Image Classification using Neural Networks

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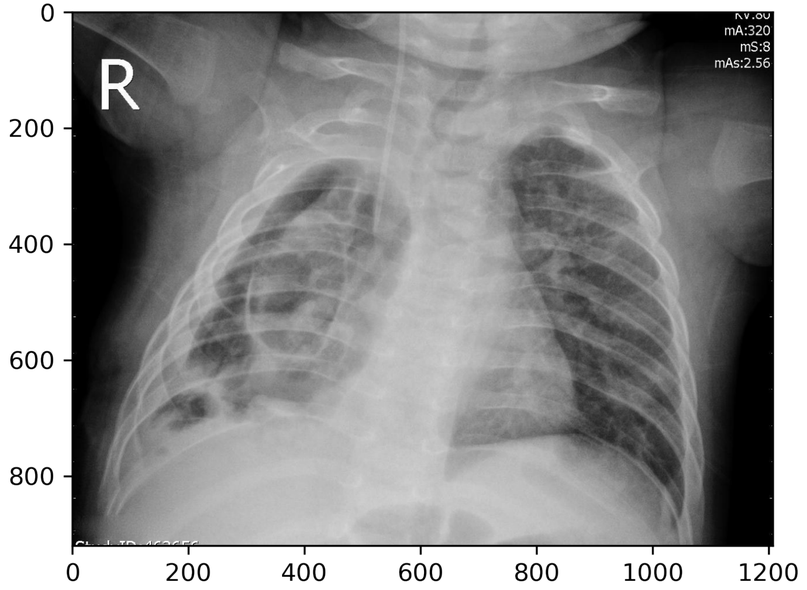
• Stakeholder:

- **Piedmont** Healthcare Group

We need a data scientist who can make job easier for our radiologists!

• Business Problem:

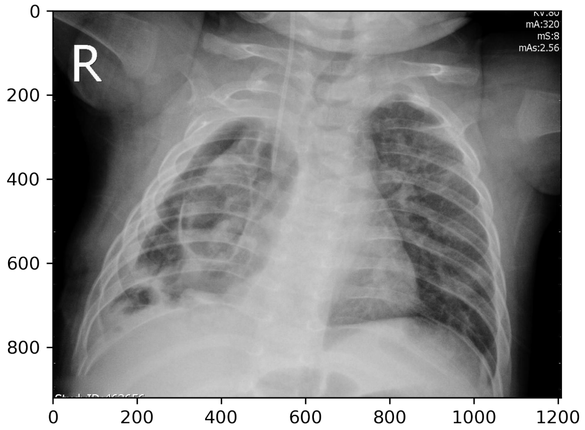
- Label **accurately** the chest X-rays as belonging to **pneumonia** or **normal**.



Data:

- Data is obtained from **Kaggle**
  - 5800 validated chest X-ray images (**normal** and **pneumonia**).

Goal:



- **Image classification neural network .**
  - **Maximizes** the **correct diagnosis** for pneumonia.
  - **Reduce** the **workload** of radiologists.
  - **Avoid any lag** in **treatment**, **patient care**
  - **Minimize** the **diagnosis time.**

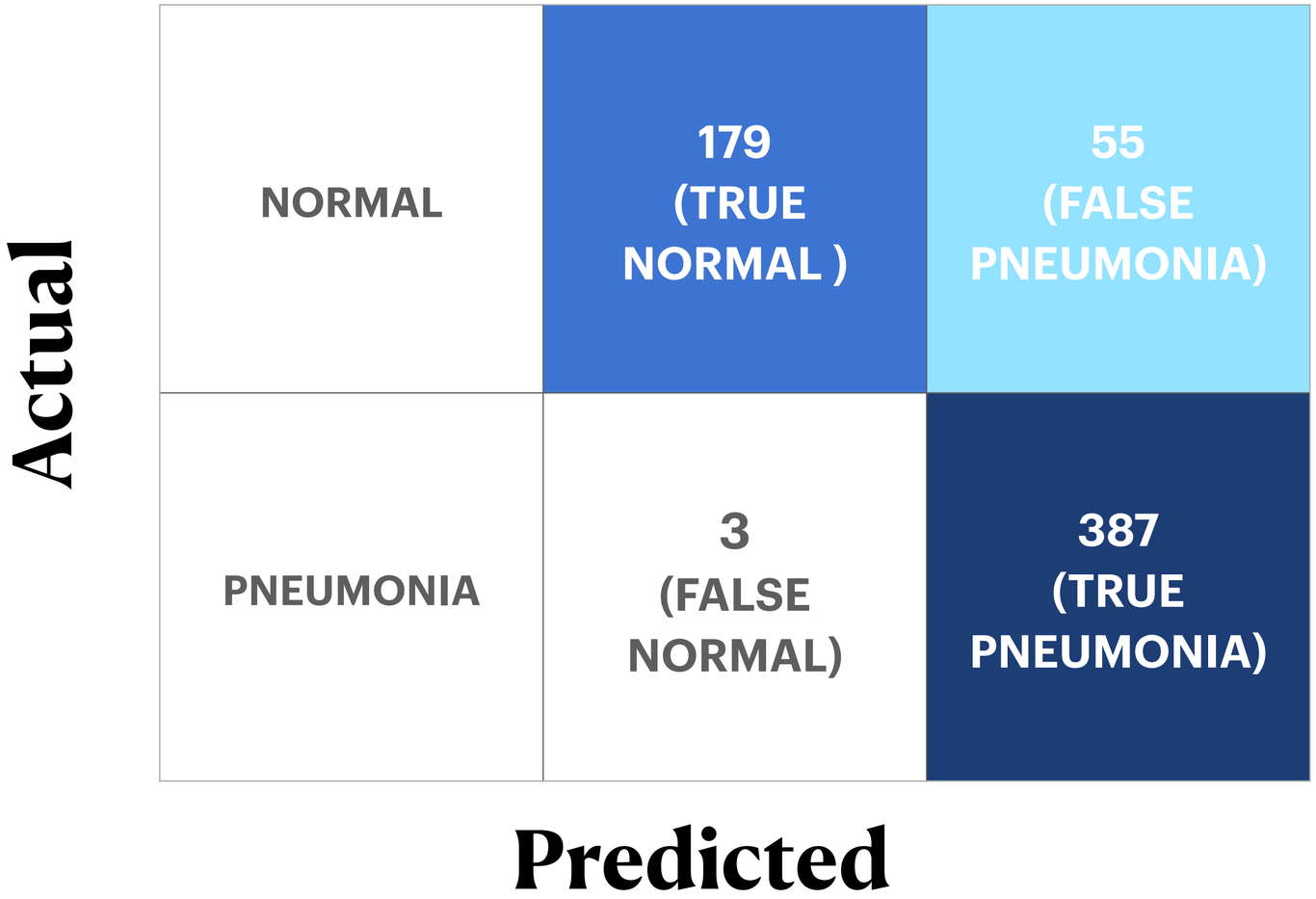
Results from the Best Model:

- RECALL:
  - **correct true predictions** for a given class
  - represents fraction of correctly labeled cases within a class.
  - the **higher the better**—-dont want pneumonia patients to go home without treatment!

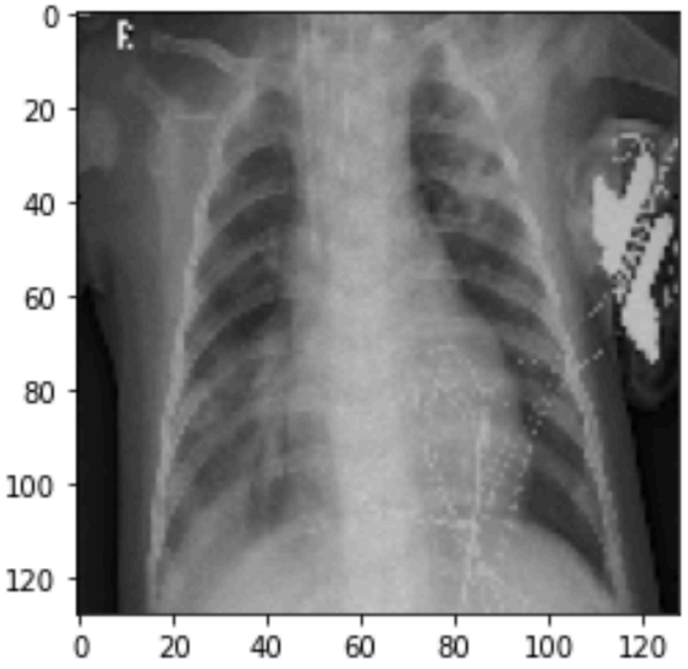
CNN Model with layers trained on augmented data

	Pneumonia	Normal
RECALL	**99%**	76%

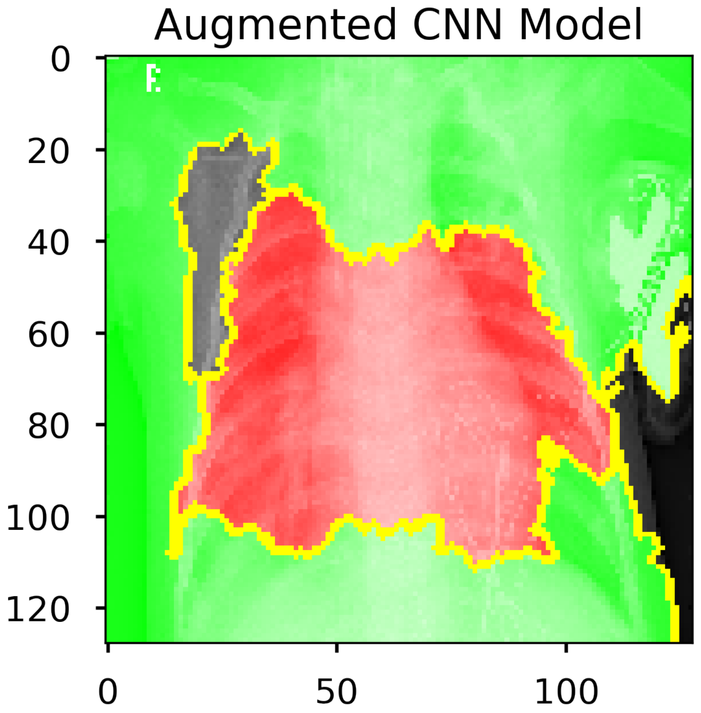
Only 3 out of 390 pneumonia cases are mis-labeled!



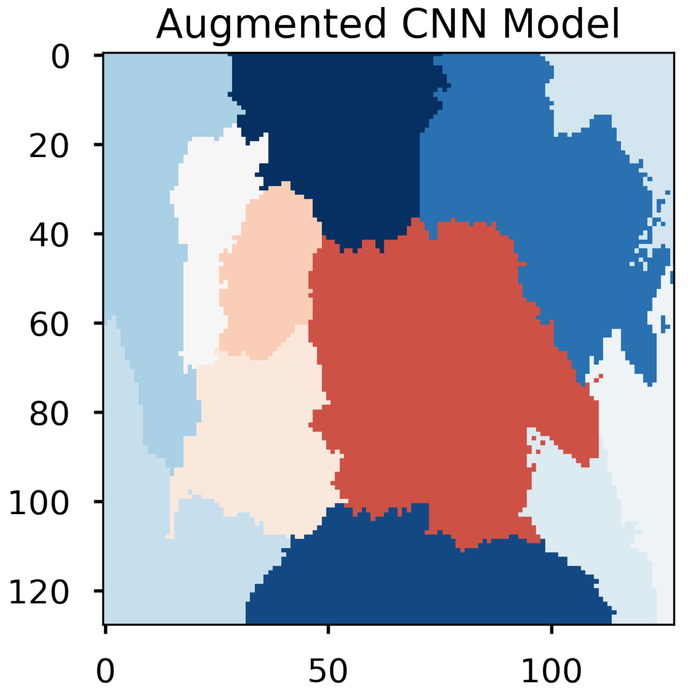
Example showing model work under the hood!



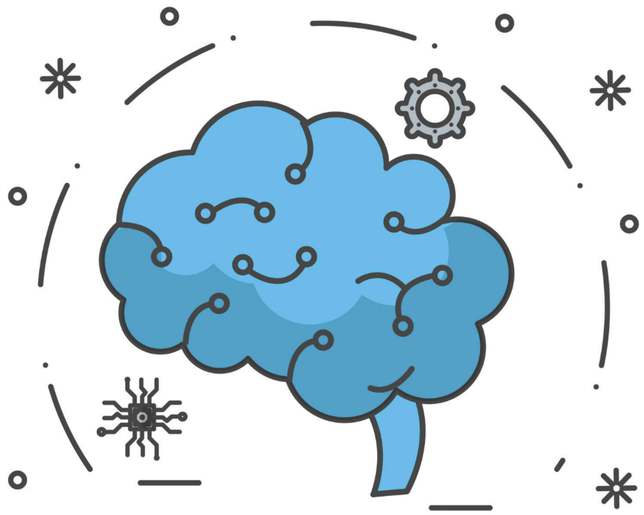
Original image



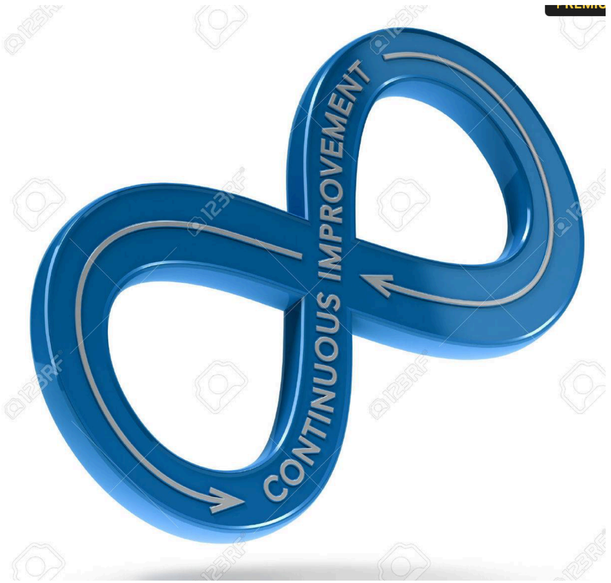
Mask Boundaries:
Towards (Green);
Against(Red)



Heatmap: the **more blue** it is, the higher the **positive impact**!



Recommendations



Recommendations

- **Neural nets** to classify X-ray images.
- **Faster diagnosis, early intervention**
- **Reduction** in **waiting times.**

Limitations:

- Implements **weights** in training to take into account **class imbalance.**
- **Muti-label classification** bacterial/viral/normal .
- **Crop images** to get rid of unnecessary details.

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