REPORT FOR FINAL PROJECT

INTRODUCTION :

The aim of this project is to find a computer vision method that allows the classification of scans acquired from a subject into either healthy or unhealthy. This fits into the general goal of providing a valid support to a human diagnostic in the field of healthcare.

METHOD :

Three subjects were recruited in the Advanced Retinal Imaging Lab. Two subjects presented signs of a disease in their retina. The other subject is normal.

Two thousand scans were acquired. Each scan represents a cross-sectional view of the retina. Scans from different eccentricities in the retina were included, so the variability in the morphology across the retina was taken into account. 800 were used in the purpose of training the support vector machine. 650 scans were used in the purpose of testing the model. The training set and the testing set are independent.
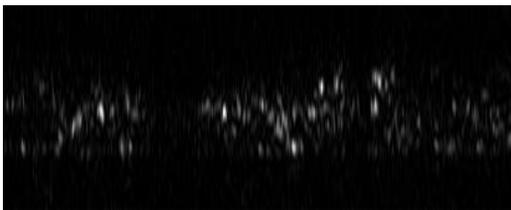
unhealthy scan   vs   healthy scan

The training consisted in the following :

- Extraction of key points (2500)
- SIFT computation on each of the key points. Each SIFT feature is 128-dimensional vector.
- K-mean clustering
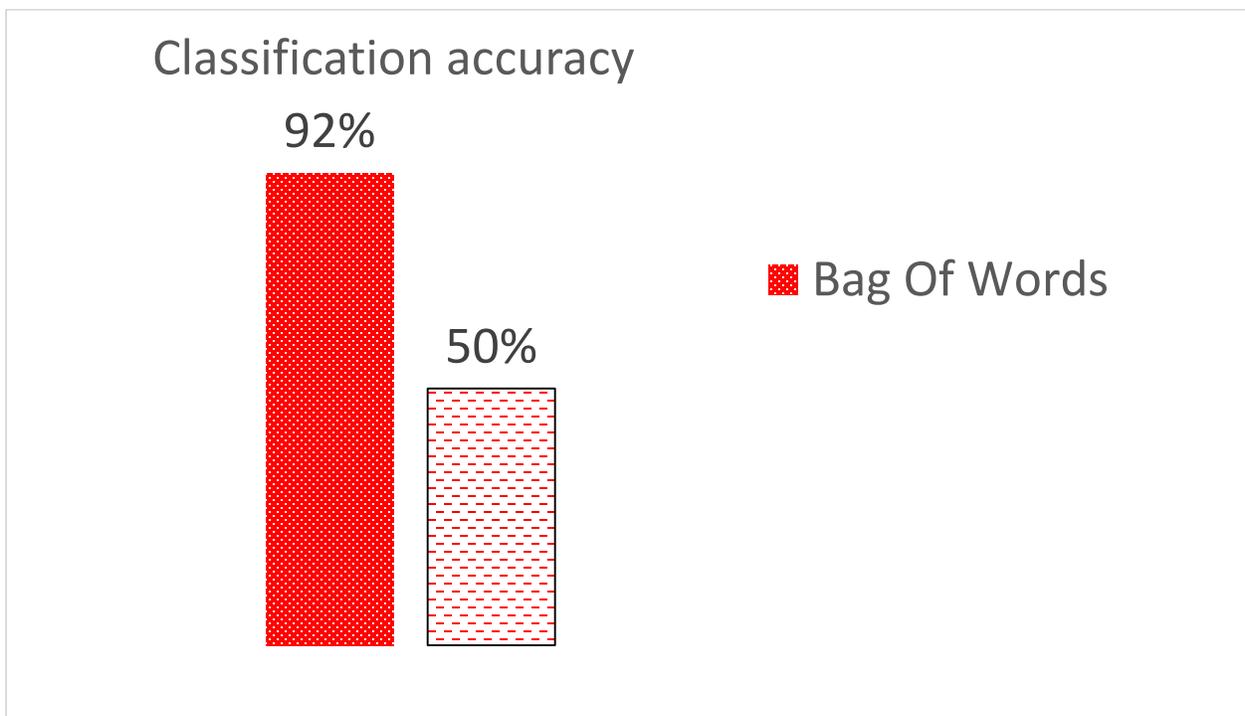- Training the support vector machine according by feeding the clusters formed.

In order to execute the program, first go to the folder alassoue-final/ayoub.

In order to execute training, type the command *./a3 train bow*

In order to execute testing, type the command *./a3 test bow*

RESULTS :

Results are shown in the graph below :

The Bag of Words technique gives a classification accuracy of 92 %, to be compared with the random guess accuracy of 50%.

CONCLUSION :

This method is efficient in classifying scans from our subjects with a high rate of accuracy. This method is also relatively fast to implement.

FUTURE WORK :

The training and testing set both comes from only three subjects. Even though the scans were taken at different retinal locations, it is necessary to try our model on a dataset with more inter-subject variability.

The study was successful on two subjects with the same disease. For other diseases with a different impact on the scan structure, we still don't know if our technique works.

REFERENCES :

[1] http://www.robots.ox.ac.uk/~az/icvss08_az_bow.pdf

[2] Spaide, *et al.*, Retina, 31(8), 2011

[3] Curcio, *et al.*, J. Comp. Neurol. 292(497), 1990

[4] Dubra, *et al.*, Biomed. Opt. Express , 2(7), 2011.

[5] http://stackoverflow.com/questions/7352706/cannot-allocate-an-object-of-abstract-type-error