DR Dataset Analysis

1.) Diaretdb0:

a.) No. of Classes : 5 (Classes are based upon types of lesions in images)

b.) Images in each class :

Total Images = 130
Images with Microaneurysms = 106
Images with Haemorrhages = 80
Images with Hard Exudates = 71
Images with Soft Exudates = 41
Images with Neovascularization = 20

c.) Type of task : Segmentation/classification purposes

d.) Folder structure :

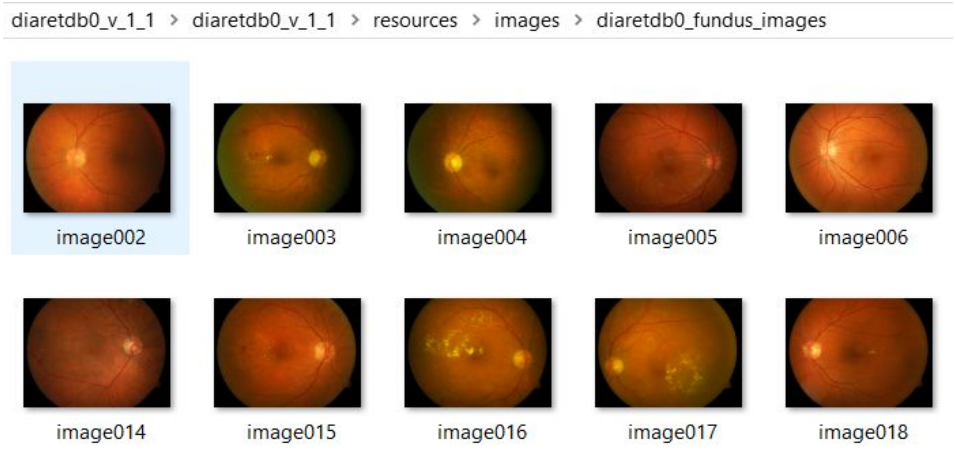


Fig 1 : Destination of the main folder that includes images.

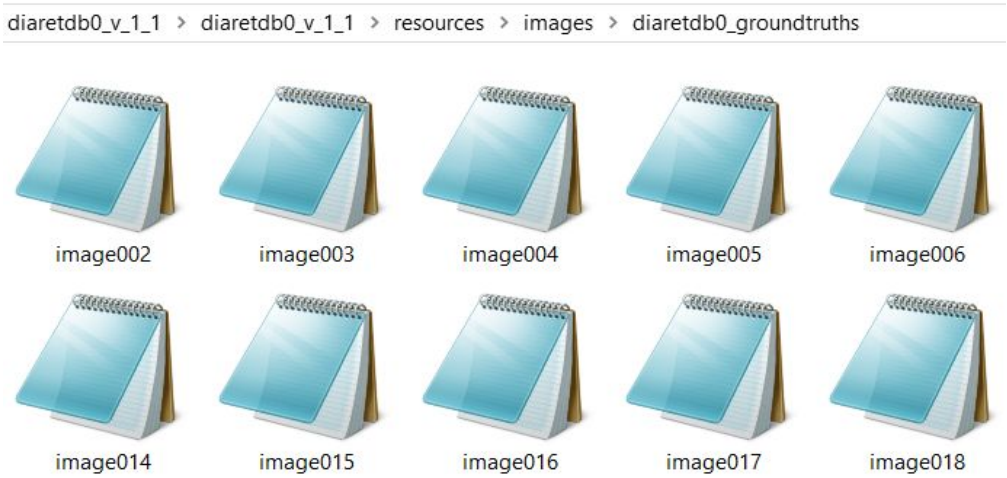


Fig 2 : Destination of the main folder that includes ground truths.

e.) Annotation format and example :

Annotation format = redsmalldots n/a hardexudates n/a neovascularisation

f.) Image with its ground truth :

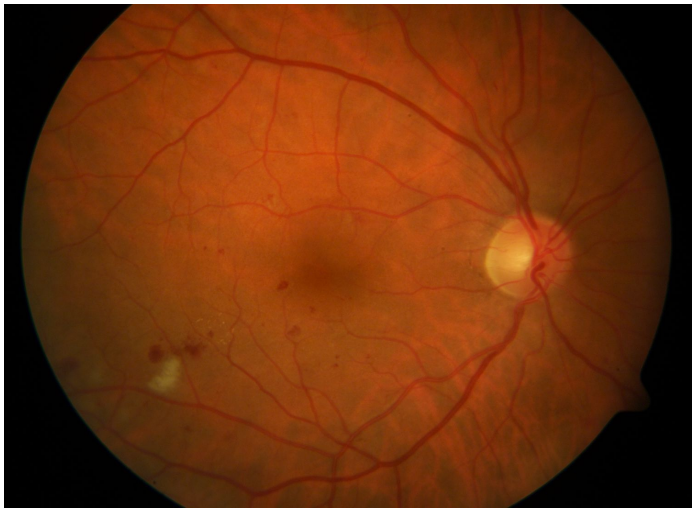


Fig 3 : Sample fundus image from DiaretDB0

Fig 4 : Ground truth for image in Fig 3

2.) Diaretdb1:

a.) No. of Classes : 4 (Classes are based upon types of lesions in images)

b.) Images in each class :

Total images = 89
Images with Microaneurysms = 72
Images with Haemorrhages = 51
Images with Hard Exudates = 47
Images with Soft Exudates = 36

c.) Type of task : Segmentation/classification purposes

d.) Folder structure :

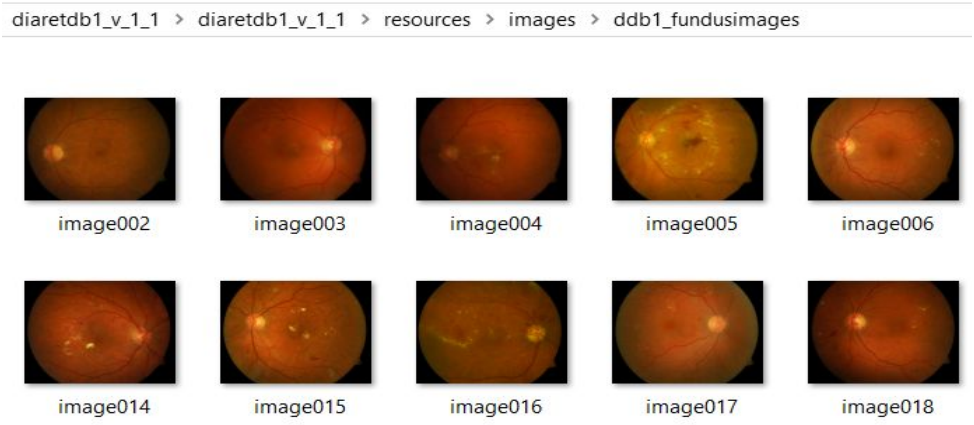


Fig 5 : Destination of the main folder that includes images.

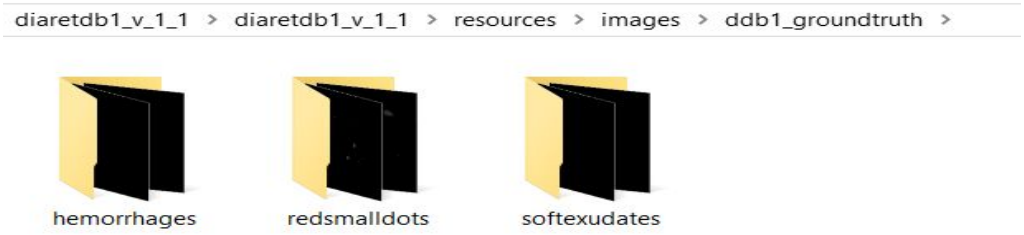


Fig 6 : Destination of the main folder that includes annotation files.

e.) **Annotation format and example :** Annotation is provided in the form of masks created according to different lesion classes present in each image.

f.) **Image with its ground truth :**

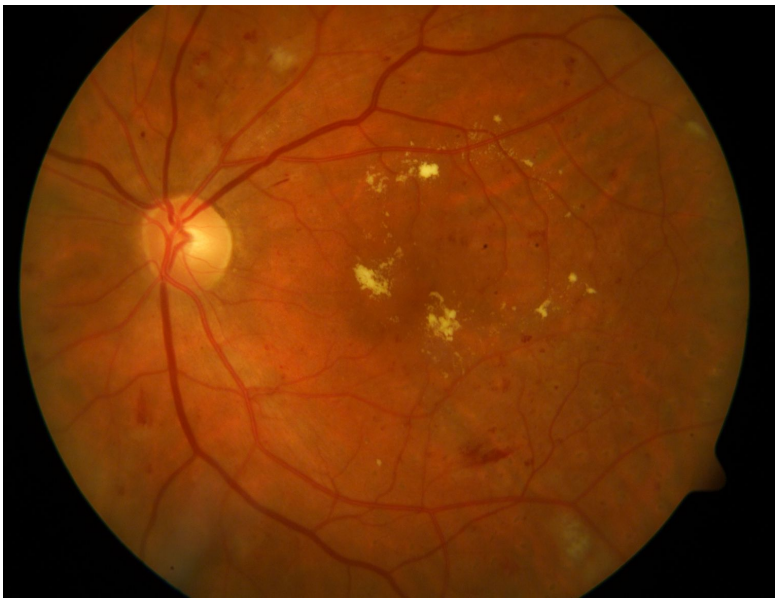
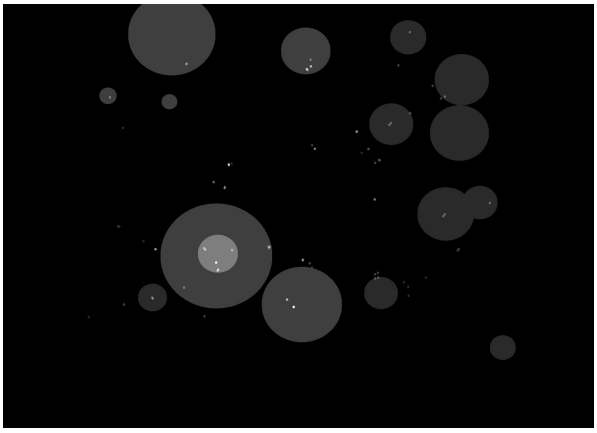
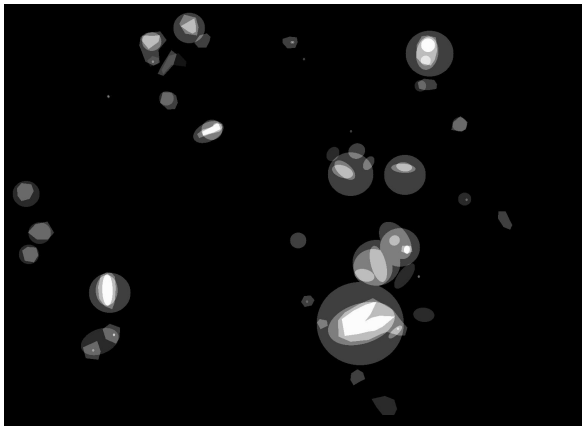


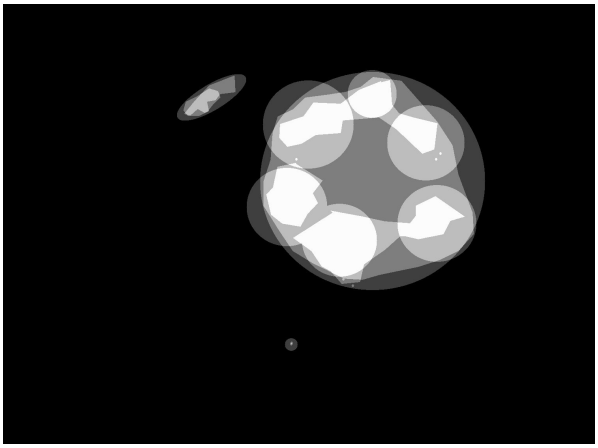
Fig 7 : Sample fundus image from DiaretDB1



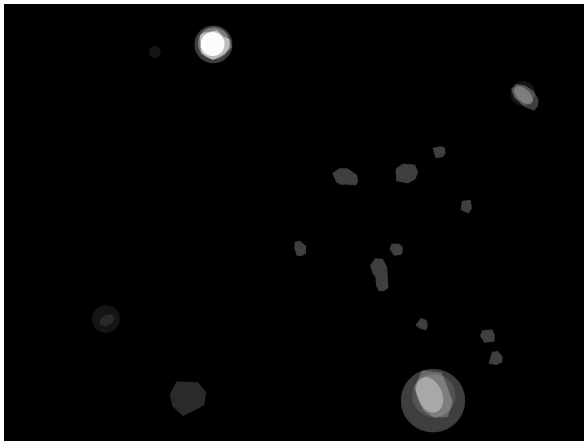
(a)



(b)



(c)



(d)

Fig 8 : ‘a’ describes the mask for microaneurysm, ‘b’ for haemorrhages, ‘c’ for hard exudates, ‘d’ for soft exudates.

3.) Messidor:

a.) No. of classes : 4

b.) Images in each class :

Total Images = 1200

Based of Retinopathy grading :

No. of Grade 0 Images = 546
No. of Grade 1 Images = 153
No. of Grade 2 Images = 247
No. of Grade 3 Images = 254

Based on Risk of Macular Edema:

Images having Risk factor 0 = 974

Images having Risk factor 1 = 75

Images having Risk factor 2 = 151

c.) Type of task : Classification purposes

d.) Folder Structure :

Messidor dataset is available in 3 groups each having 400 images. Each group has been divided into 4 folders each having 100 images along with its annotation file.

Here as seen, Base11 is one of the 4 folders from Group 1 of the dataset. It has 100 images and an annotation file for those images.

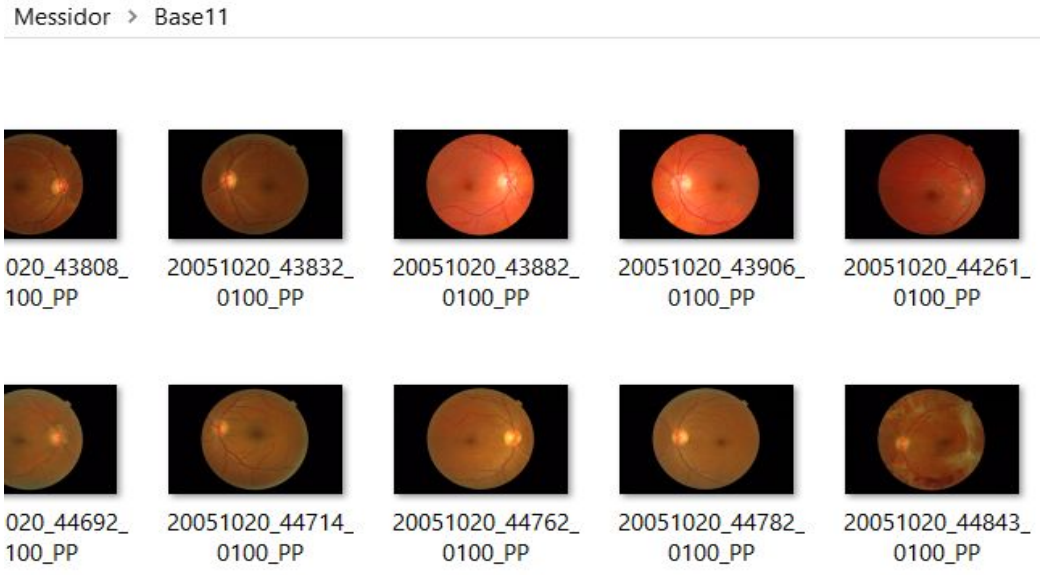


Fig 9 : Destination of the main folder that includes images in Messidor

e.) Annotation format and example :

An annotation excel file is provided for each folder.

Format:
[Image_001.tiff Dept. Retinopathy-Grade Risk of Edema]

f.) Image with its ground truth :

Fig 10 : Sample fundus image from Messidor

Image name	Ophthalmologic department	Retinopathy grade	Risk of macular edema
20051020_45137_0100_PP.tif	Service Ophtalmologie Lariboisière	3	2

Fig 11 : Ground truth describing the image in Fig 10.

4.) Messidor-2

a.) No. of classes: 5

b.) Images in each class:

Total Images = 1748

Based on Retinopathy Grading:

No. of Grade 0 Images = 1017
No. of Grade 1 Images = 270
No. of Grade 2 Images = 347
No. of Grade 3 Images = 75
No. of Grade 4 Images = 35

Based on Risk of Macular Edema:

Images having Macular Edema = 151
Images not having Macular Edema = 1593

c.) Type of task : Classification purposes

d.) Folder Structure :

Messidor-2 is divided into 4 zipped groups that can be downloaded separately.

e.) Annotation format and example:

image_id	adjudicated_dr_grade	adjudicated_dme	adjudicated_gradable
20051020_43808_0100_PP.png	0	0	1
20051020_43832_0100_PP.png	1	0	1
20051020_43882_0100_PP.png	1	0	1
20051020_43906_0100_PP.png	2	1	1
20051020_44261_0100_PP.png	0	0	1
20051020_44284_0100_PP.png	0	0	1
20051020_44338_0100_PP.png	0	0	1
20051020_44349_0100_PP.png	2	0	1
20051020_44400_0100_PP.png	0	0	1
20051020_44431_0100_PP.png	0	0	1
20051020_44598_0100_PP.png	2	0	1
20051020_44636_0100_PP.png	2	0	1
20051020_44692_0100_PP.png	0	0	1
20051020_44714_0100_PP.png	0	0	1

Fig 12 : Example of Annotation file

5.) DRIONS_DB

a.) No. of classes : Images are not grouped into any classes. This dataset is basically used for optic disk detection.

b.) Total Images : 110 (All images are optic disk centered.

c.) Type of task : Used for optic disk detection

d.) Folder Structure :

Fig 13 : Destination of the main folder that includes images in Drions_DB.

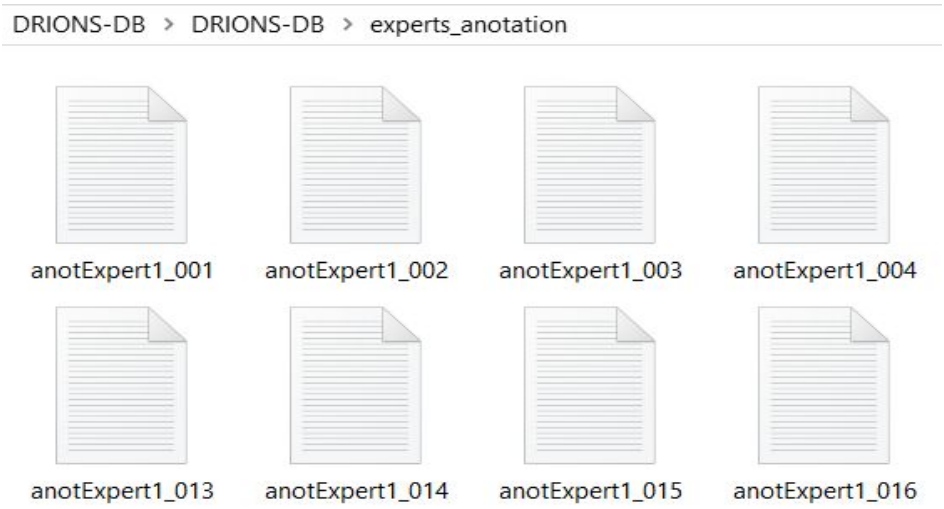


Fig 14 : Destination of the main folder that includes annotation files for Drions_DB .

e.) Annotation format and example :

The annotations for each image is a text file having 36 lines of text that denotes 36 points in the 2d plane of the image. These points correspond to detecting the optic disk in the retinal image.

Example:

1.) 328, 245
2.) 312, 231
3.) 365, 257
.
.
.
35.) 278, 180
36.) 245, 198

f.) Image with Ground Truth :

anotExpert1_037 - Notepad

File Edit Format View Help

```
348.566 , 217.938
345.812 , 226.116
342.923 , 234.300
338.135 , 241.611
332.897 , 248.945
324.875 , 253.019
316.675 , 256.114
308.217 , 257.953
299.640 , 259.817
290.862 , 259.091
282.521 , 256.345
275.013 , 251.966
268.099 , 246.899
261.391 , 241.405
254.498 , 235.373
250.494 , 227.199
246.953 , 218.601
245.870 , 209.311
246.209 , 199.889
247.994 , 190.513
252.269 , 181.961
257.820 , 174.220
264.495 , 167.426
272.858 , 162.923
281.509 , 159.497
290.338 , 156.554
299.640 , 156.866
308.823 , 157.233
317.912 , 159.108
325.647 , 164.265
332.561 , 170.077
338.119 , 177.023
343.200 , 184.162
346.593 , 192.221
350.046 , 200.423
349.581 , 209.311
```

(a) **(b)**

Fig 14 : ‘a’ describes the fundus image and ‘b’ describes the annotation for ‘a’

6.) HRF (High Resolution Fundus Imaging)

a.) No. of classes : 3 (Here the total images are divided into 3 classes based on diabetic retinopathy, glaucoma, and normal image.

b.)Images in each class :

Total Images = 45

Images consisting Diabetic retinopathy = 15

Images consisting Glaucoma = 15

Normal Images = 15

c.) Type of Task : Segmentation/Classification purposes

i.) Here the classification is to be done on the basis of the 3 classes listed above.

ii.) Segmentation of lesions and optic disc is possible in all the images.

d.) Folder Structure:

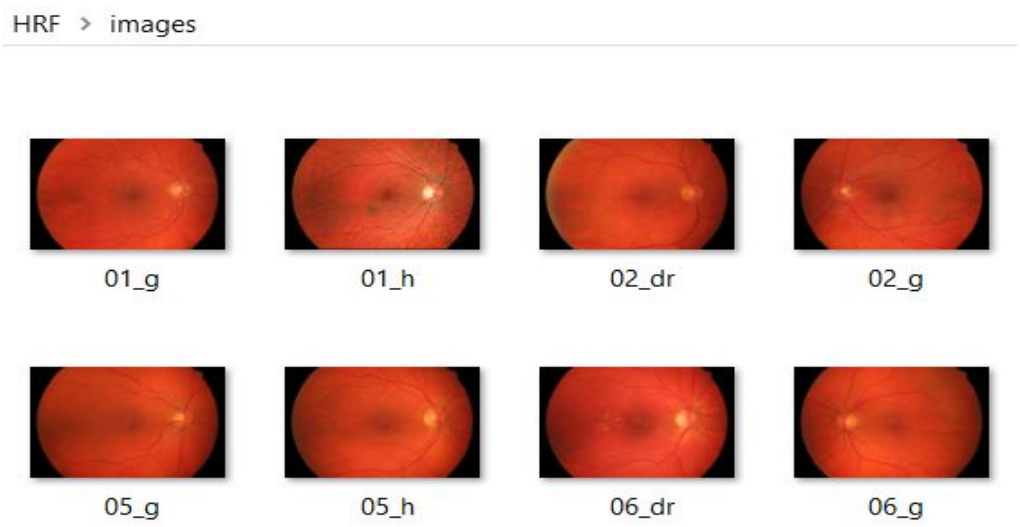


Fig 15 : Destination of the main folder that includes images in HRF dataset.

e.) Annotation Format :

There isn't any seperate annotation given in the HRF dataset. But the images have their classes labeled in their name itself.

Example :

"01_dr" = 1st image classified as having DR.

"01_g" = 1st image classified as having Glaucoma.

"01_h" = 1st image classified as normal retina.

f.) Image with Ground Truth:

Fig 16 : Retinal Fundus image having retinopathy with its vessel flow

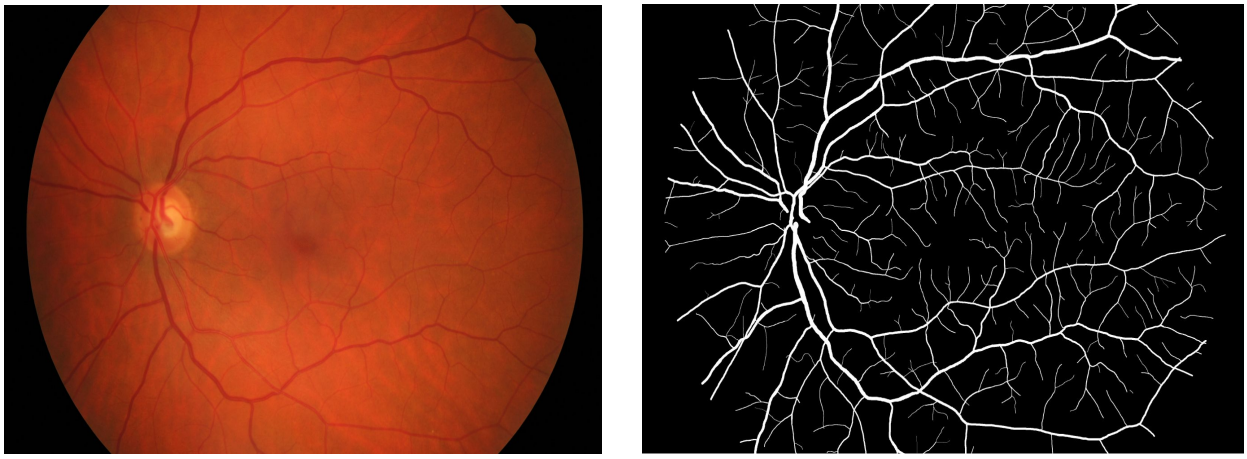


Fig 17 : Retinal Fundus image having Glaucoma with its vessel flow

Fig 18 : Retinal Fundus image that is normal with its vessel flow.

7.) **INSPIRE-STEREO**

a.) **No. of classes :** There are no classes used to distribute this data.

b.) **Total Images :** 30

c.) **Type of task :** Segmentation purposes.

d.) **Folder Structure :**

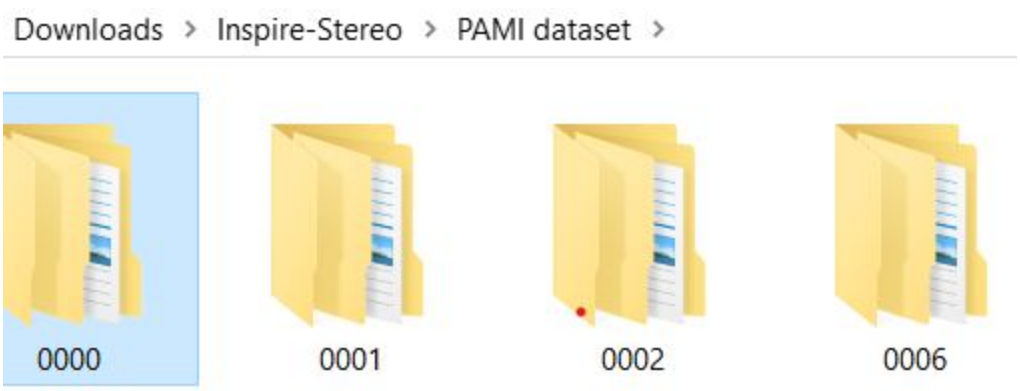


Fig 19 : Destination of the main folder that includes images in INSPIRE-STEREO.

e.) **Annotation format :** There isn't any annotation given in this dataset. There are fundus images focussed around optic disk and a depth reference of the optic disk for each retinal image. This depth reference is taken into consideration during Optical Coherence Tomography for determining the cross sectional region of the macula and optic disc.

f.) Image with depth reference:

(a) **(b)**

Fig 20 : ‘a’ describes the optic focussed retinal image and ‘b’ is the depth reference image of ‘a’.

8.) INSPIRE-AVR

a.) No. of classes : Images aren’t segmented based on any classes.

b.) Total Images : 40

c.) Type of task : Segmentation purposes

d.) Folder structure :

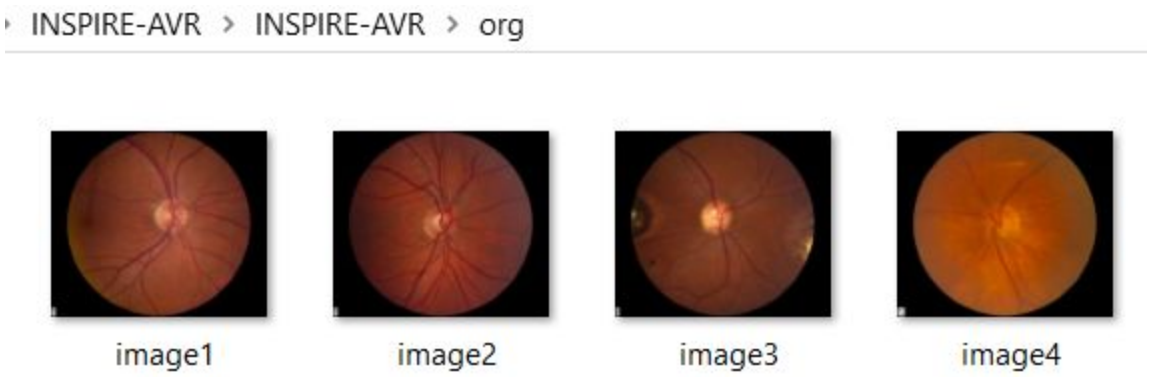


Fig 21 : Destination of the main folder that includes images in INSPIRE-AVR.

e.) Annotation format : This dataset is annotated with an AVR (Arterio Venous Ratio). 2 simultaneous AVR are calculated for each image and provided in the Ground Truth file.

f.) Image with its AVR :

Fig 22 : Optic centered image taken from INSPIRE-AVR

Annotation :

Image	AVR-obs1	AVR-obs2
image19.jpg	0.67	0.63

9.) HEI-MED (Hamilton Eye Institute Macular Edema Dataset)

a.) No. of classes :

i.) The classes in this dataset aren't constant but the common things that the dataset is divided upon are exudates and other lesions that include cotton wool spots, drusens, microaneurysms, and other fluid occurring regions.

ii.) Basically the most common classes include 3 names(exudates, microaneurysms, drusens).

iii.) There are a lot of other classes describing the kind of retinopathy(Proliferative or not), extent of macular edema, pigmentations, fluid leakages, etc

b.) Total Images = 169 (All have their separate ground truth file)

c.) Type of task : Majorly classification purposes.

d.) Folder Structure :

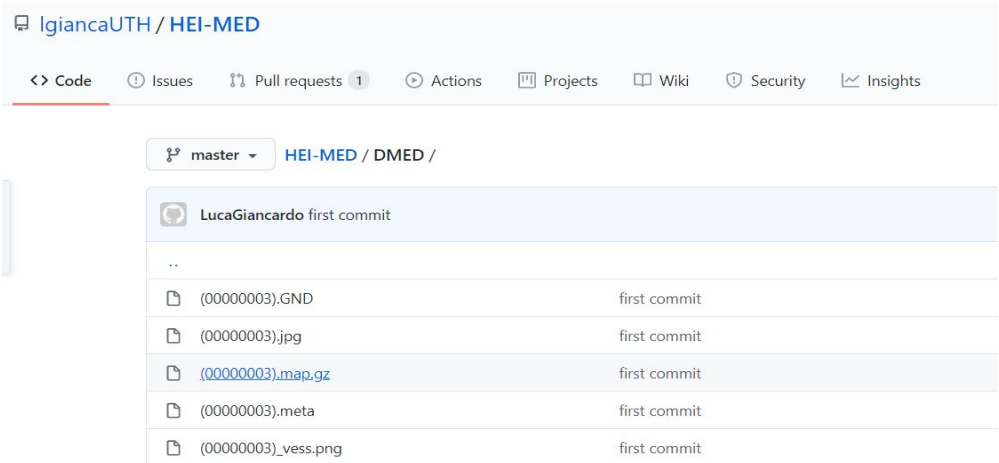


Fig 23 : Destination of the main folder that includes images in HEI-MED.

e.) **Annotation format :** There is a separate annotation(ground truth file) provided for each image. Each image consists of all the classes in that image and each class is listed down in a different line.
Example :

```
3
MicroAneurysm 0
MicroAneurysm 0
MicroAneurysm 0
0
38
9
NPDR
7: NPDR Severe + CSME
6: NPDR Severe - CSME
5: NPDR Moderate + CSME
4: NPDR Moderate - CSME
3: NPDR Mild/Minimal + CSME
2: NPDR Mild/Minimal - CSME
1: Absent
0: Unknown
PDR
5: PDR + CSME
4: PDR - CSME
3: PDR + HRC + CSME
2: PDR + HRC - CSME
1: Absent
0: Unknown
```

Fig 24 : Image describing a sample annotation file.

Each line firstly defines the number of lesions of a particular type followed by the name of the lesion upto that number.
Here 3 in the 1st line defines 3 Microaneurysms followed by 38 in the 6th line that defines 38 different classes and their names.

f.) Image with its ground truth :

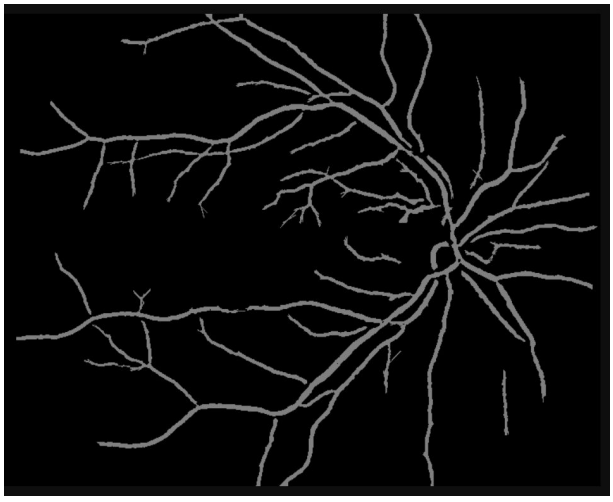
(a)

```
5
Other Bright Lesion 1
Other Bright Lesion 1
Other Bright Lesion 1
Other Bright Lesion 1
Other Bright Lesion 1
0
0
0
NA
NA
NA
NA
NA
NA
NA
```

(b)

```
~ImageName:~(00000168).jpg
~PatientGender~F
~PatientRace~CAUCASIAN
~PatientDOB~10/21/1954
~QualityValue~0.839159
~DiabetesType~TYPE II
~ONrow~923
~ONcol~1625
```

(c)



(d)

Fig 25 : ‘a’ contains a sample fundus image, ‘b’ is the annotation file for ‘a’, ‘c’ describes the patient’s metadata, ‘d’ is the vessel flow of ‘a’.