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| 28.03.2016 |  | Dissertation Report |
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| Task | % | Problems | Deadline |
| --- | --- | --- | --- |
| Supervised ML |  |  |  |
| DNN(Tensorflow) |  |  |  |
| Related work |  |  |  |
| Dissertation |  |  |  |
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| Update | Date |
|  | 28.03.16 |
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# MESSIDOR Data Set Information

“Methods to evaluate segmentation and indexing techniques in the field of retinal ophthalmology” (MESSIDOR). The original web site of MESSIDOR is <http://messidor.crihan.fr>.

1200 eye fundus colour numerical images; 654 diabetes and 546 healthy patients.

Image resolutions are as follows; 1440\*960, 2240\*1488 or 2304\*1536

For each image we have information of 2 medical diagnoses; retinopathy grade and risk of macular edema.

* There are 4 grades for retinopathy grade;

0 (Normal): (μA = 0) AND (H = 0)

1: (0 < μA <= 5) AND (H = 0)

2: ((5 < μA < 15) OR (0 < H < 5)) AND (NV = 0)

3: (μA >= 15) OR (H >=5) OR (NV = 1)

* There are 3 grades for macular edema;

0 (No risk): No visible hard exudates

1: Shortest distance between macula and hard exudates > one papilla diameter

2: Shortest distance between macula and hard exudates <= one papilla diameter

# Extracted Features Data Set

For supervised learning machine learning, we have used features extracted by Antal et al. For predicting image contains signs of diabetic retinopathy or not. Feature information as follows:

0) The binary result of quality assessment. 0 = bad quality 1 = sufficient quality.   
1) The binary result of pre-screening, where 1 indicates severe retinal abnormality and 0 its lack.   
2-7) The results of MA detection. Each feature value stand for the   
number of MAs found at the confidence levels alpha = 0.5, . . . , 1, respectively.   
8-15) contain the same information as 2-7) for exudates. However,   
as exudates are represented by a set of points rather than the number of   
pixels constructing the lesions, these features are normalized by dividing the   
number of lesions with the diameter of the ROI to compensate different image   
sizes.   
16) The Euclidean distance of the center of   
the macula and the center of the optic disc to provide important information   
regarding the patient€™s condition. This feature   
is also normalized with the diameter of the ROI.   
17) The diameter of the optic disc.   
18) The binary result of the AM/FM-based classification.   
19) Class label. 1 = contains signs of DR (Accumulative label for the Messidor classes 1, 2, 3), 0 = no signs of DR.

# Supervised Machine Learning

By using the extracted features described in Section 1.1, we try to use different supervised machine learning techniques to automatically detect Diabetic Retinopathy. Each image is represented as a feature vector of length 19 and then different machine learning methods are trained. We use Random Forest Classifier, Linear Discriminant Analysis, Support Vector Machines, Naïve Bayes Classifier…

# Deep Neural Network

We use Deep Learning to automatically detect Diabetic Retinopathy and its degree by using different types of Neural Networks with different number of layers. We will start with Softmax Regression and then use complex Neural Nets like Convolutional Neural Networks.

*Kindly provided by the Messidor program partners (see* [*http://www.adcis.net/en/DownloadThirdParty/Messidor.html*](http://www.adcis.net/en/DownloadThirdParty/Messidor.html)*).*