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Intelligent Systems in Medicine
Winter term 2020/21

Project description: skin lesion classification

Melanoma is the deadliest form of skin cancer but curable if detected in an early stage. Dermoscopic images can help improve the diagnosis of skin lesions. The ISIC challenge SSkin Lesion Analysis Towards Melanoma Detection"deals with automated classification of skin lesion images to improve algorithms and cancer detection.

The task: Your task is the classification of skin lesion images. A file with the split between training and validation data will be uploaded, as well as a link to the training images. DO NOT use validation data for training. Your algorithms and networks should be able to predict the class based on an input image. Feel free to use the ISIC data provided for segmentation tasks from previous years. The data comes with a few challenges that you need to figure out.

What to solve:

- Perform skin lesion classification with classical feature extraction
- Perform skin lesion classification with neural networks

In phase 1 you will implement feature extraction methods to solve the classification tasks, in phase 2 the tasks should be tackled with neural networks. Each phase has a deadline (see schedule). Additionally, it will be necessary to apply different preprocessing methods to improve the images.

Project groups: Each project group should be formed by four students. You can register for the groups in the Stud.IP course "Project Seminar: Intelligent Systems in Medicine" as of the 5th of November, 6 pm. The deadline for the project group registration is the 11th of November, 11 pm. There is no fixed time where you have to work on the project.

Time schedule: After the project group registration and introduction you need to set up a time schedule with your group. The deadline is the 25th of November. This should contain an overview about the different tasks assigned to the group members. An example will be given in the first exercise.

Feedback: You will have to give intermediate updates on your progress (Feedback 1-4). This should be based on the tasks assigned in the time schedule. Please use this to recapitulate your work as a team and address any issues. The timely submission of the time schedule and the feedback will be considered for the allocation of bonus points.

Submission: You will submit your results via our online submission system. The format of your submission should match that of the groundtruth-data file. We will evaluate your results and add them to a winner board, so you can compare your performance with the other groups. The link to the submission system will be provided after the project start.

Computational Ressources: Please use

- Google Colab (https://colab.research.google.com/notebooks/welcome.ipynb)
- Ressources from the Computer Center ("Rechenzentrum")

Presentation: The presentations are scheduled for the 26th of January and will be followed by the release of the winner board. Every group has to prepare a presentation explaining their methods and results. The presentation should be around 12 minutes and each student has to participate. Afterwards, we will take a look at your code.

Paper: The deadline for the paper is the 28th of February. A template will be provided and should be used. As bonus points will be distributed individually, please indicate the operating expenses of each student. Your paper should contain 8 to 12 references and have 4 pages.