

CONCRETE APPARITIONS

SCREENING FOR PEDIATRIC PNEUMONIA WITH
CONVOLUTIONAL NEURAL NETWORKS





OUR TEAM



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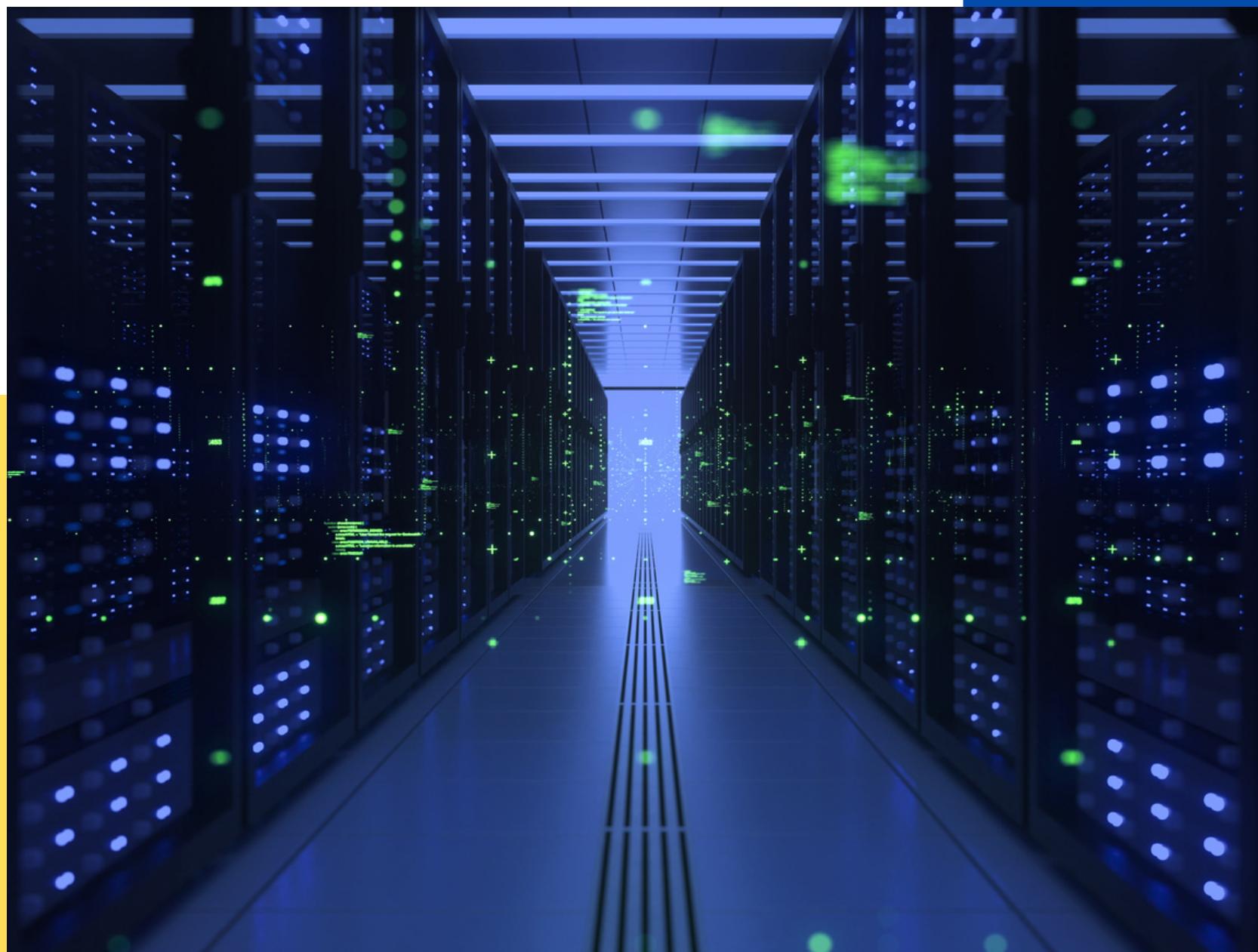


TASK

- **World Health Organization:**
 - *Pneumonia=14% deaths under 5 years*
 - *Antibiotics to only 1/3 eligible children*
- **Chest X-rays --> Radiologist --> Patient**
- **Low Resource Settings**
- **Machine Learning**
- **"Human in the Loop"**



Patel, B.N., Rosenberg, L., Willcox, G. et al. Human-machine partnership with artificial intelligence for chest radiograph diagnosis. *npj Digit. Med.* 2, 111 (2019). <https://doi.org/10.1038/s41746-019-0189-7>



THE DATA

Zhang Lab Data from Mendeley



5000+ Images



Employed AWS
Cloud Computing



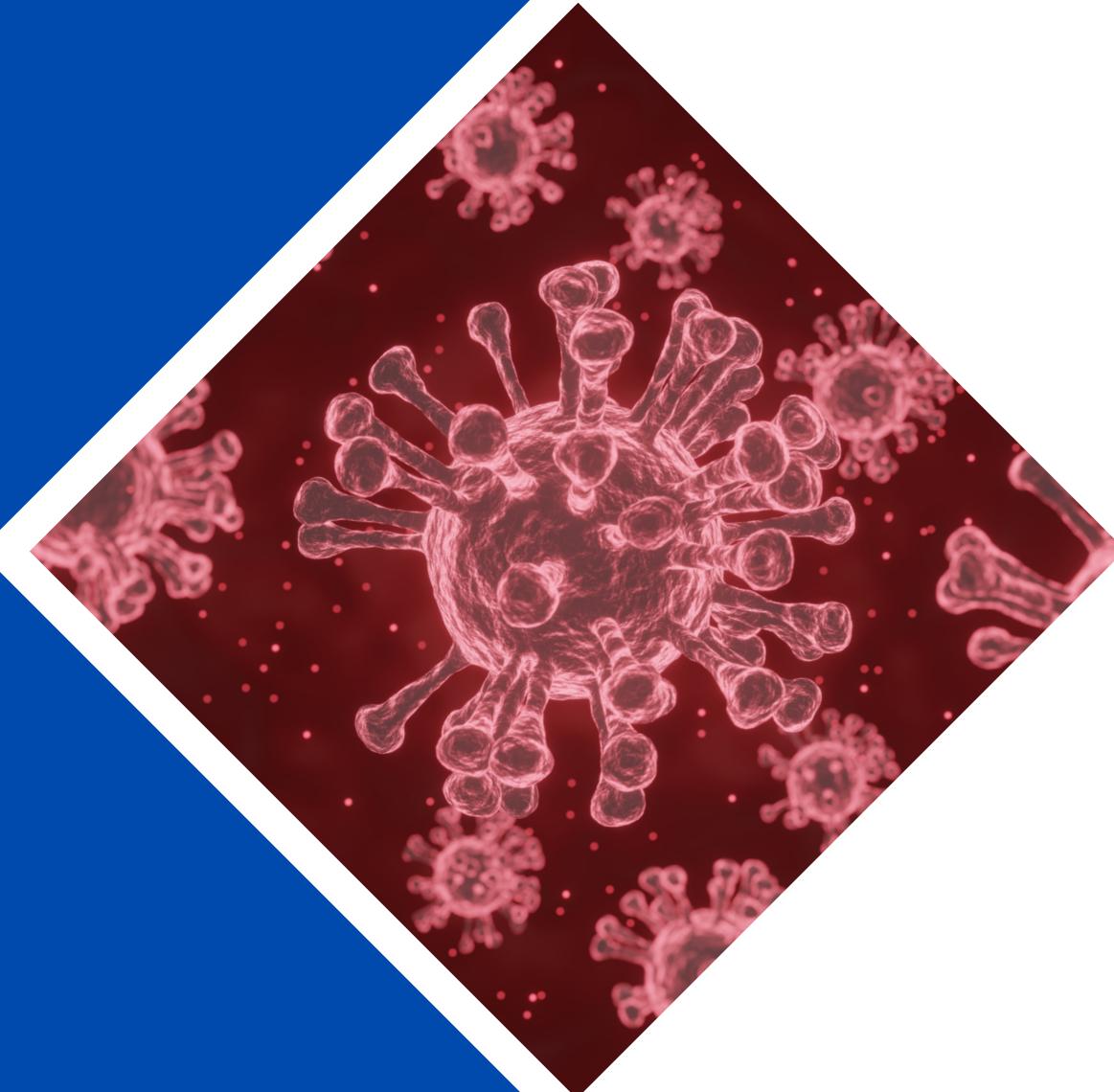
Building on
Previous Research



Mendeley



IMAGE RECOGNITION CNN



Binary

- Binary model
- Sick or healthy



Multiclass model

- Multiclass model
- Bacterial, viral, normal



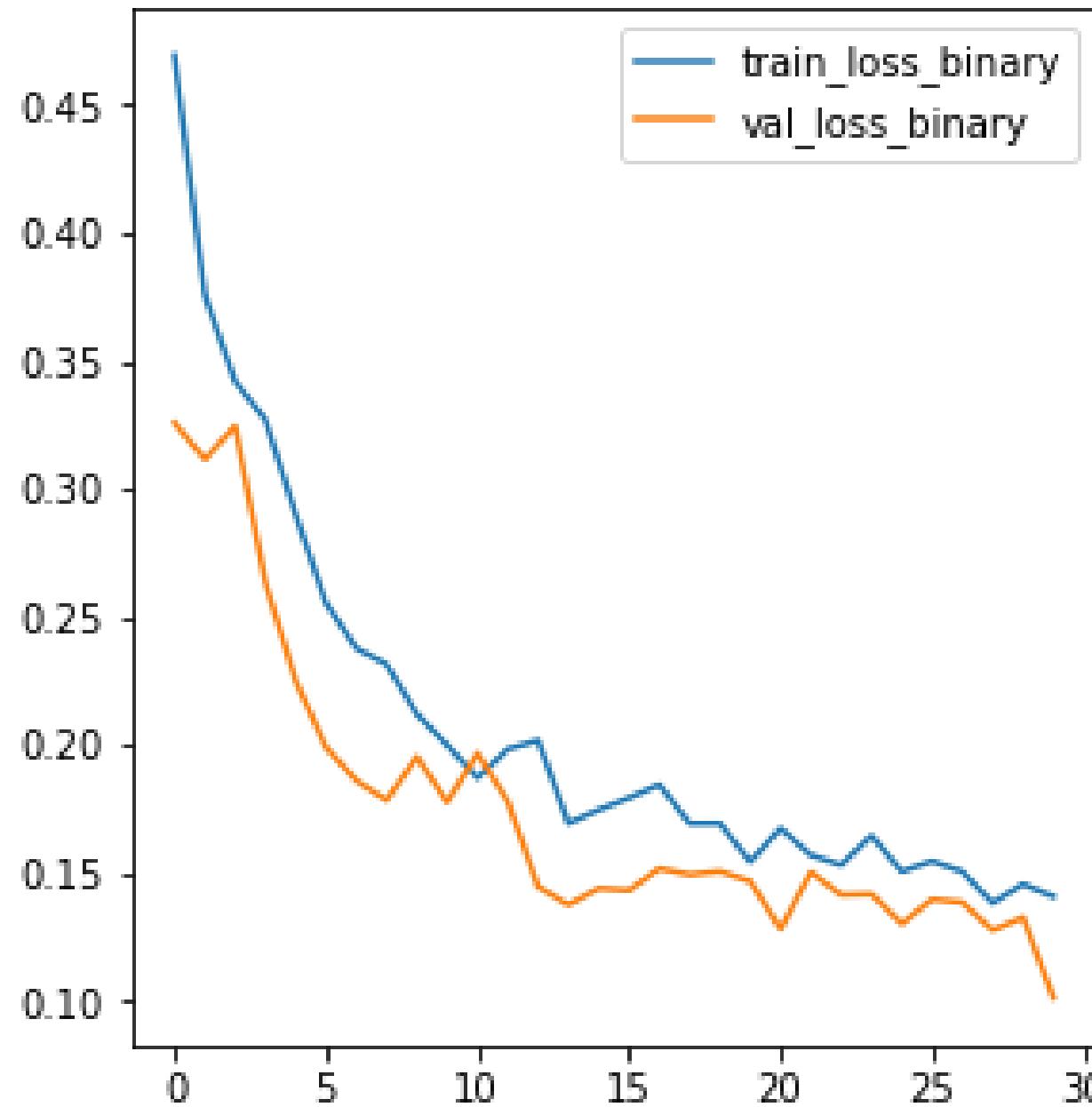
Humans AND Machines

- Efficacy and Safety Optimization

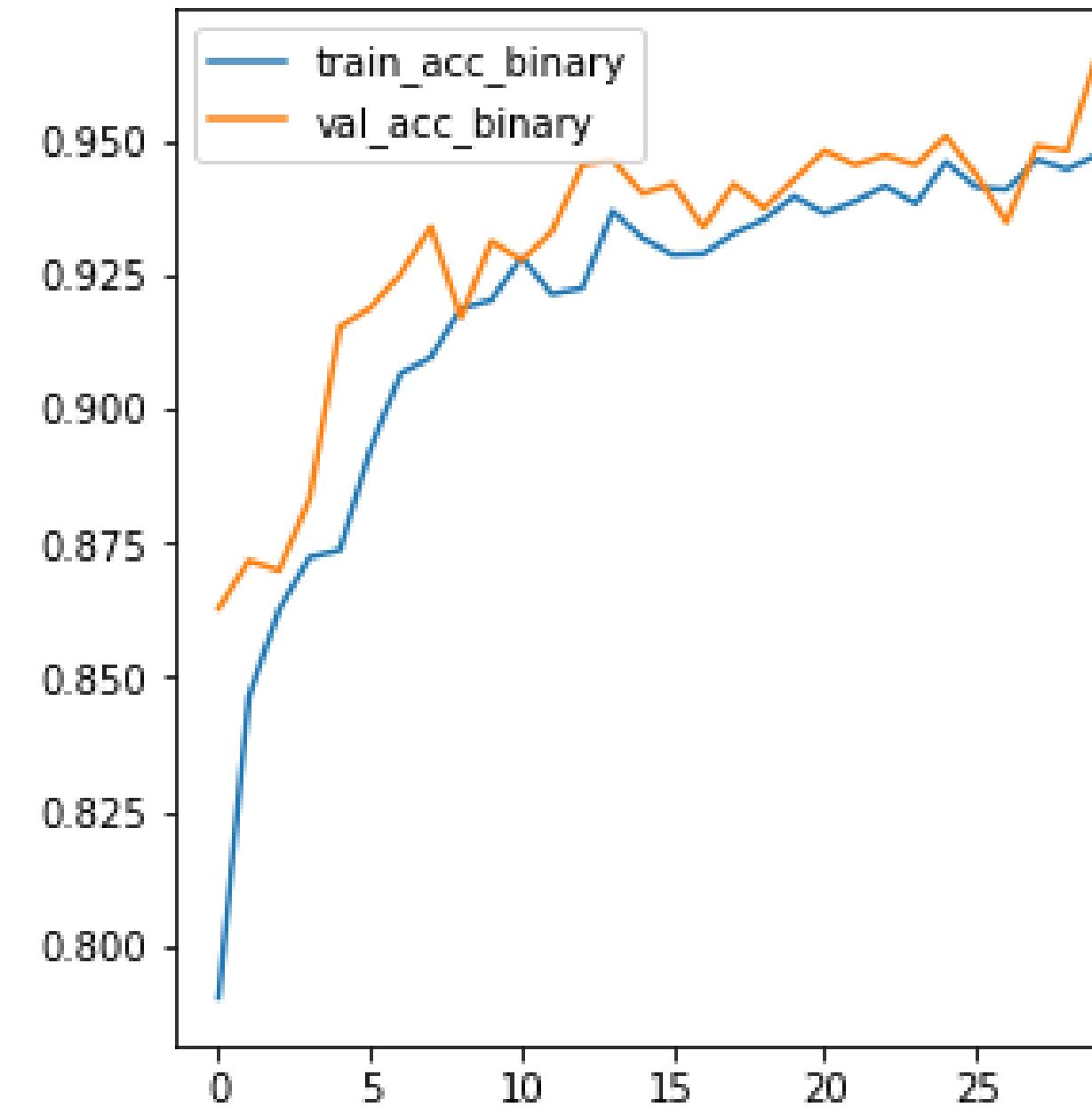


Binary Model

Loss



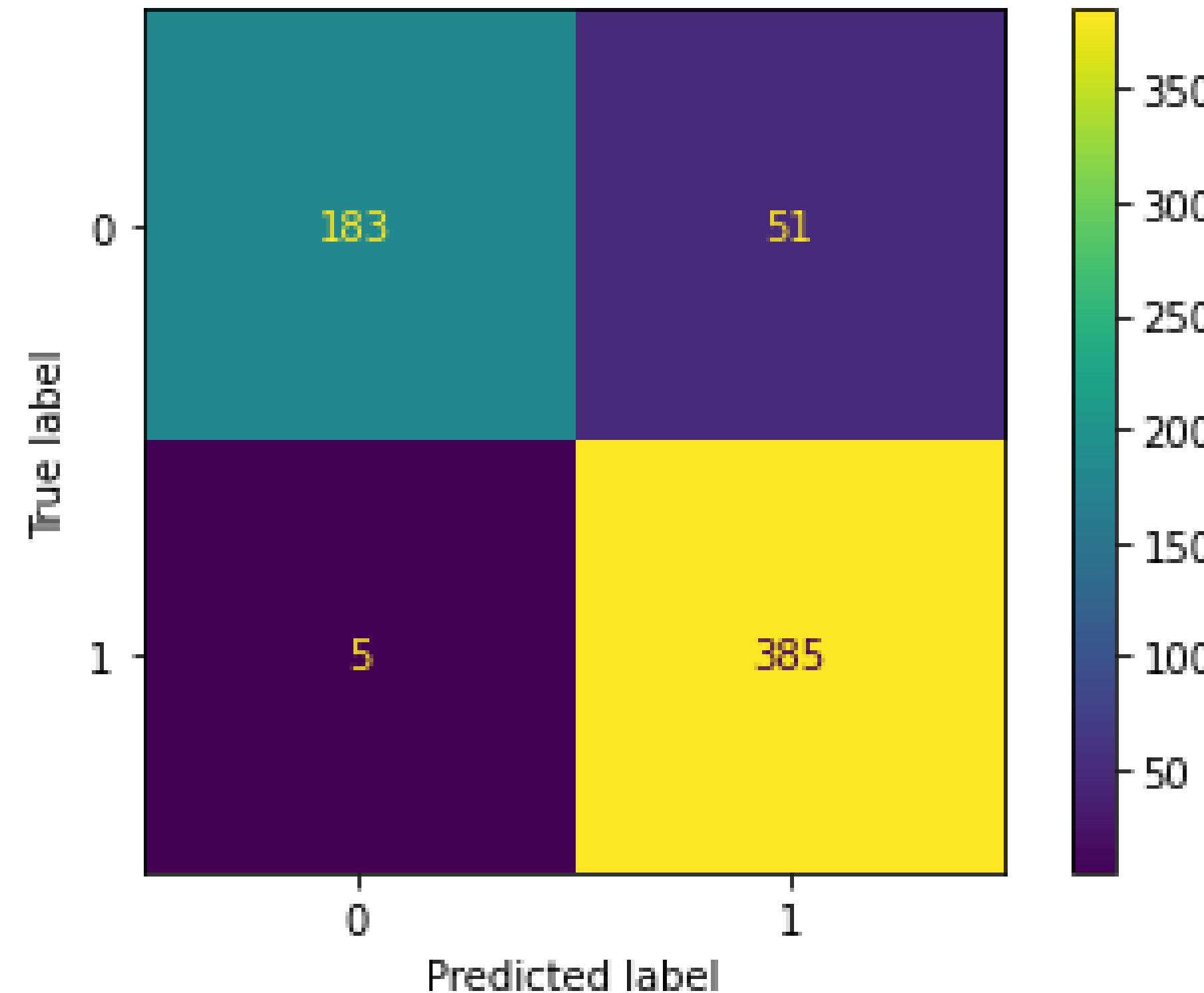
Accuracy



Rounds of Training (epochs)

- 76%
- Baseline
- 98.7%
recall/sensitivity
- 92.3%
- Final model

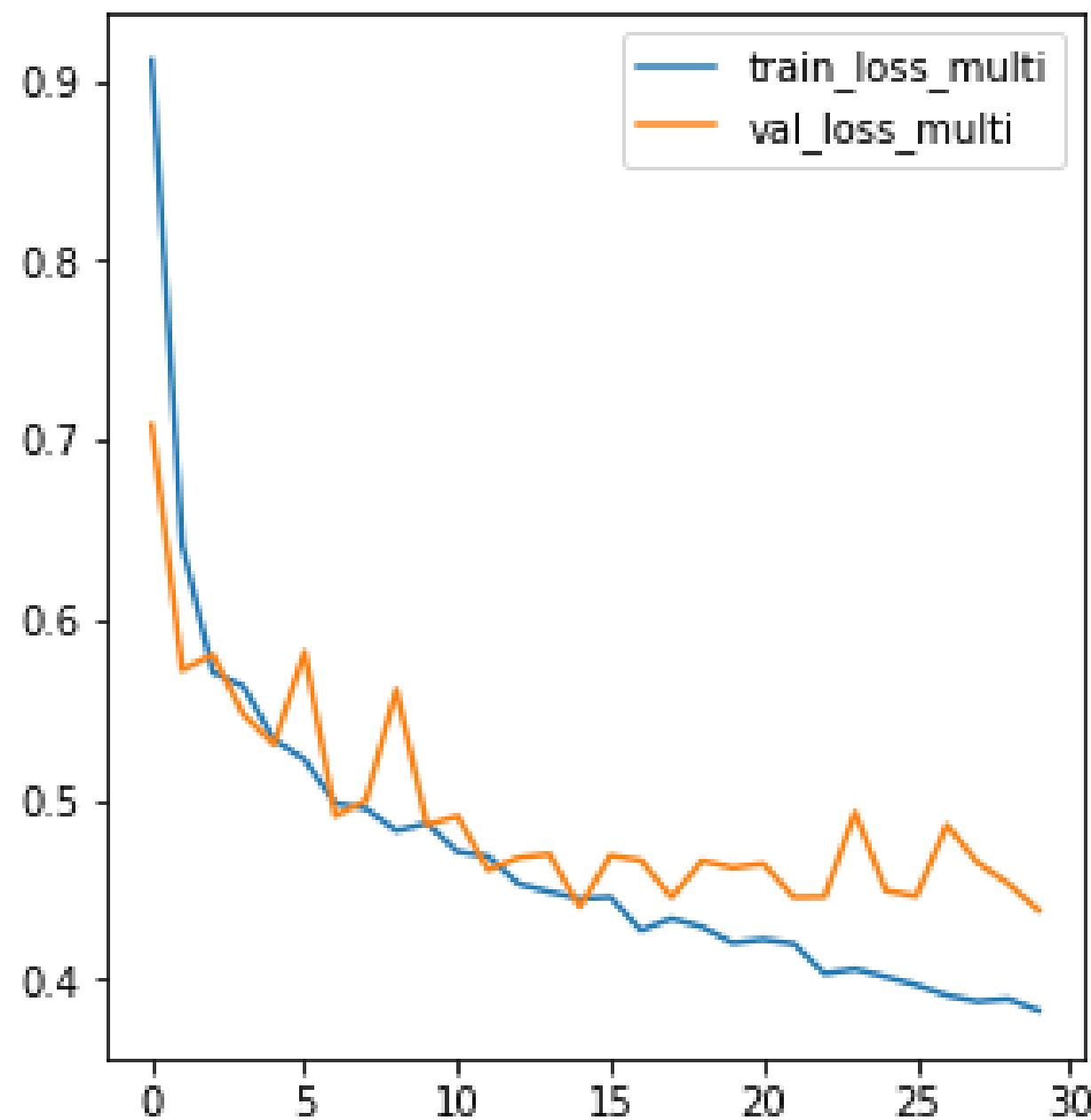
Binary Model



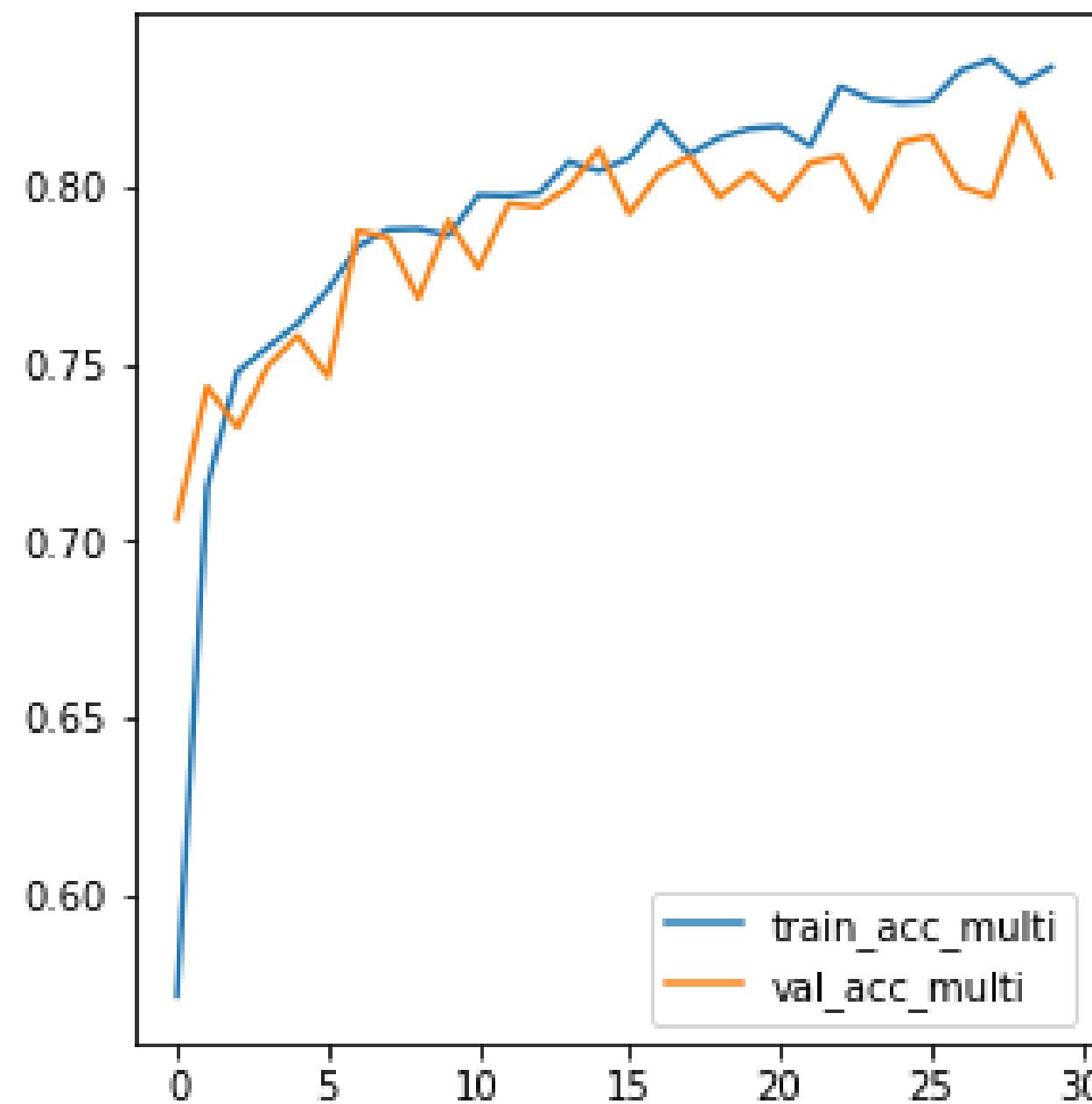
- 0 = Normal
- 1 = Pneumonia

Multiclass Model

Loss

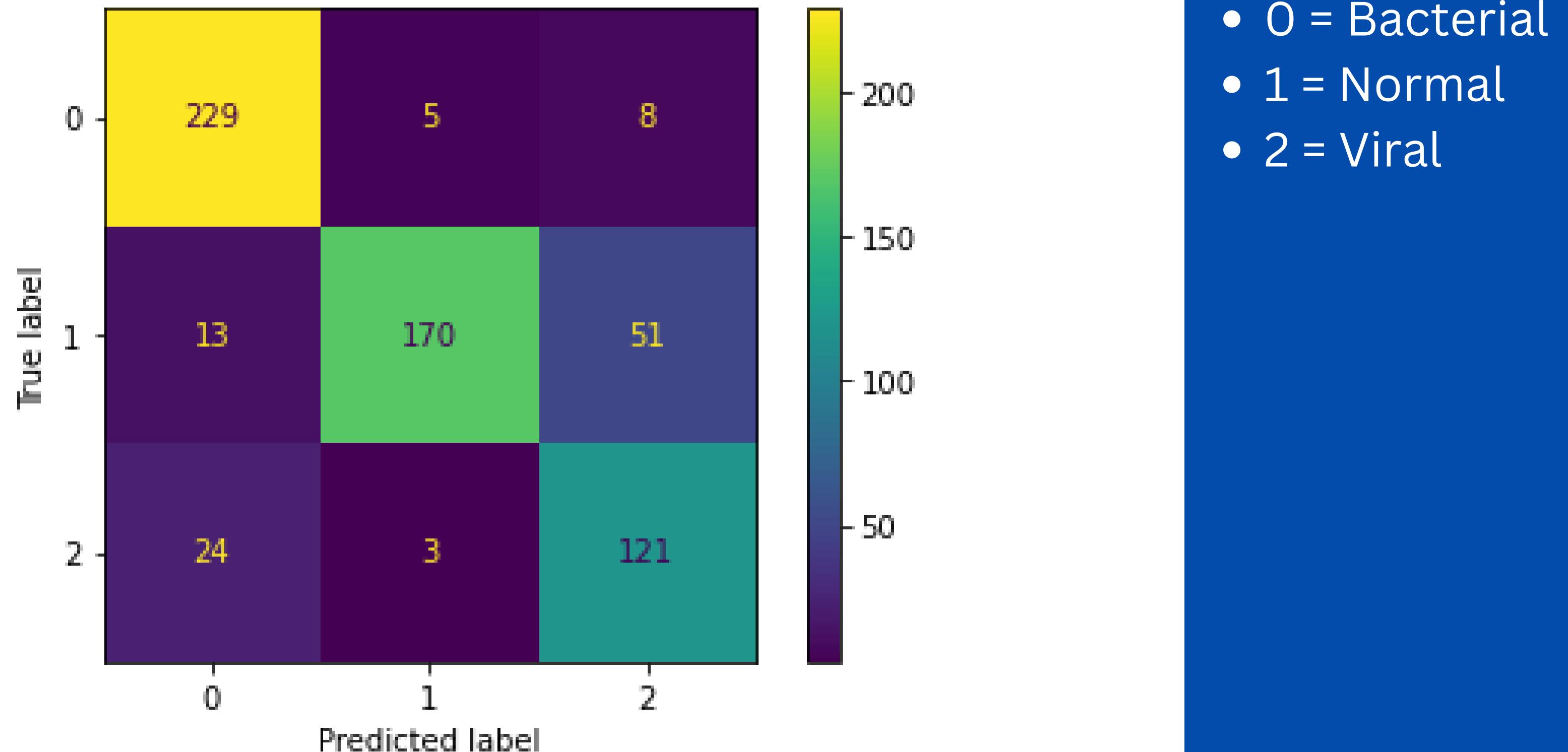


Accuracy



- Baseline 48% Accuracy (bacteria)
- ROC-AUC = 0.938
- 84.3% Accuracy Final model

Multiclass Model



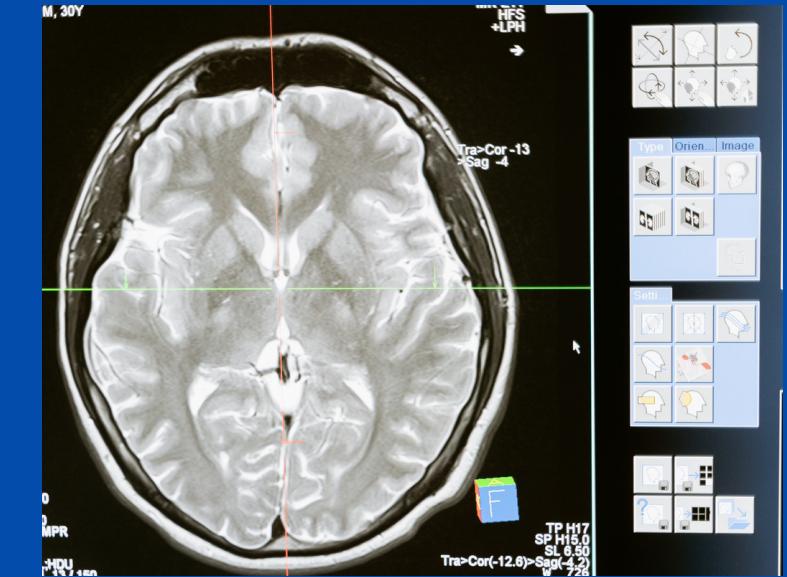
MODEL DEPLOYMENT

Human In The Loop



Bacterial	Normal	Viral
97.1%	<0.01%	2.89%

- Radiologist
- Increased speed and accuracy
- ([Patel et al 2019, Nature](#))



FUTURE DEVELOPMENT



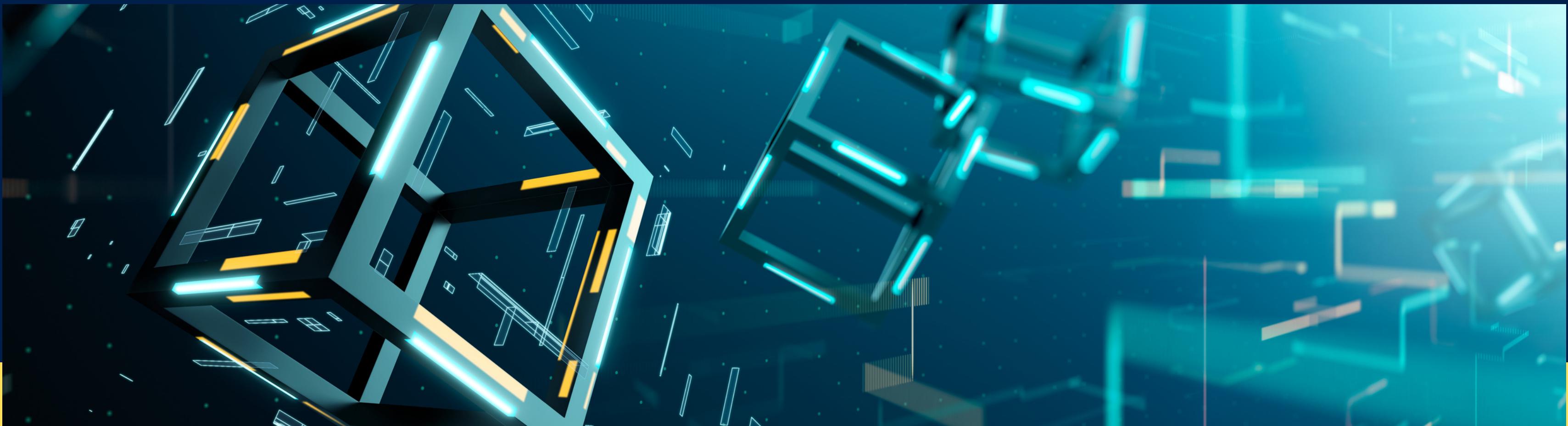
Limitations

- Computation speed
- Data size



Future Project

- Additional illness detection
- Application Development





CONTACT US



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Project Repository:



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THANK YOU!!

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