



# Abstract: Baseline Pipeline for Automated Eye Redness Extraction with Relation to Clinical Grading

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An essential bio-marker to detect ocular surface diseases like dry eye disease is ocular redness. In clinical routine, this marker is graded by visual comparison to reference image scales. We aim at supporting clinicians in this time-consuming and subjective task by determining a redness score from images, obtained with a novel device for standardized ocular surface photography (Cornea Dome Lens, Occyo GmbH, Innsbruck, Austria). Therefore, in a previous work [1], we presented a baseline pipeline to automatically determine eye redness. Regions of interest were cropped from the recordings based on the iris center and split up into smaller squared sub-regions called tiles. Each of these tiles was classified by a machine learning model and the redness is extracted for the relevant regions. Using the pipeline, images from 36 healthy and 37 pathological eyes were divided into 5840 tiles (80 per eye). A typical split of 80/10/10 % was used as training, validation and test set, respectively, to train the machine learning model. Hereby, the Random Forest model employed in the baseline was replaced by a deep learning model (ResNet50) to improve the performance. This model showed an accuracy of 0.920 and an F1-score of 0.919 on the test data set compared to an accuracy of 0.856 and an F1-score of 0.855 for the Random Forest [2]. In a follow-up work, we were able to relate the resulting redness scores with gradings from clinicians [3]. A positive relation between the scores and the gradings was observed. In the future, we will expand our data set and include more features (e.g., vessel density) to define a meaningful indicator for eye redness grading, which can be used as support in the clinical routine.

## References

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