

# Detecting Pneumonia in Chest Radiographs

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# Summary

- **Pneumonia** accounts for 14% of all deaths of children under 5 years old
- **Medecins Sans Limites (MSL)**, an AI-based medical research company, hopes to use **Convolutional Neural Networks** to identify patients with pneumonia based on **Chest Radiographs**

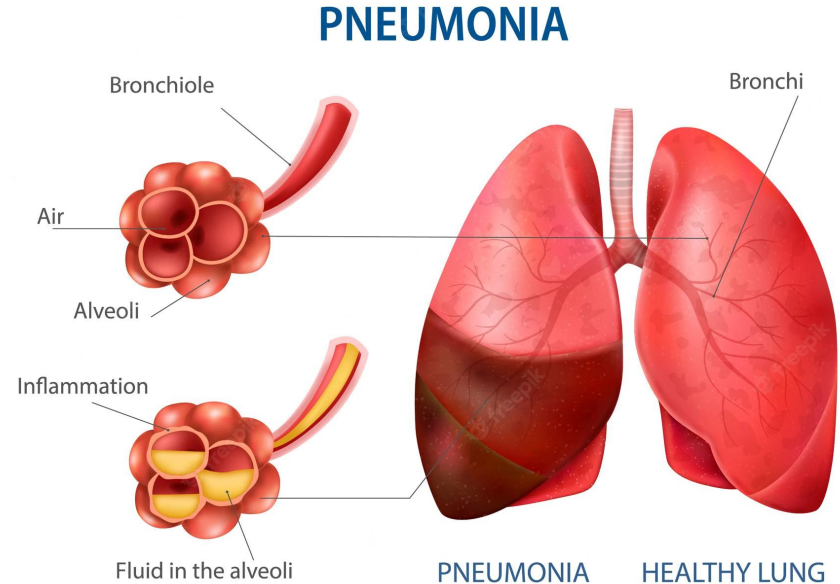


# Outline

- The Problem
  - Data
  - Methods
  - Results
  - Conclusions
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# The Problem

- According to the World Health Organization, pneumonia accounts for 14% of all deaths of children under 5 years old, **killing almost 800,000 children in 2019**
- Medical Professionals need tools to accurately identify and treat illnesses worldwide



# Data



- 5,863 Total Images
- X-Rays from pediatric patients 1-5 years old
- Classes reduced to 2: NORMAL and PNEUMONIA

# Data

Data Labeled NORMAL

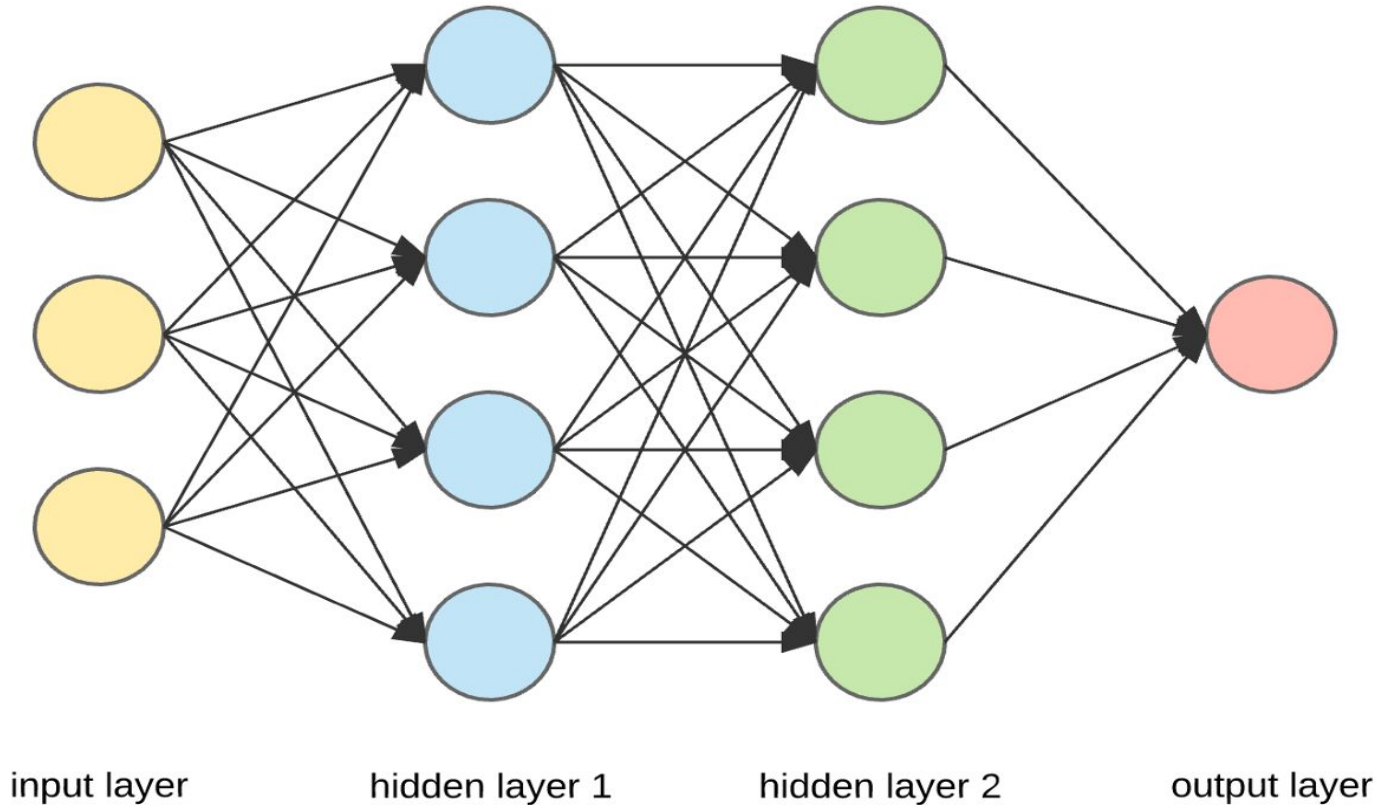


# Data

## Data Labeled PNEUMONIA

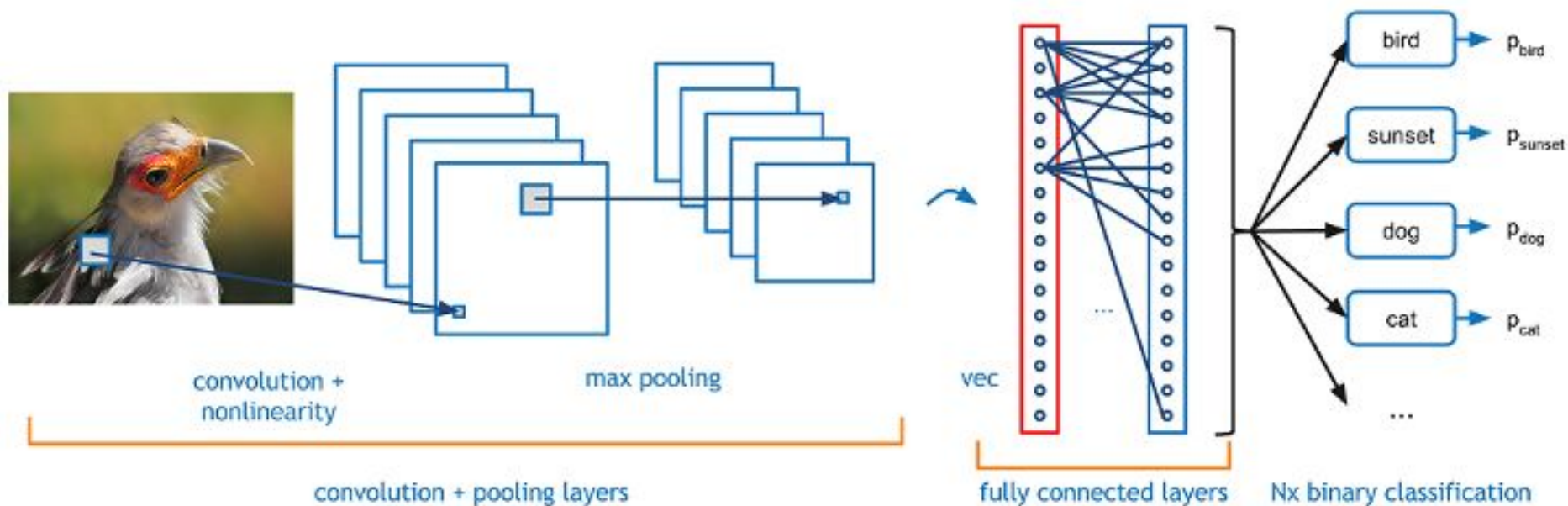


# Methods - Deep Learning Neural Networks





# Methods - Convolutional Neural Network

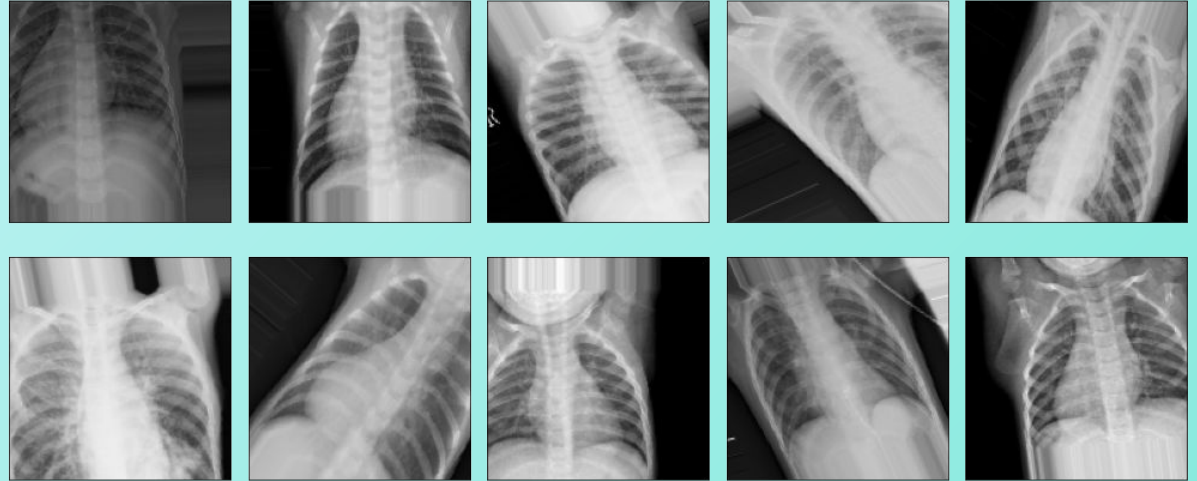


# Methods - Data Augmentation

Training images were randomly altered:

- Rotation
- Width
- Height
- Zoom
- Shear

Example - Augmented Training Images



# Results - Baseline Model

## Accuracy

Percentage of *successful*  
*predictions* by the model:

**76%**

TRUE LABELS	Healthy	Pneumonia
	Healthy	Pneumonia
Pneumonia	<b>Correctly</b> Diagnosed: Healthy  88	<b>Incorrectly</b> Diagnosed: Sick  146
	<b>Incorrectly</b> Diagnosed: Healthy  3	<b>Correctly</b> Diagnosed: Sick  387
PREDICTED LABELS		

# Results - Baseline Model

## Recall

Percentage of sick patients  
*successfully identified:*

**99%**

TRUE LABELS	Healthy	Pneumonia
	Healthy	Pneumonia
Pneumonia	<b>Correctly</b> Diagnosed: Healthy  88	<b>Incorrectly</b> Diagnosed: Sick  146
	<b>Incorrectly</b> Diagnosed: Healthy  3	<b>Correctly</b> Diagnosed: Sick  387
PREDICTED LABELS		

# Results - Final Model

## Accuracy

Percentage of *successful predictions* by the model:

**87%**

TRUE LABELS	Healthy	Pneumonia
	Healthy	Pneumonia
Healthy	<b>Correctly</b> Diagnosed: Healthy  160	<b>Incorrectly</b> Diagnosed: Sick  74
Pneumonia	<b>Incorrectly</b> Diagnosed: Healthy  2	<b>Correctly</b> Diagnosed: Sick  388

# Results - Final Model

## Recall

Percentage of sick patients  
*successfully identified:*

**99%**

TRUE LABELS	Healthy	Pneumonia
	Healthy	Pneumonia
PREDICTED LABELS	<b>Correctly</b> Diagnosed: Healthy  160	<b>Incorrectly</b> Diagnosed: Sick  74
	<b>Incorrectly</b> Diagnosed: Healthy  2	<b>Correctly</b> Diagnosed: Sick  388

# Conclusion

- High scoring model
- Medecins Sans Limites can confidently deploy this model for use in medical settings

# Next Steps

- Additional data collection for further fine tuning
- Adjust model for wider demographic of patients
- Create classifiers that can identify multiple illnesses



# Thank you

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