Case 2. Pneumonia X-ray image analysis

Neural Networks for Health Technology Applications, Spring 2020

Type
Team work, 25-40 hours

Aim
The aim of this assignment is to learn to use convolutional neural networks to classify medical images.

Task
Your task is to use convolutional neural networks to create a binary classifier for x-ray chest images.

Download and extract the dataset from: https://data.mendeley.com/datasets/rscbjbr9sj/2 .

Use tensorflow.keras.metrics.SensitivityAtSpecificity as the metrics to evaluate your results. The desired specificity level should be at least 90 % (0.90). Create at least 3 different CNN models and compare their results. Calculate also the classification reports and confusion matrices for the outcomes. Select your best model and give reasons for your selection.

You may study others author's solutions, but make your own experiments and versions in your Notebooks. Remember to give credits to those authors from you have gained inspiration.

Return
Save your results (three models) to your GitHub folder and provide a link to your Notebook(s) in OMA. Use OMA's hyperlink tools for providing the links.

Evaluation
The following categories are used for evaluation:
- Organisation
    - The code is sequential and the code cells (parts of scripts) are in right order
    - The document follows a clear structure
- Clarity
    - The document (and embedded code) is clear, polished, and easy to understand
    - The code follows good coding practices and contains sufficient comments
    - The document parts support the code
- Contents
    - The background and data preprocessing are well explained
    - The models are validated
    - The results are reasonable

o   The conclusions are clearly stated and in a line with the results

max. 20 points. Late submission reduces the maximum achievable points.

Materials

- [Loading from external datasets](#)
- [Imageio usage examples](#)
- [Introduction to convnets](#)
- [Using convnets with small datasets](#)
- [Guide to sequential model](#)
- [Convolutional layers](#)