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Abstract Title: A Decision Support Framework for Screening Diabetic Retinopathy
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Purpose:
The early signs of non-proliferative diabetic retinopathy are depicted by microaneurysms among other signs. A prompt diagnosis can help prevent irreversible damages to the diabetic eye. This paper presents a decision support framework for automated screening for deducing the presence or absence of microaneurysms under a univariate environment.

Methods:
The entire process is composed of recognition, training and classification mechanisms. Recognition involves developing algorithms for the detection of disorders. Training uses supervised learning and training data is obtained by applying the detection algorithms to retinal images. Classification is performed by test data subjected to unsupervised learning. In order to test the performance of the machine the results obtained are compared with the physician’s diagnosis. As the patterns exhibited by DR are independent of each other, a feature can be studied individually. This approach has been developed for microaneurysms. The decision support framework used to detect the presence or absence of microaneurysms is based on binary hypotheses testing problem considering the bayes optimality criteria. There is a cost associated with each decision that depends on whether the decision coincides with the true diagnosis or not. The probable classifications are thus given as:

- Correct accept/hit: A person affected with DR has a true diagnosis.
- False accept/false alarm: A normal person diagnosed with DR. (type I error)
- False reject/miss: An affected person diagnosed as normal (type II error).
- Correct reject: A normal person classified as unaffected.

Results:
We have made use of 143 retinal images provided by the Louisiana State University Eye Center. In our experiments we have compared the retinal images of the diabetic patients which do not manifest microaneurysms with those which do. Fig. 1 shows the pdf's obtained for both the cases.

Conclusions:
This paper proposed a decision support framework for automated screening of DR for the univariate case. The experiments support the feasibility of a complete automated screening mechanism that includes all the
disorders related to DR.

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