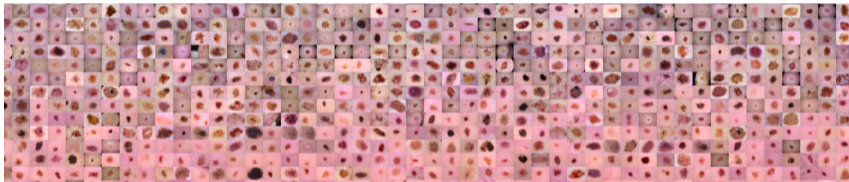


Project Proposals

Computer Vision and Deep Learning 2023/24

Skin Cancer Classification

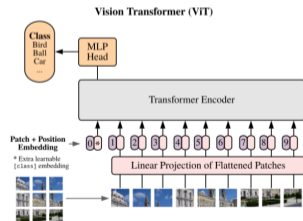
- ▶ Classify different types of skin cancer based on dermoscopic images
- ▶ You can use the [HAM10000](#) dataset for training which contains images of lesions corresponding to seven different diseases



- ▶ The dataset was part of a now closed [computer vision challenge](#) for lesion analysis
- ▶ You can access the [manuscripts of the competitors](#) to draw inspiration from their solutions

Skin Cancer Classification

- ▶ The task would be to investigate the dataset, read about previous work, develop and implement your own solution, and present your results
 - ▶ Your solution should not merely reproduce an existing solution, but it can build on what has been done so far
 - ▶ For example, you could approach the problem using novel architectures like vision transformers, as introduced in the lecture
- ▶ Grading will not be based on the accuracy of your prototype, but rather on the quality and quantity of your efforts



Pneumonia Detection

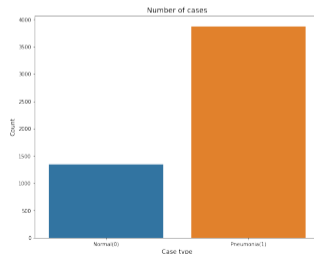
- ▶ Detect pneumonia based on chest X-ray images
- ▶ You can use the [Chest X-Ray Images for Pneumonia](#) dataset for training a binary classifier to tell apart normal from pathological cases



- ▶ Again there is some [previous work](#) available in form of notebooks that you can use to draw inspiration from when approaching the problem
- ▶ Particular challenge is that the dataset is rather small and imbalanced

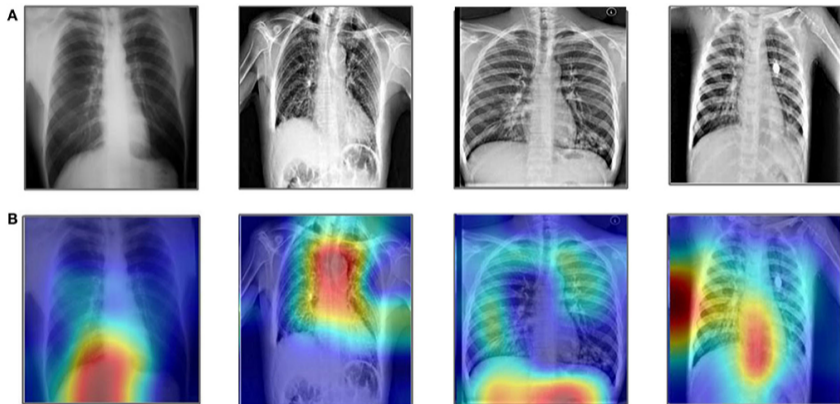
Pneumonia Detection

- ▶ The task would be to similar to the previous project, but with more emphasis on dealing with the problem of small and inbalanced data
 - ▶ You could use [this article](#) as a gentle introduction to the problem and as starting point for further exploration
 - ▶ In particular you can experiment with different data augmentation techniques and with the application of transfer learning
- ▶ Grading will again not be based on the accuracy of your prototype, but rather on the quality and quantity of your efforts
- ▶ You should show that you understand the problem and common approaches to deal with it



Network Visualization

- Analyse networks pretrained on medical image classification.



Network Visualization

- ▶ Task would be to use investigate a network pretrained for medical image classification using different approaches
 - ▶ Project can involve techniques introduced in the lecture as well as other approaches, like [Grad-CAM](#) for example
 - ▶ Goal is to present different visualizations that shed some light on how network predictions are related to input features
- ▶ You could use the [TorchXRyVision](#) library which is based on PyTorch and provides datasets and pretrained models



Presentation and Report

- ▶ Projects should be worked on in groups of 4 to 6 students
- ▶ Presentation
 - ▶ In the end of the semester you should present the results of your project work
 - ▶ Duration of the presentation should be 20 minutes
 - ▶ Presentations are scheduled for Tuesday, 13th of February, 6 pm
- ▶ Report
 - ▶ Besides the presentation, you should submit a written report
 - ▶ The report should have at least 5 pages excluding figures, tables, and references
 - ▶ Only one report per project is required