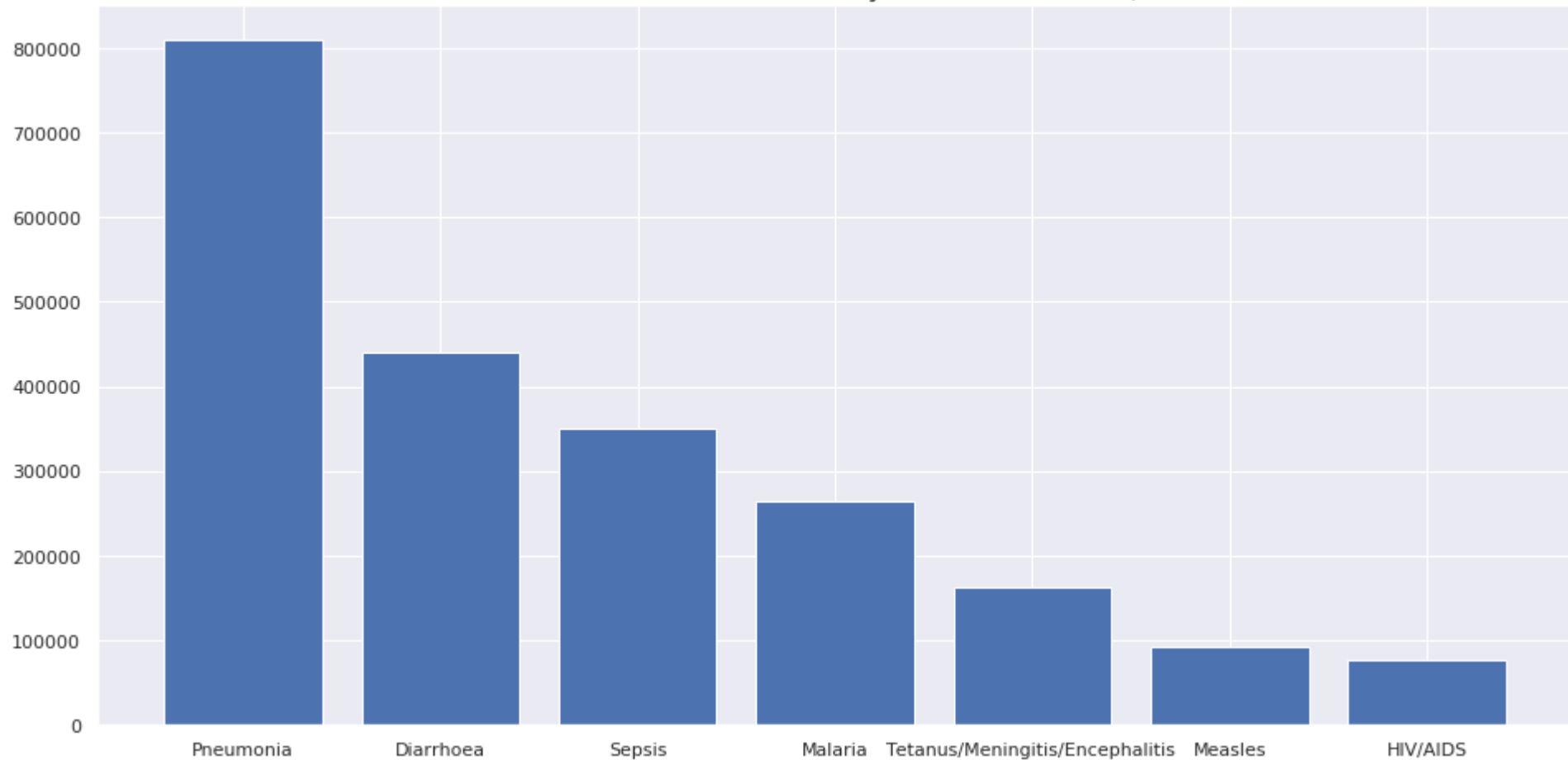


Identifying pneumonia disease on chest X-rays by image-based deep learning

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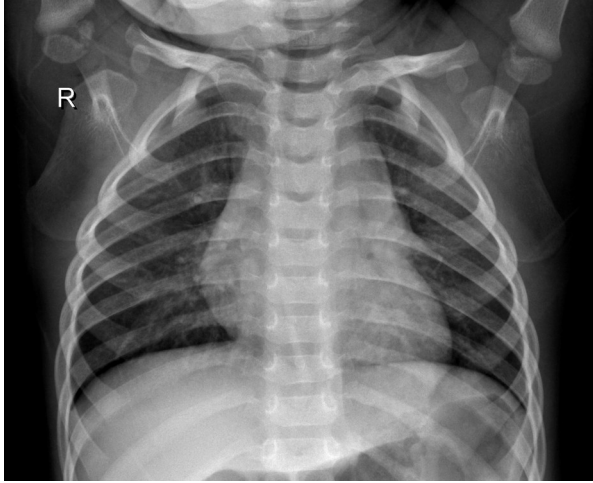
Deaths of children under five by infectious disease, 2017



Above barplot confirms that pneumonia is single leading cause of childhood mortality

Types of pneumonia

Normal



The normal chest X-ray shows clear lungs without abnormal opacification.

Bacterial



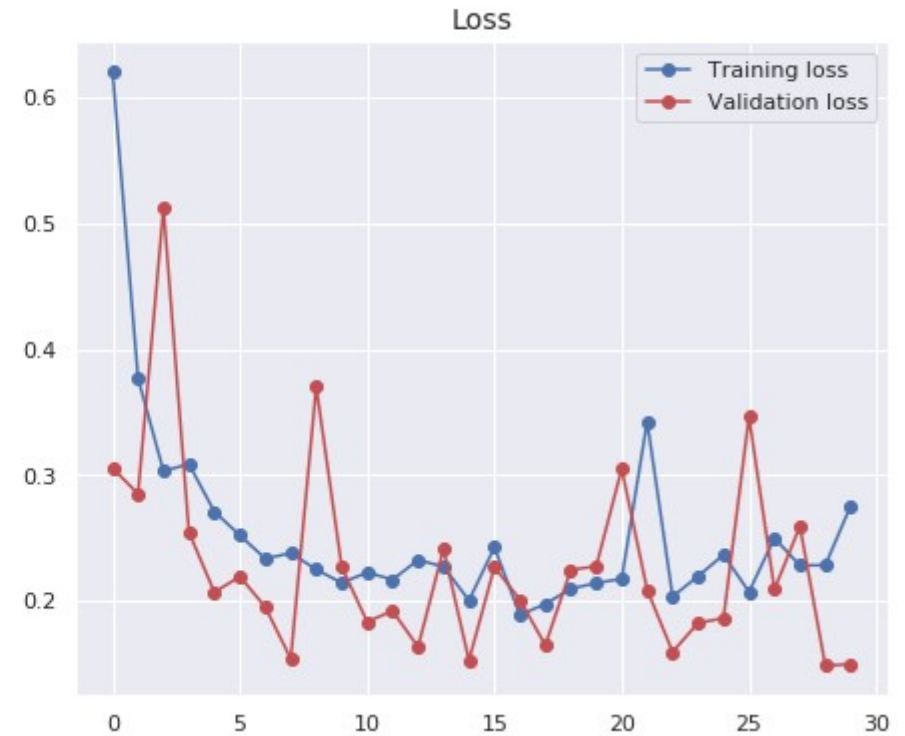
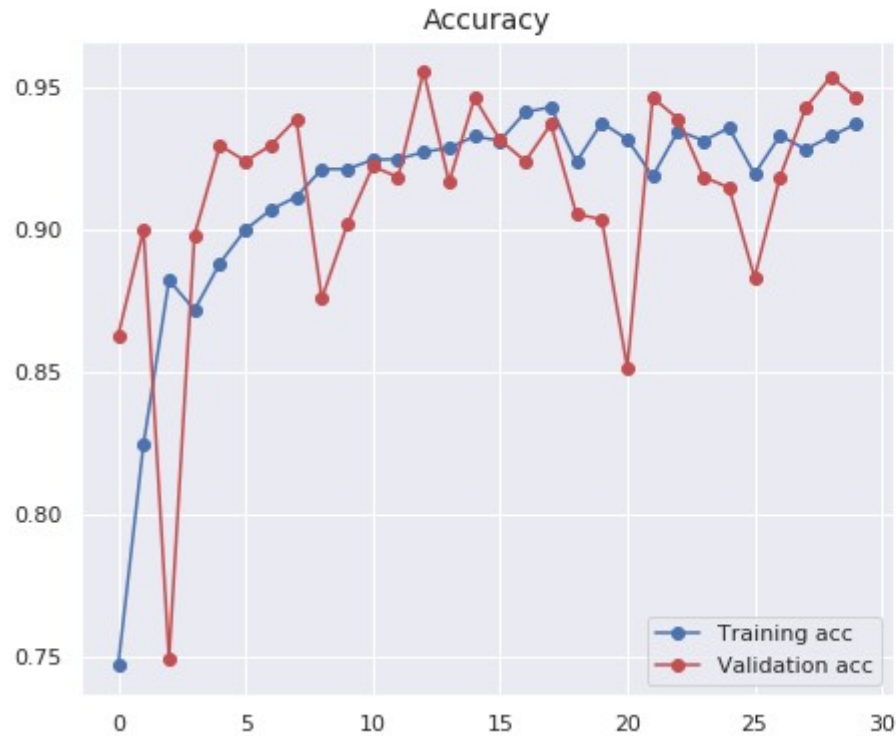
Bacterial pneumonia typically shows lobar consolidation.

Viral



Viral pneumonia looks like "interstitial" pattern in both lungs.

Training and validation

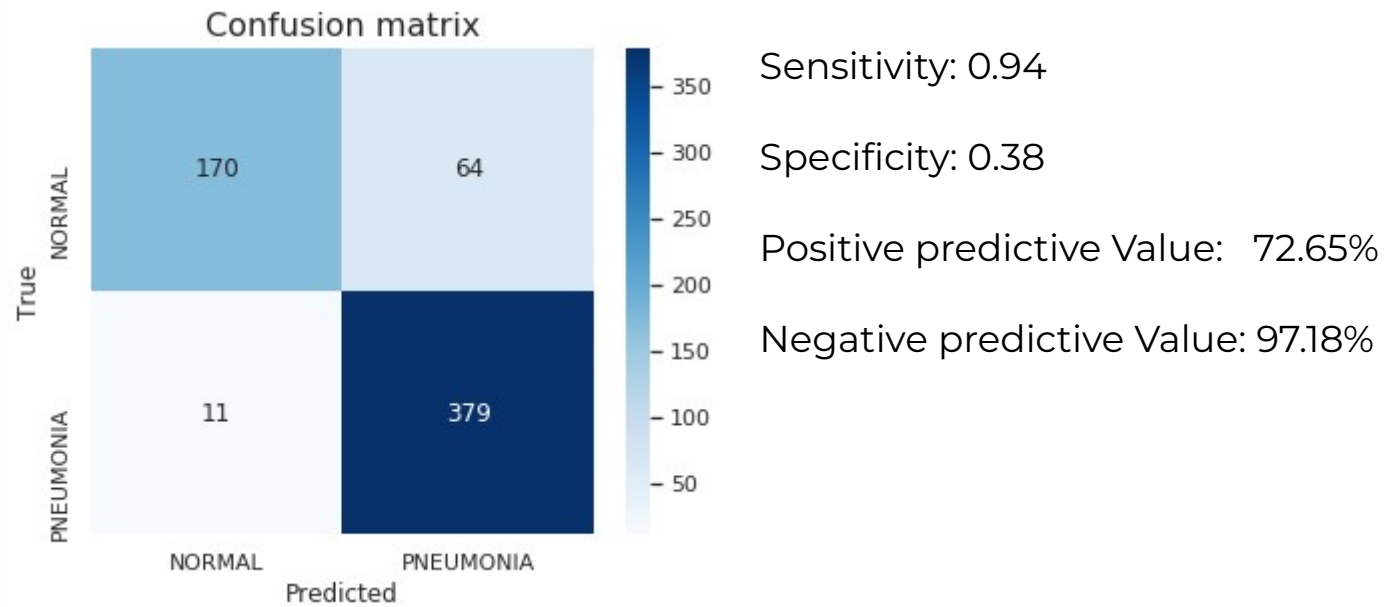


On test data the model shows next metric values:

Accuracy : 87.98%

Recall : 97.18%

False Negatives : 11.0



The **sensitivity** of a model is defined as the proportion of people with the disease who will have a positive result.

The **specificity** of a model is the proportion of people without the disease who will have a negative result.

The **positive predictive value** is the probability of patients who have a positive result actually having the disease.

The **negative predictive value** is the probability that people who get a negative result truly do not have the disease.

Conclusions:

Here, I establish a diagnostic deep-learning model for the screening of patients with pediatric pneumonia.

I utilized a transfer learning, which trains a neural network with a fraction of the data of conventional approaches.

Applying this approach to a dataset of chest X-rays images, I demonstrated applicability of this AI system for diagnosis of this kind of diseases.

This tool may ultimately aid in expediting the diagnosis and referral of these treatable conditions, thereby facilitating earlier treatment and resulting in improved clinical outcomes.

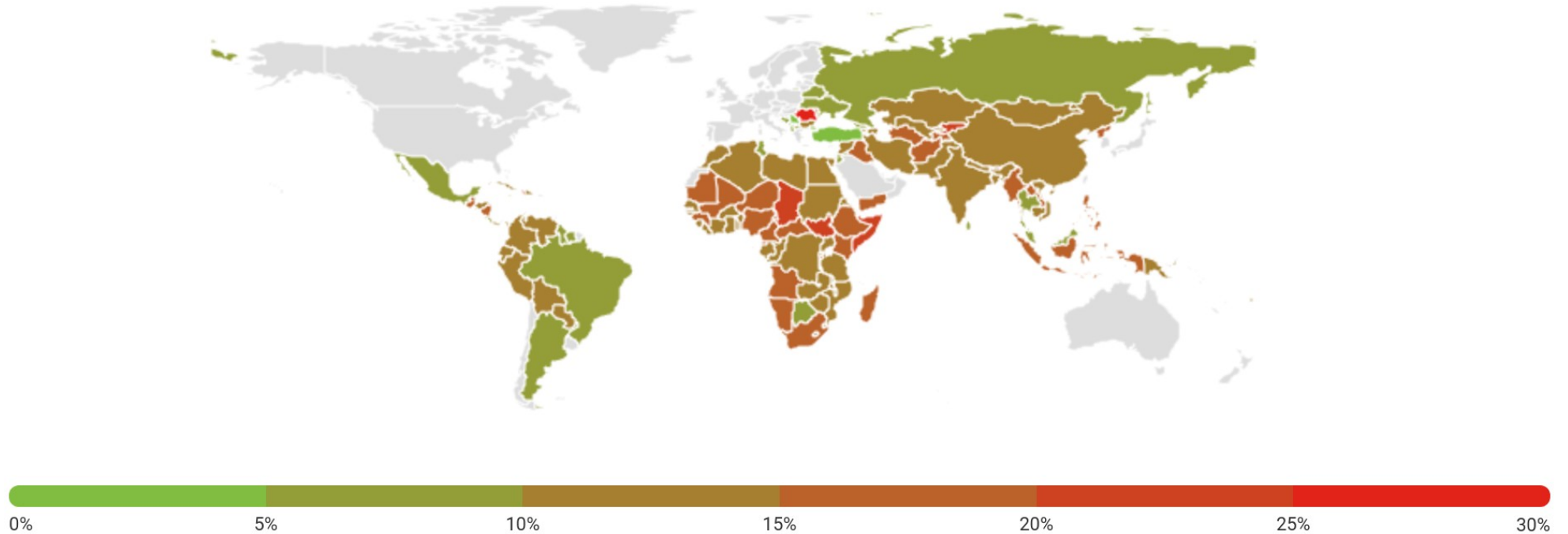
Future work:

In the future, this model can be trained more epochs to improve selected metrics.

It can be trained to differentiate bacterial and viral type of pneumonia.

Also this model can be tested on another medical imaging techniques (e.g., Optical coherence tomography, MRI, computed tomography) to make a clinical diagnostic decision.

Thank you!



Percentage of deaths caused by pneumonia in children under 5 years of age (2017)

Source: WHO Maternal Child Epidemiology Estimation (WHO-MCEE) 2018.