INTERNET ENGINEERING

Master Thesis Seminar

Kamil Nawrot
235737

Agenda

- Problem Definition

- Goals

- State of the Art

- Solution Proposal
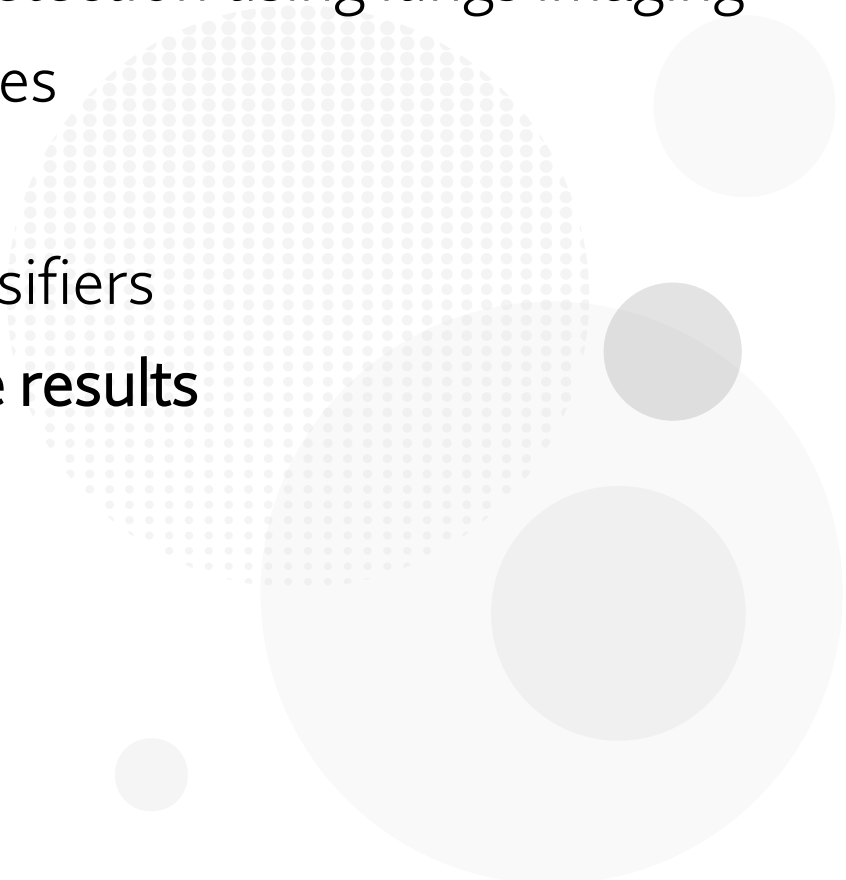
- Assumptions

- References

THESIS TOPIC

Softcomputing Methods for COVID-19 Classification Based on Lung Imaging

*under the guidance of **Jacek Mazurkiewicz**, PhD*

Goals

- To **gain theoretical knowledge** on COVID-19 detection using lungs imaging
- To **build and preprocess dataset** of X-Ray images
- To select and **implement classifiers**
- To **conduct learning procedure** on created classifiers
- To **compare different approaches** and **evaluate results**

State of the Art

- new problem, hence no well-tested solutions

- very rapid changes

- most common solution – convolutional neural network

- ~95% accuracy in the best binary classifiers

Chest X-Ray Images

CXR images were decided to be used in project because:
- they can be easily obtained in large amount
- they are commonly used in similar applications
- they may cause problems that could be eliminated

Selected Methods

– Convolutional Neural Network

   - the most common approach

   - utilizing deep learning techniques

– Fuzzy Classifier (?)

   - rarely described in literature

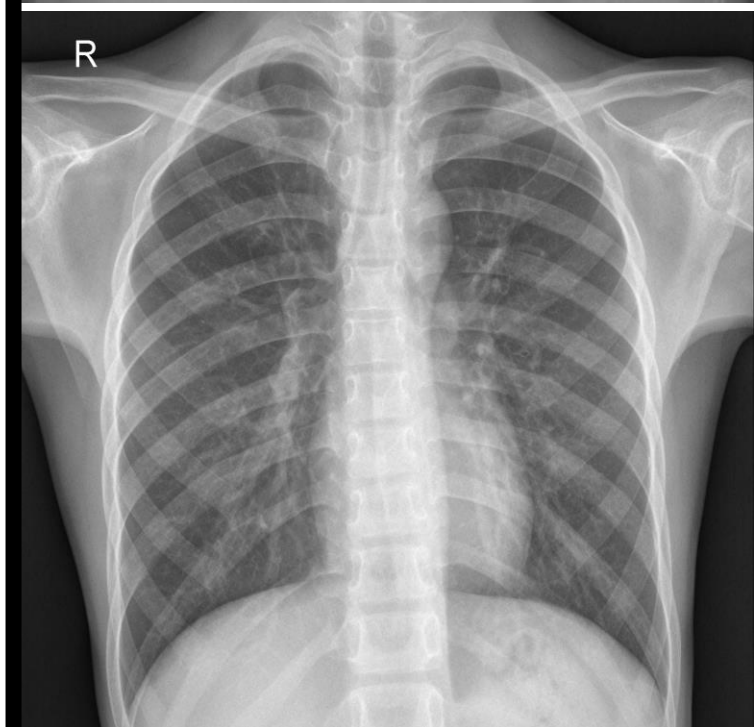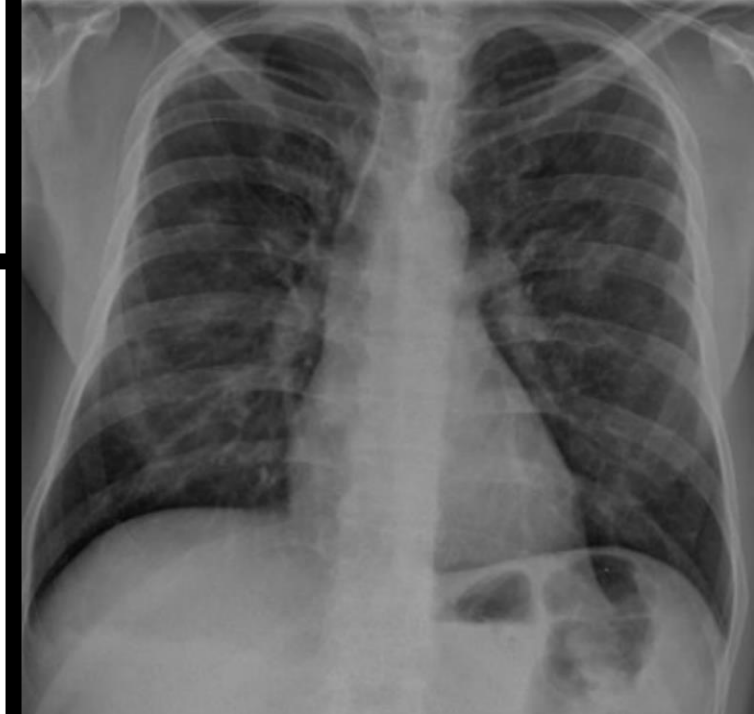   - may generate interesting results

Dataset

Around **27.000** of X-Ray images, taken from **three independent sources**, divided into **four categories**:

NORMAL	COVID-19	PNEUMONIA	LUNGS OPACITY

Software & Tools

Python 3.8   +   TensorFlow 2   +   Pillow

Resources

Kobashi, S., Nyul L., Udupa, J., **Soft Computing in Medical Image Processing**, Computational and Mathematical Methods in Medicine, (2016).

Tsiknakis, N., Trivizakis, E., Vassalou, E. E., Papadakis, G. Z., Spandidos, D. A., Tsatsakis, A., Sánchez-García, J., López-González, R., Papanikolaou, N., Karantanas, A. H., Marias, K. **Interpretable artificial intelligence framework for COVID-19 screening on chest X-rays**, Experimental and Therapeutic Medicine 20.2 (2020): 727-735.

Abbas, A., Abdelsamea, M.M. & Gaber, M.M. **Classification of COVID-19 in chest X-ray images using DeTraC deep convolutional neural network**. *Appl Intell* **51,** 854–864 (2021).

López-Cabrera, J.D., Orozco-Morales, R., Portal-Diaz, J.A. *et al.* **Current limitations to identify COVID-19 using artificial intelligence with chest X-ray imaging**. *Health Technol.* **11,** 411–424 (2021).

Thank you for attention!