Software related to the publication "EarlyAMDRate -- a working platform for OCT-based assessment and manual grading of early lesions caused by age-related macular degeneration"

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Introduction.

"EarlyAMDRate" is a working platform for OCT-based assessment and manual grading of Early-AMD lesions. Its core element is the questionnaire "EarlyAMDChart" for precise annotation and detailed description of a single lesion, comprising its relative position and interaction with the surrounding retinal layers, reflectivity, special properties and state of progression (if applicable) as well as a graphical masking of the lesion. File input, preparation for grading, readout and output are organized in fully automated way while the actual grading step has to be performed manually. Storage of grading results is carried out independently of the particular software environment in HDF5 files of type "EarlyAMDStorage".

The platform is organized in a modular architecture, allowing for easy modification and adaptation of the input and output interfaces as well as for the future addition or replacement of single modules. It consists of five basic modules, to be applied in this order: 1) input module, 2) conversion module, 3) the actual grading step, to be performed manually, 4) readout module, and 5) output module, converting the storage file into a directory containing lesion masks and logfiles. Modules 1), 2), 4) and 5) were implemented as MATLAB functions. They were tested on MATLAB 9.14.0.2286388 (R2023a). No particular attempts for optimization of runtime behaviour were made.

The present note provides a description of the software package, which is accessible from the website `health-atlas.de/projects/69` .

License.

Requirements.

Application of the software requires MATLAB (R2023a) (`mathworks.com`).

Contents.

The package `Software_EarlyAMDRate_version_0.1.zip` contains the following subdirectories and files.

`\bscans` – Contains nine examples of OCT-B-scans as `.png` images. The example files are related to the following figures in the main paper:

`Proband_01_BAS_OD_BS_49_modus_gimdat_type_image.png` -- Figures 3 and 4

Proband_02_BAS_OS_BS_49_modus_gimdat_type_image.png -- Figure 5, A -- D

Proband_03_BAS_OS_BS_48_modus_gimdat_type_image.png -- Figure 5, E -- H

Proband_04_FUP_OS_BS_09_modus_gimdat_type_image.png -- Figure 5, I -- L

Proband_05_BAS_OD_BS_53_modus_gimdat_type_image.png – Figure 5, M -- P

Proband_06_BAS_OS_BS_46_modus_gimdat_type_image.png – Figure 6, A -- D

Proband_06_FUP_OS_BS_46_modus_gimdat_type_image.png – Figure 6, E -- H

Proband_07_BAS_OD_BS_82_modus_gimdat_type_image.png – Figure 6, I -- L

Proband_07_FUP_OD_BS_82_modus_gimdat_type_image.png – Figure 6, M -- P

\empty_forms – Contains nine empty grading forms related to the example B-scans as .png images, e.g. Proband_01_BAS_OD_BS_49_gradingform_prep.png.

\gradings – Contains nine processed grading forms related to the example B-scans as .png images, e.g. Proband_01_BAS_OD_BS_49_gradingform_done.png.

\graphics – Contains six .png graphics files required during execution of module_02.m.

\license – Contains the license file Creative_Commons_License_CC_BY-SA_4.0.txt for the complete package.

\output_examples – Contains seven output subdirectories related to the example B-scans, e.g. \Proband_01.

\storage – Empty directory for .h5 storage files.

\storage_examples – Contains nine .h5 storage files related to the example B-scans and the processed grading forms, e.g. Proband_01_BAS_OD_BS_49_storage.h5.

EarlyAMDRate_batch.m – MATLAB procedure realizing a grading project and calling the functions related to the automated modules 1), 2) 4) and 5).

module_01.m – MATLAB function implementing the input module 1).

module_02.m – MATLAB function implementing the conversion module 2).

module_04.m – MATLAB function implementing the readout module 4).

module_05.m – MATLAB function implementing the output module 5).

working_instruction_GIMP.docx – Working instruction for manual processing of grading froms using the open-source image editor GIMP (gimp.org).

Usage.

Before executing EarlyAMDRate_batch.m, ensure the following:

1) The files module_01.m, module_02.m, module_04.m and module_05.m must be available in the same directory as EarlyAMDRate_batch.m, serving as working directory.

2) \bscans, \gradings, \graphics and \storage are expected to be subdirectories of the working directory.

3) The file `EarlyAMDRate_batch.m` must be edited in order to include the name of the input file, the visit, the eye concerned and the number of the B-scan within the original volume scan. After manual grading, the processed grading form must be properly named and stored in the `\gradings` subdirectory.

4) The storage file, which will be newly created during execution of `module_01.m`, is not allowed to already exist in the `\storage` subdirectory. Otherwise, the execution stops with an error message.

Now open MATLAB, turn to the working directory and type `EarlyAMDRate_batch`.

References.

01. Wagner M, Peschel T, Leutloff CJ, Rauscher FG. EarlyAMDRate -- a working platform for OCT-based assessment and manual grading of early lesions caused by age-related macular degeneration. Submitted; 21 pp.

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