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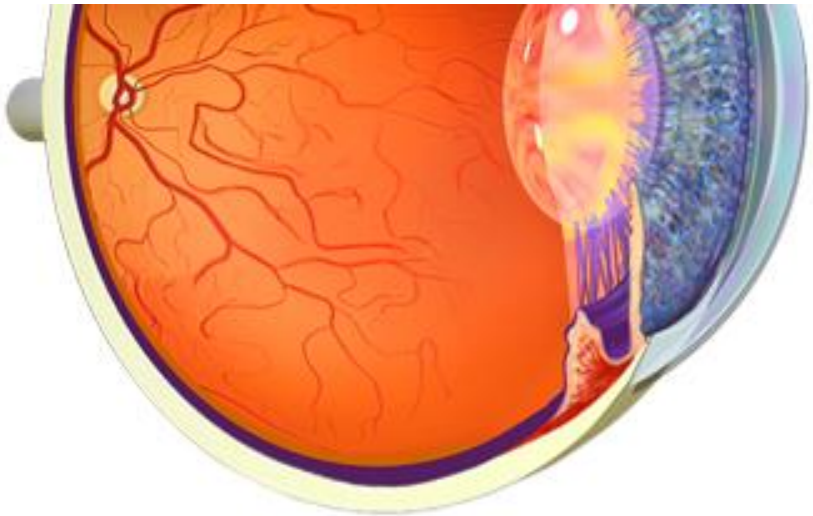

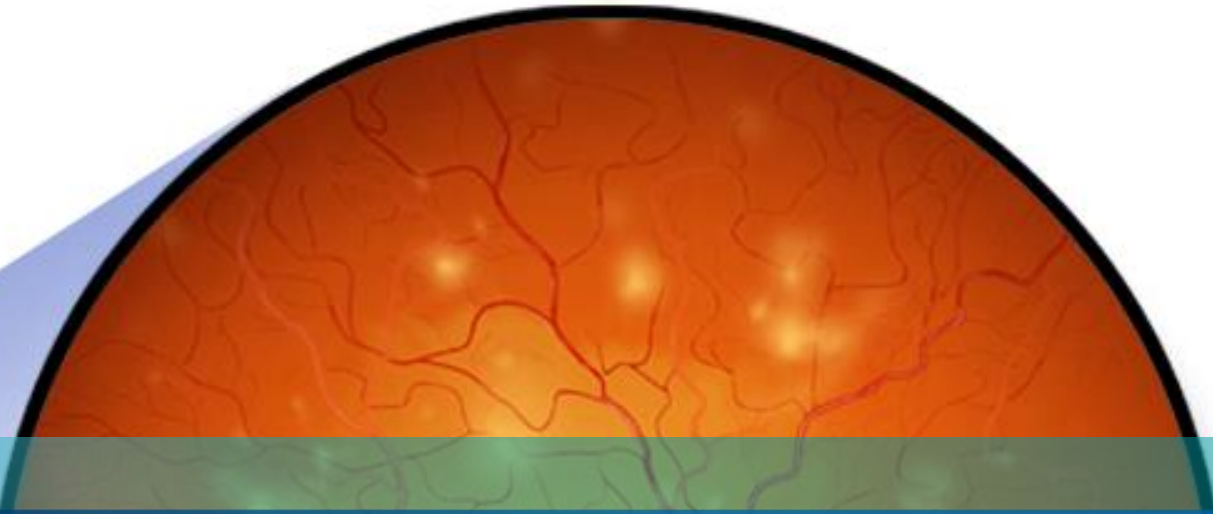

› PROJECT 1:DIABETIC RETINOPATHY CLASSIFICATION

Advanced Approaches for AI-Based Image Processing

Prof. Alexander Windberger - IT Faculty – MIM / SEM - WS 2023/24

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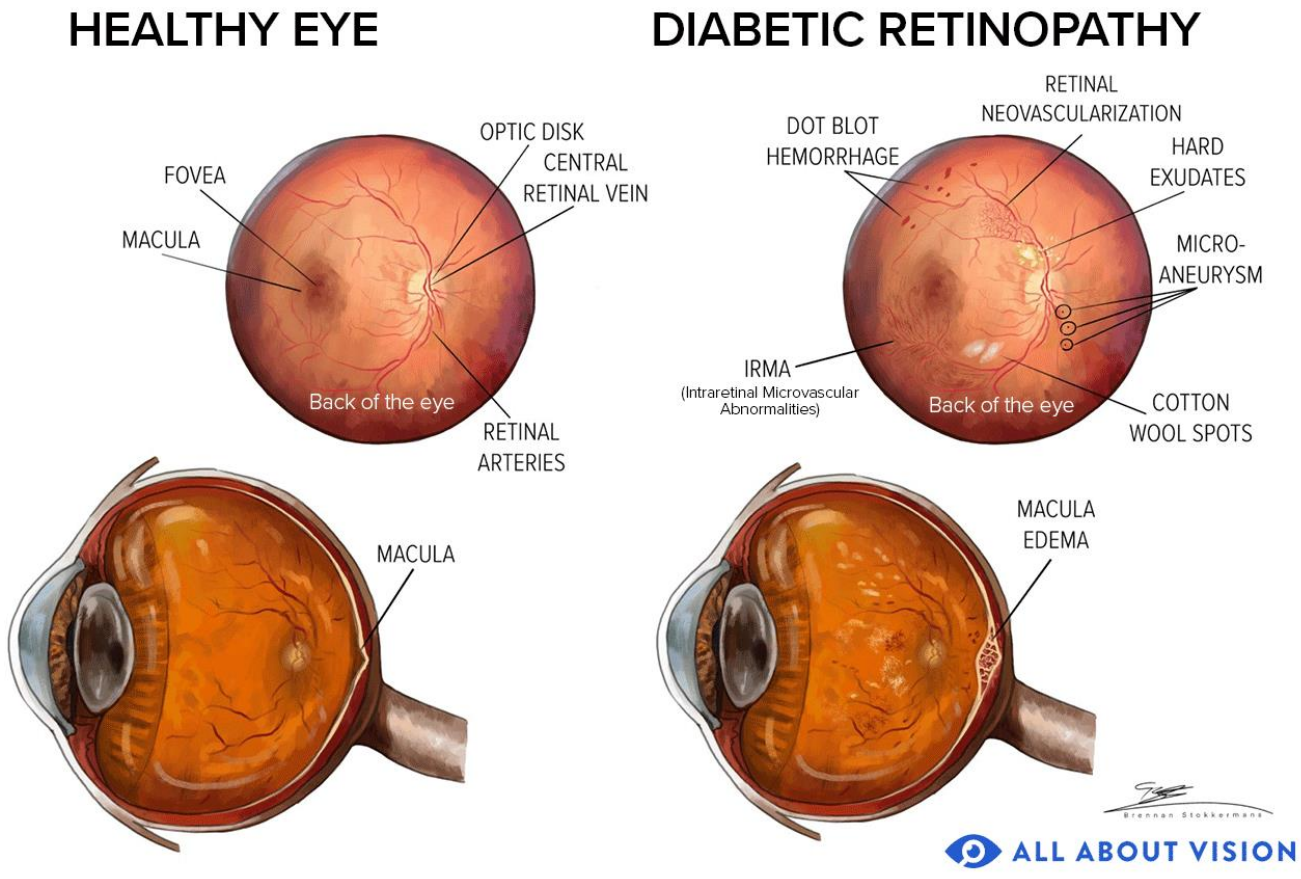
DIABETIC RETINOPATHY



https://www.allaboutvision.com/conditions/diabetic.htm

https://en.wikipedia.org/wiki/Diabetic_retinopathy

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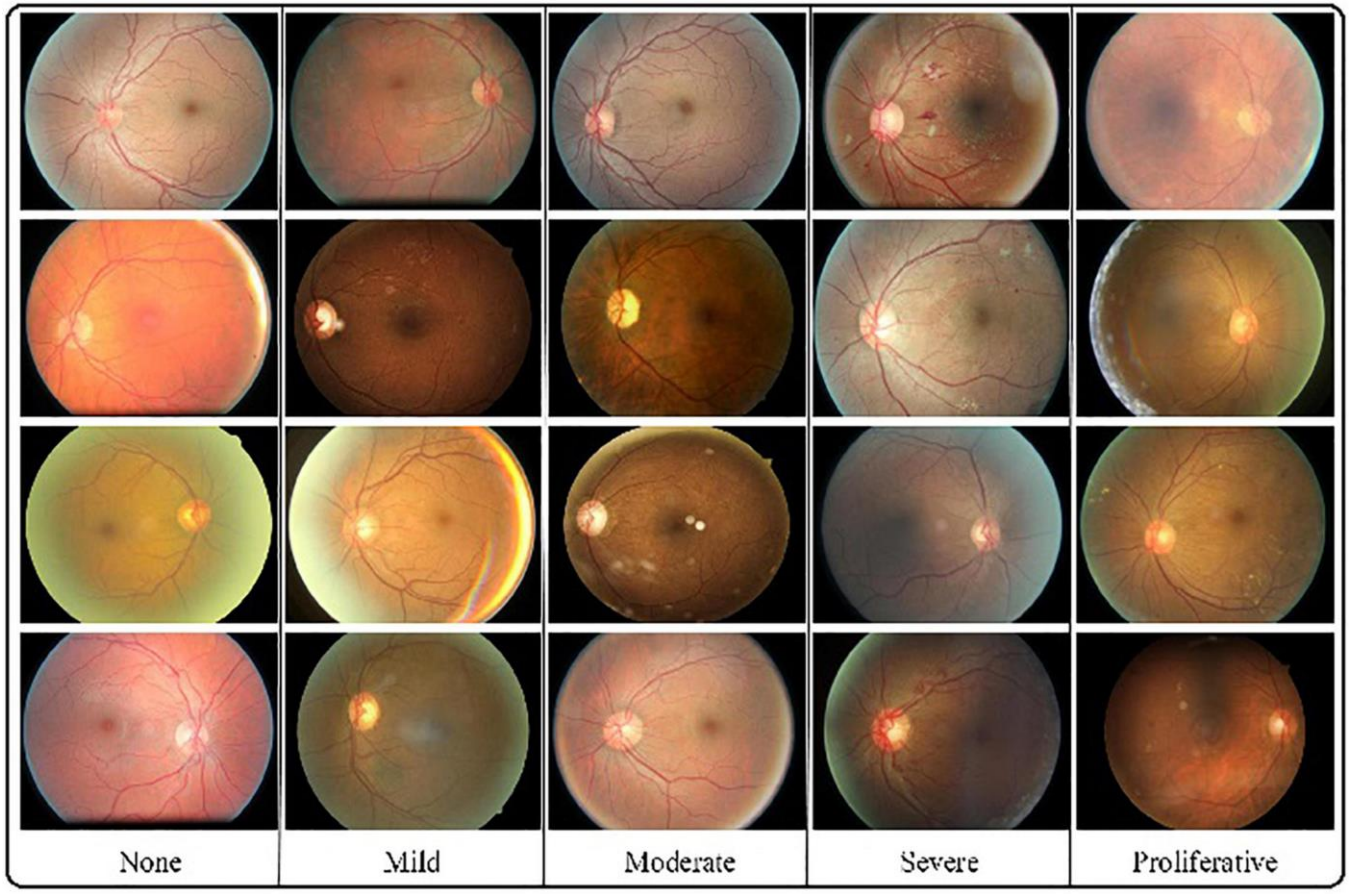
THE DATA



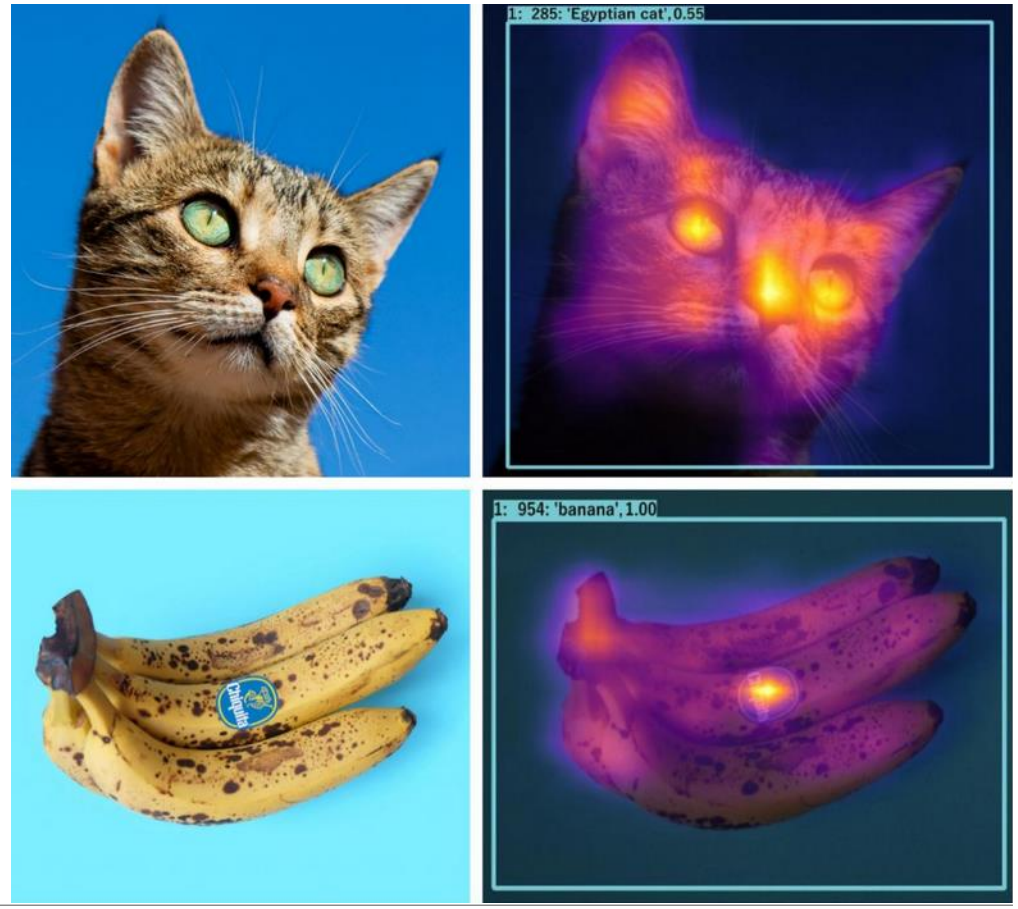
https://www.frontiersin.org/articles/10.3389/fmed.2022.872214/full

DEAL WITH LITTLE DATA

- Only a few hundred Images available for training
- Use Data Augmentation, Transfer Learning, Big-Transfer…

EXPLAINING AI DECISIONS

- Build trust in your solution by making your model‘s decisions explainable
- E.g. Attention Maps, Self-Attention



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THE TASK

- Train a classifier to distinguish between the different stages of Diabetic Retinopathy
- You will be equipped with a data set: https://bwsyncandshare.kit.edu/s/wkaHiAFaMacMMct (PSWRD: Diabetic_Retinopathy)
- You will get access to a GitLab repository
- **Do not add binaries or image data to the repository**
- You can use any Python library for this task as well as Open Source code (as long as the license allows it and you cite it!)

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THE TASK

- Implement your training and evaluation classes and methods in python source code within your repository
- Additionally, you need to hand in one or max. two **filled-in** Jupyter notebooks to document and demonstrate your results. The notebook must contain
  - The data and model preparation (including **image augmentation**). Train and evaluate at least **two different model architectures, one CNN, one Transformer,** for the task. Motivate your model choice.
  - The training including relevant metrics as losses and accuracies (**also as plot**). Implement at least **one technique to deal with little data**. Motivate your choice. Optimize hyperparameters to get the best out of your training.
  - Evaluate your models on a **separate test set**, including accuracies, a **confusion matrix**, and the average inference time on your platform. Which model works better? Show **five examples of miss-classifed images** and discuss possible reasons.
  - Use an **attention map technique** to explain your models decision using five example images. Discuss whether the model focuses on the right features
- **Keep your trained model locally** in case I need to reproduce your results
- It doesn‘t matter how big your model is. It can be interesting to try a smaller architecture and see how well it does

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THE TASK

- Due date is **17.11.23**
- You can receive 10 Points for this task
  - 7 points for a **complete and functional** submission
  - 3 points for **presentation, style, and creativity**

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OUTLOOK: SECOND PROJECT (DETAILS WILL FOLLOW)

- Each group can choose a topic proposed by me
- Or come up with an own request (needs to be approved by my)
- Work on an Idea developed during the Hackathon

  https://mmmake.com/de/event/heilbronn-future-city/

- Goal:
  - Provide a coding tutorial on the topic for your peers
  - Present the your tutorial in the course
  - Prepare demonstrate your code live in class