

MIRA: Classifier of eye fundus images to detect the degree of Diabetic Retinopathy

SUMMARY OF THE TECHNOLOGY

Preventive screening of the eye fundus is a usual technique to detect Diabetic Retinopathy disease (DR). This disease is one of the most important causes of blindness in adults worldwide. Automatic tools for image processing and classification may facilitate the hard work of manual labelling of this kind of images, which requires of high expertise and a lot of time of expert doctors. An eye with DR may present some of the following lesions: microaneurisms, exudates, hemorrhages. The number, location and level permits to classify the disease in different stages.

The computer System we offer, called MIRA, receives an eye fundus image (from a non-mydratic camera) and classifies the image into 4 categories: No DR, Mild DR, Moderate DR and Severe DR.

DESCRIPTION OF THE TECHNOLOGY

The computer System MIRA, jointly developed by the [Rovira i Virgili University](#) and the [Pere Virgili Institute](#), receives an eye fundus image (from a non-mydratic camera) and classifies the image into 4 categories:

- No DR
- Mild DR
- Moderate DR
- Severe DR.

In addition, in preliminary stage permits to filter non-valid images, which can be images that does not correspond to an eye, or images with poor quality that should not be analysed. This tool avoids the classification in a DR level of images that are wrong.

The tool has been constructed using **Deep Learning techniques** for training **3 different models** using a data set of labelled images. Expert ophthalmologists of our team at the [Hospital Universitari Sant Joan de Reus](#) have labelled and validated the images to assure there are no mistakes in their classification.

Fuzzy sets are used to combine the outputs of the classification models and provide to the user, not only a single class label but a numerical confidence value on each of the possible outcome labels. In that way, the doctor that is using MIRA, can know the probability of each of the categories in order to take the most appropriate decision for the patient (i.e. treatment, test, etc.).

This system is not for use of patients, **it is a support tool for doctors**, who can check if the prediction given by MIRA really corresponds to what is observed in the image. In that sense, MIRA can be especially useful to avoid False Negatives, because the automatic classification system is able to detect very small lesions that are hardly visible by human inspection.

The classification model is stored in a compacted way and can be accessible through a Web Service interface.

INTELLECTUAL PROPERTY STATUS

Other forms of protection - Copyright

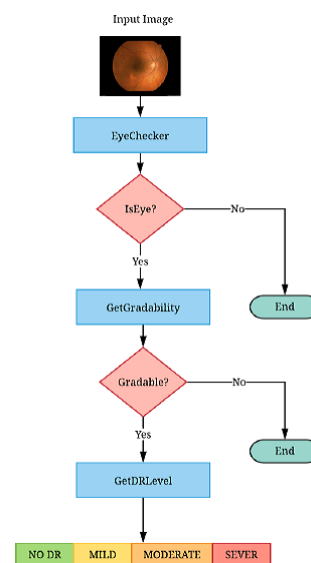
CURRENT DEVELOPMENT STATUS

Commercially available technologies

DESIRED BUSINESS RELATIONSHIP

Other : SW Licesing

TECHNOLOGY OWNER





UNIVERSITAT ROVIRA I VIRGILI
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