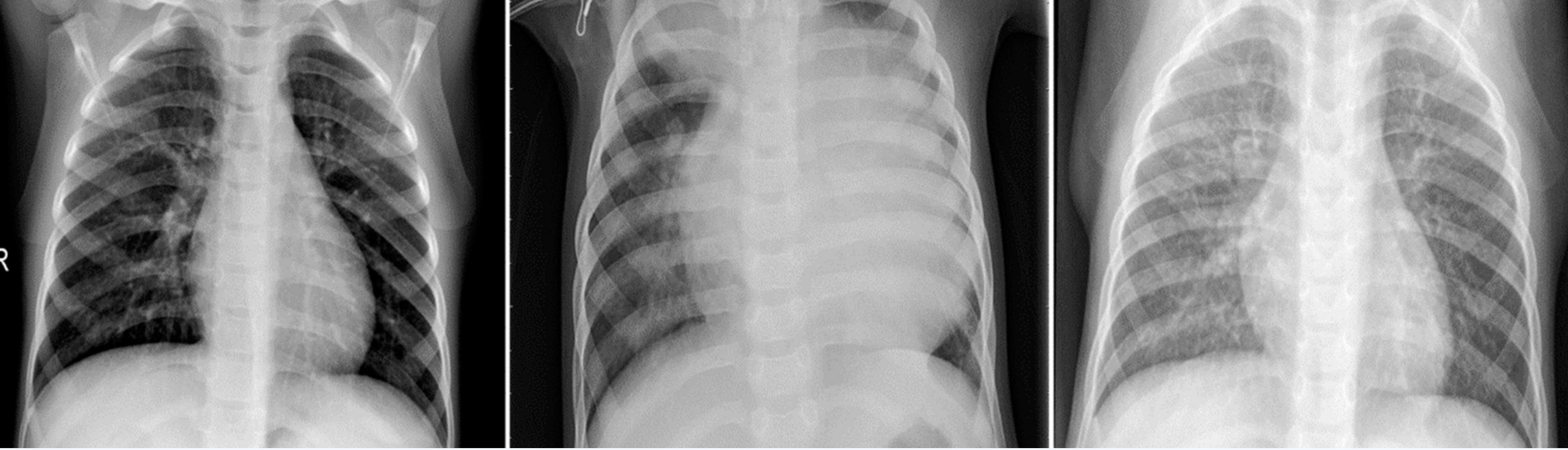


UNICEF Medical Center

Convolutional Neural Networks and Deep Learning for Pneumonia Detection in Chest X-rays

Presented by
Bryan Keating and Anhduy Nguyen

WHO we are

World Health Organization

Anhduy Nguyen

Bryan Keating

Presentation Outline

Today's Topics

- Overview of Pneumonia
- Stakeholder/Business Problem
- Data
- Methods/Results
- Limitations
- Next Steps

World Health Organization

unicef

Save the Children®

NEXT

World Health Organization

Overview of Pneumonia

Pneumonia

●○○ What is it?

.

●●○ Where is it?

●●● Who does it affect?

A hospital nurse in South Sudan prepares to treat a baby for pneumonia. Photo credit: Martin Kharumwa / Save the Children, October 2017.

World Health Organization

unicef

Save the Children®

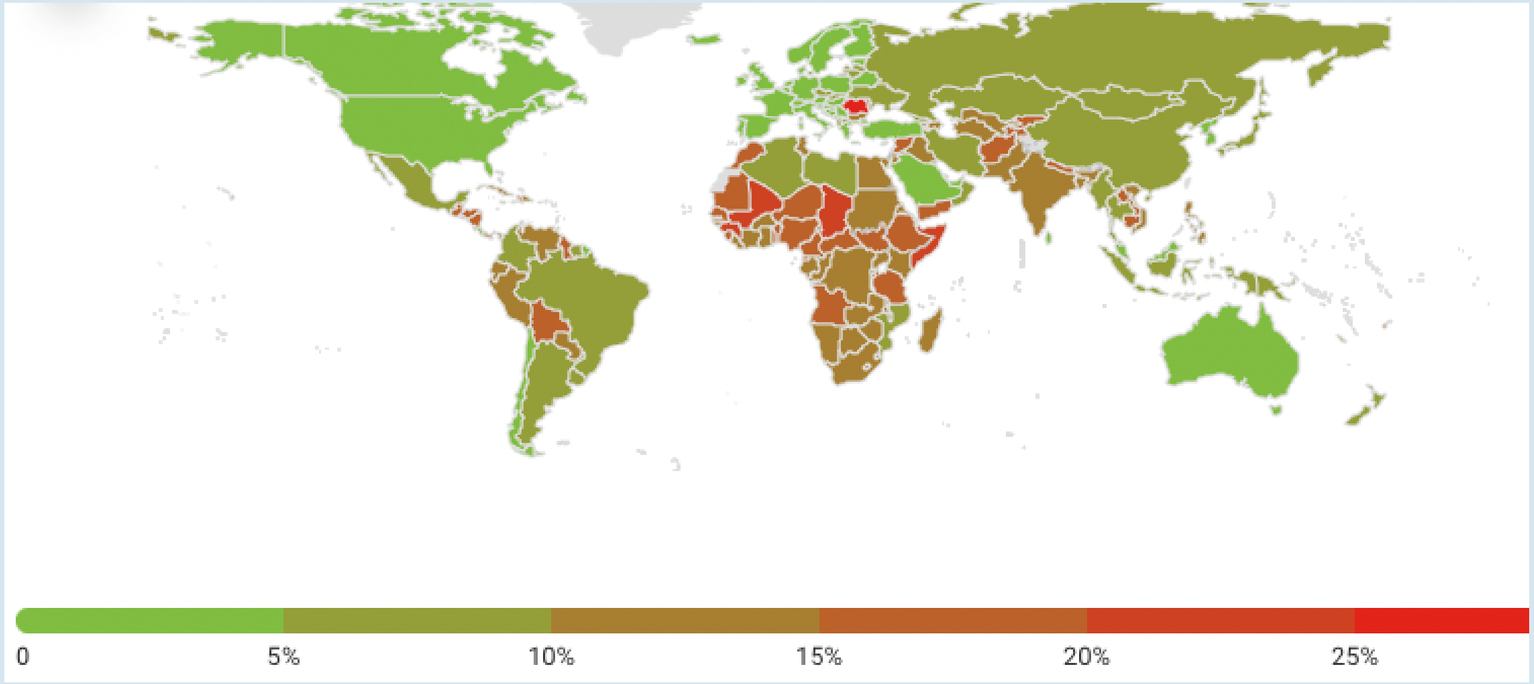
NEXT

World Health Organization

Stakeholder/Business Problem

Business Problem

"An estimated 18 million more health workers are needed by 2030 to prevent, diagnose and treat pneumonia..."(UNICEF)



Percentage of deaths caused by pneumonia in children under 5 years of age (2019)

2,200 CHILDREN DEATHS PER DAY

INADEQUATE ACCESS TO HEALTH CARE

UNDIAGNOSED AND MISDIAGNOSED PNEUMONIA PATIENTS

WORLD HEALTH ORGANIZATION - TASK FORCE

World Health Organization

unicef

Save the Children®

NEXT

World Health Organization

Data

WORLD HEALTH ORGANIZATION - TASK FORCE

Data

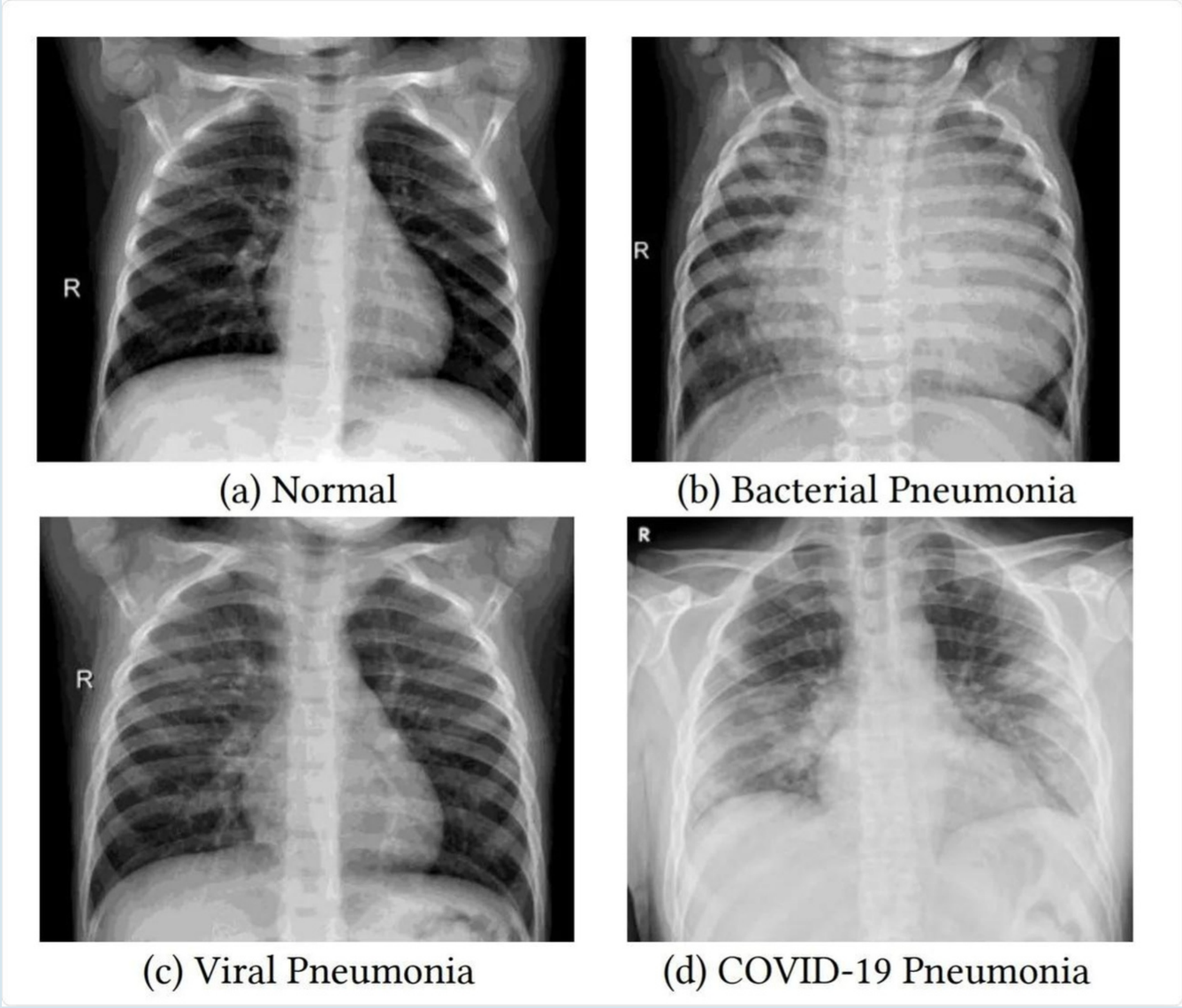
(Guangzhou Women and Children's Medical Center)

- Ages 1-5

- X-ray, NON-Pneumonia: 1,584

- X-ray, Pneumonia: 4,274

With Image Augmentation
- 121,272 images/model*



World Health Organization

unicef

Save the Children®

NEXT

World Health Organization

Method/Results

Methods

1.CLASSIFICATION MODEL:

LOGISTIC REGRESSION

0 = NORMAL,
1 = PNEUMONIA

2.DEEP LEARNING MODEL:

CONVOLUTIONAL NEURAL NETWORK

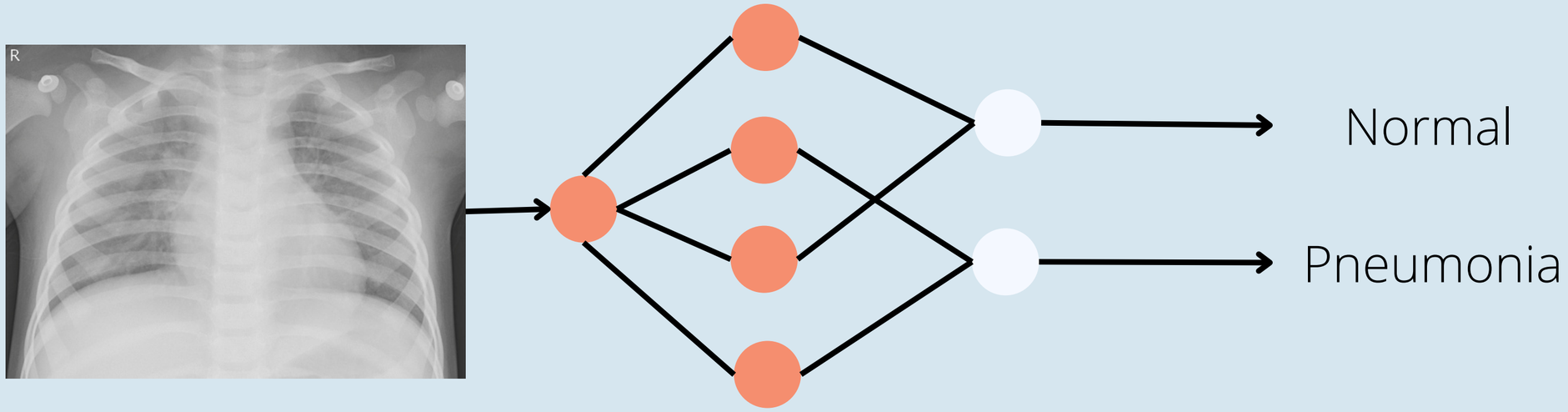
Logistic Regression

Accuracy = 67.8

Limitation:

70% of misdiagnoses were False Negatives (Bad)

Convolutional Neural Network



Accuracy: 91%

Recall: 86%

Results - Secondary Diagnostic Tool

Improve health care efficiency

Improve heath care accessability

Reduce misdiagnosis

One year-old Hakaroom sits with his mother Lokuru at a Save the Children-supported health center in Kapoeta, South Sudan, after being treated for severe pneumonia. Photo credit: Martin Kharumwa / Save the Children, October 2017.

World Health Organization

unicef

Save the Children®

NEXT

World Health Organization

Limitations

Limitations

●○○ Medical History

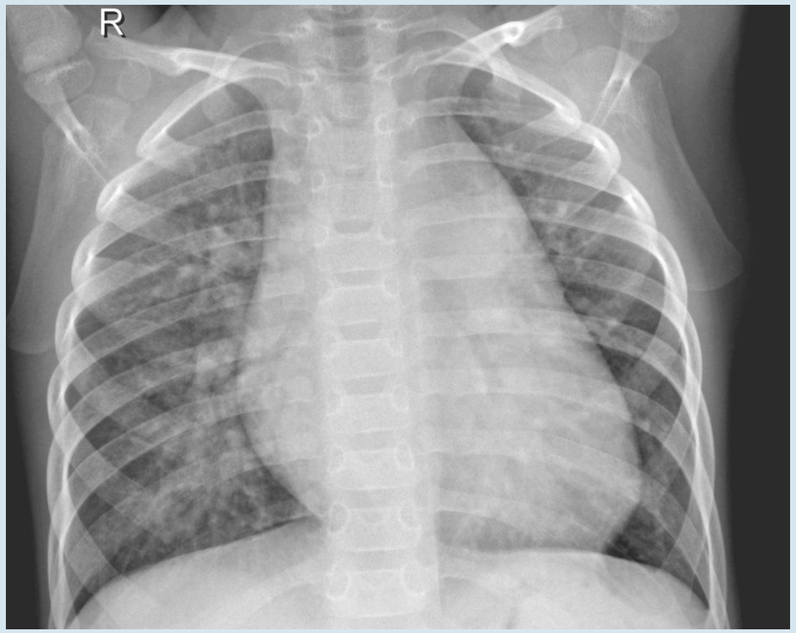
No info on preconditions

●●○ Fuzzy Scans

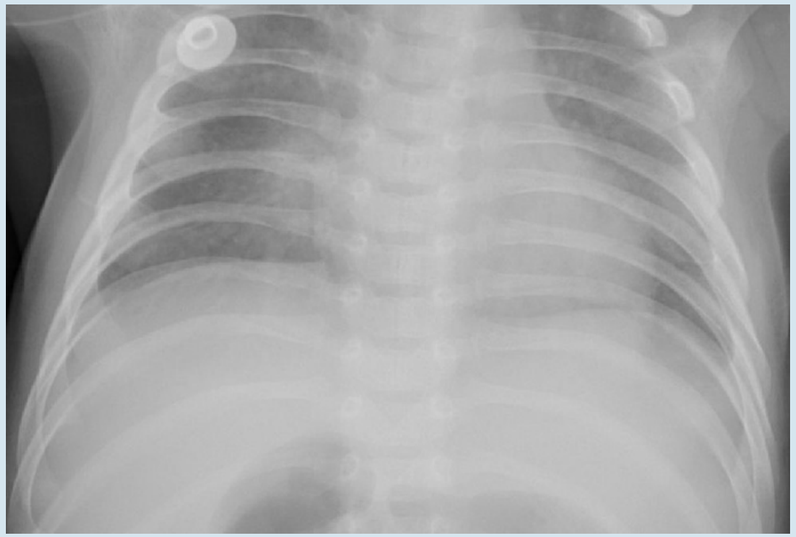
Less noisy scans

●●● Demographics

Limited ages(1-5) and populations



X-ray, minimal noise (above)



X-ray, noise distortion (above)

World Health Organization

unicef

Save the Children®

NEXT

World Health Organization

Next Steps

A mother monitors her son with pneumonia who is receiving extra oxygen. /Save The Children

Next Steps

●○○ Split Viral/Bacterial Pneumonia

●●○ Different Demographic Data

●●● Medical History of Patient

World Health Organization

unicef

Save the Children®

NEXT

World Health Organization

Thank you for your time.

Bryan Keating

Anhduy Nguyen

Contact Information

For questions, comments and inquiries

PHONE NUMBER

402-880-2334

EMAIL ADDRESS

bryankeating7@gmail.com

anguyen61191@gmail.com