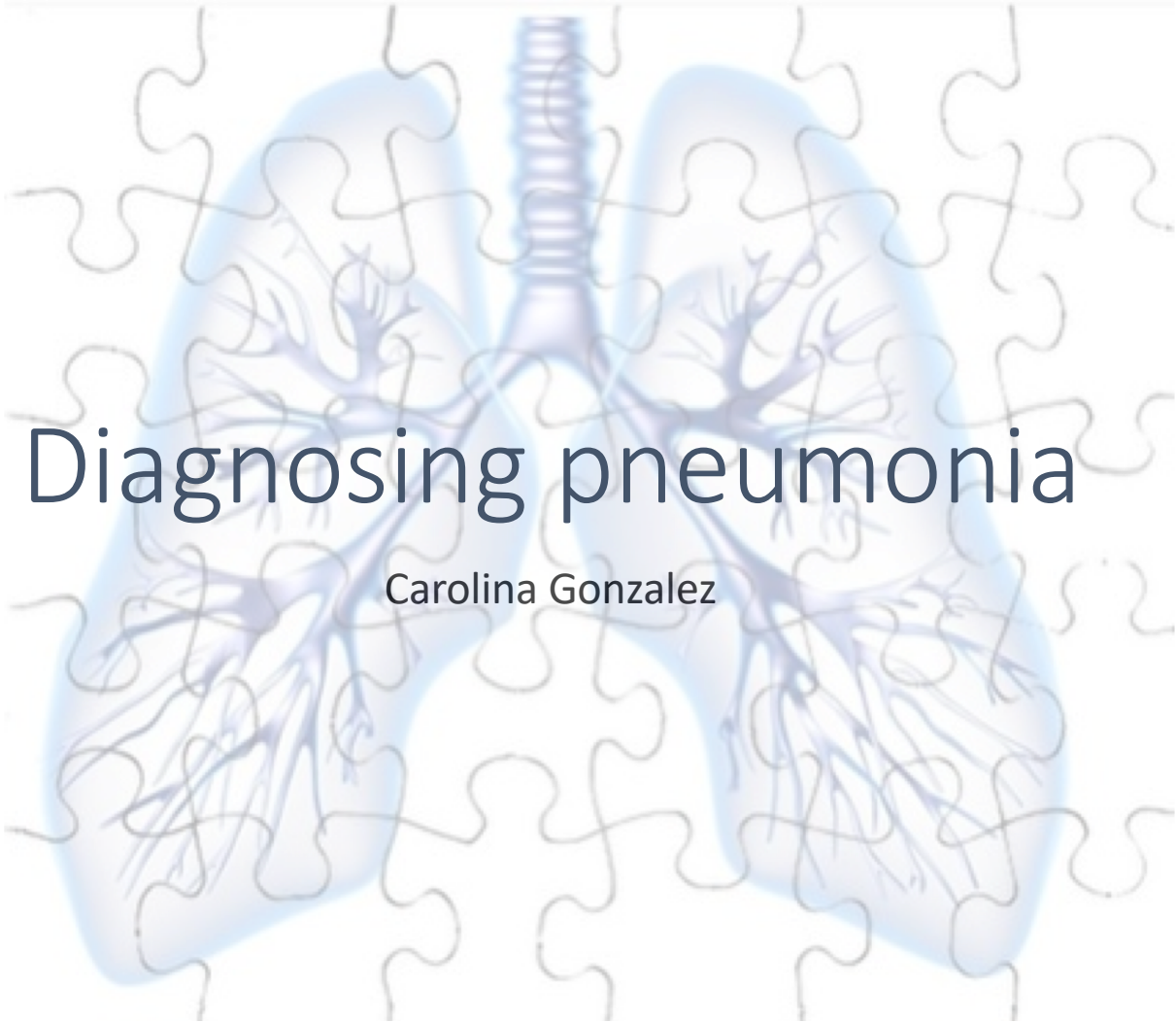
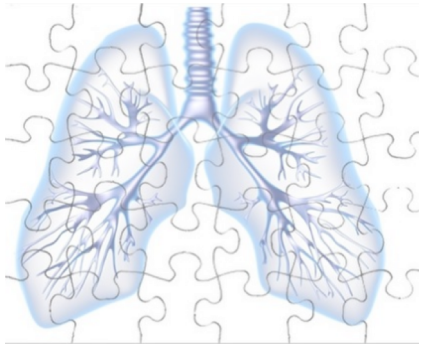


Diagnosing pneumonia

Carolina Gonzalez

Business case

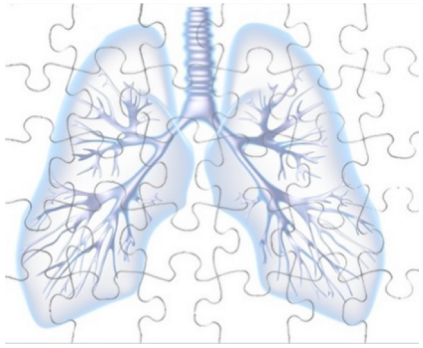
- World's leading cause of death for children under 5 y/o.
- Top ten most expensive conditions for inpatient hospitalizations.
- Chest X-rays are the most common imaging tool.
- There is a shortage of X-rays experts



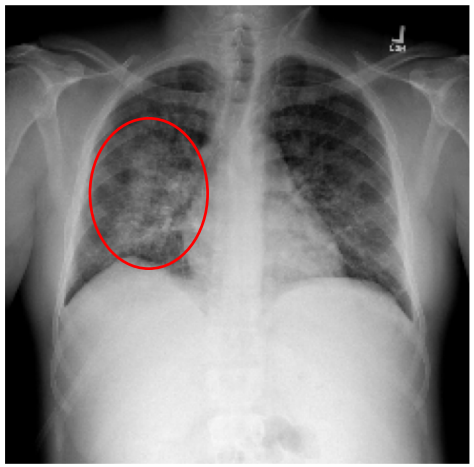
Diagnosing process

Symptoms

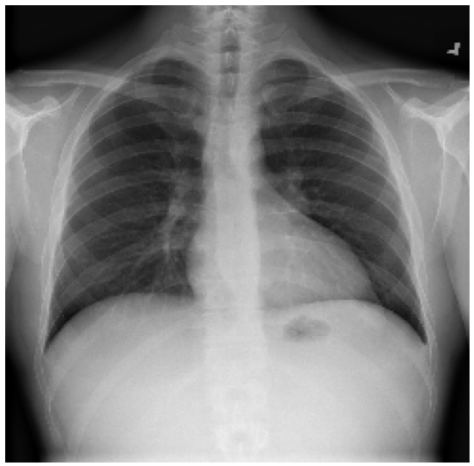
X-Rays



Data

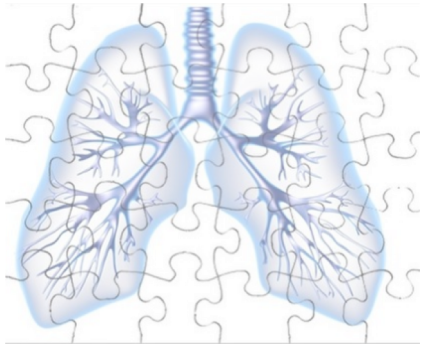


Pneumonia

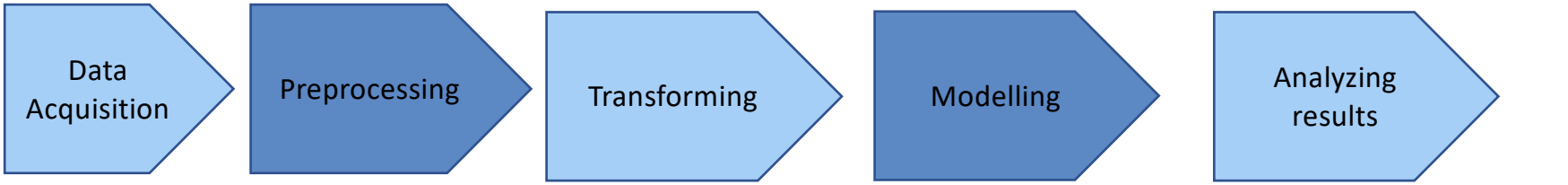


No Pneumonia

- 25000+ X-rays:
  - 78% No pneumonia
  - 22% Pneumonia



Workflow and tools



python

pandas

$y_{it} = \beta' x_{it} + \mu_i + \epsilon_{it}$

matplotlib

SPYDER

amazon web services™

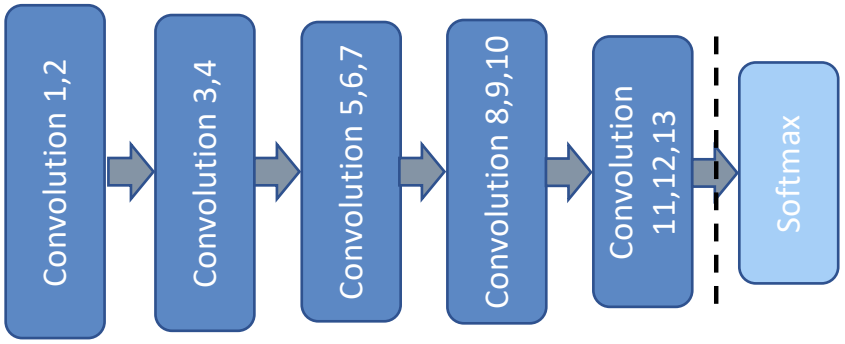
K + TensorFlow

scikit learn

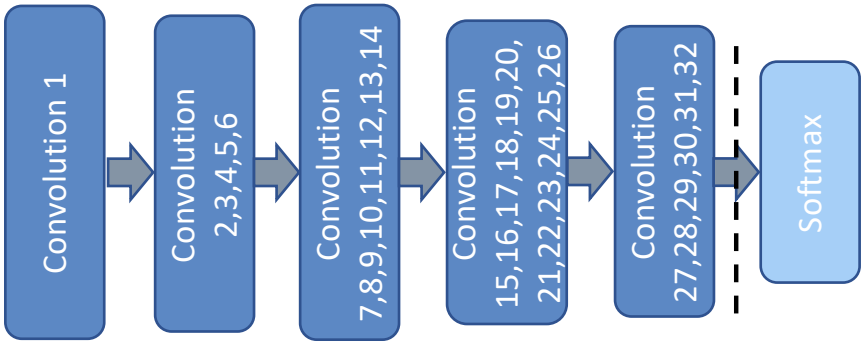
HDF5 for Python

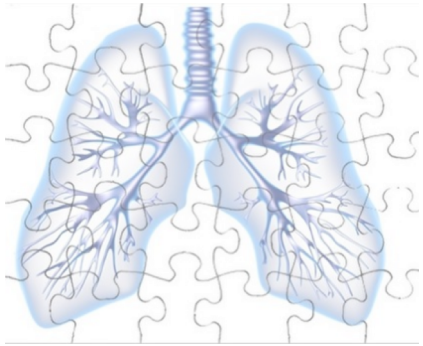
Transfer learning architectures

VGG16

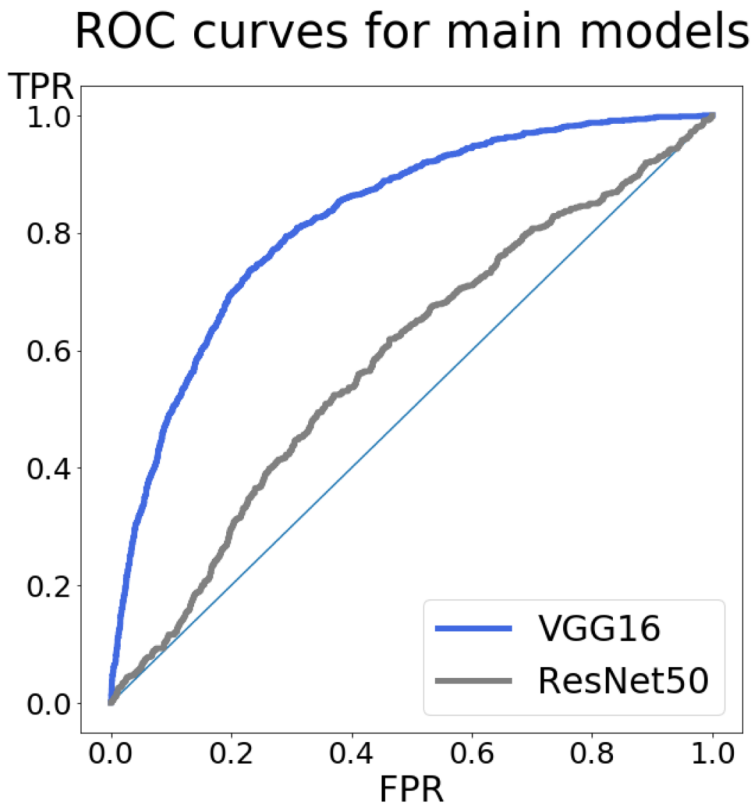


ResNet50

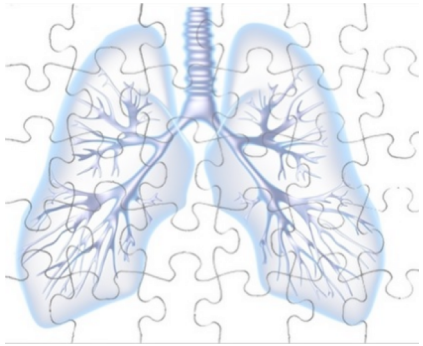




Model: neural networks transfer learning



Modified VGG16 was selected based on ROC AUC

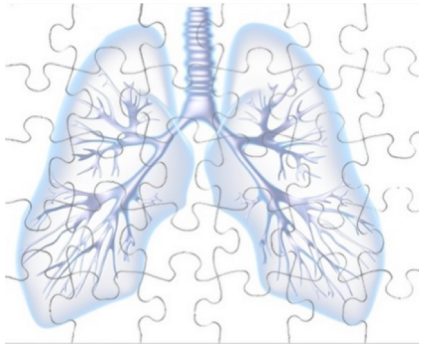


Evaluation of performance

CheXNet: Radiologist-Level Pneumonia Detection on Chest X-Rays with Deep Learning

Pranav Rajpurkar [*1] Jeremy Irvin [*1] Kaylie Zhu [1] Brandon Yang [1] Hershel Mehta [1]
Tony Duan [1] Daisy Ding [1] Aarti Bagul [1] Robyn L. Ball [2] Curtis Langlotz [3] Katie Shpanskaya [3]
Matthew P. Lungren [3] Andrew Y. Ng [1]

Reviewer	F1 Score
Radiologist 1	0.383
Radiologist 2	0.356
Radiologist 3	0.365
Radiologist 4	0.442
Radiologist avg.	0.387
Model	0.573



Ref: Rajpurkar, Pranav, et al. "Chexnet: Radiologist-level pneumonia detection on chest x-rays with deep learning." *arXiv preprint arXiv:1711.05225* (2017).

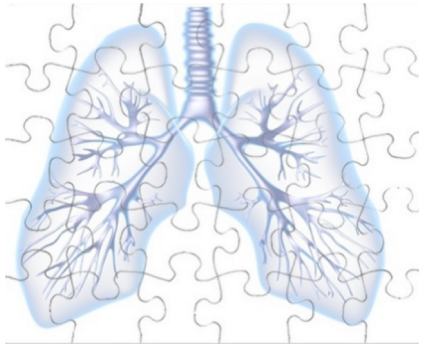
Conclusions

- The model diagnosed pneumonia based on chest X-rays.

- It showed an improvement over radiologists performance.

Future work:

- Inclusion of metadata for pneumonia diagnosis.



Thank you

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