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Project Group ID: EYE_VN

Project ID: EYE_VN_Data_Science_winter 2024

Project Title: Computer Vision and Deep Learning Approaches to Predict DME

Project Short Description:

As a part of this course work, Diabetic Macular Edema (DME) prediction has been chosen. It is estimated that 1 in 5 people with diabetes will develop DME [1]. It is caused by high levels of blood sugar and can become dangerous when sugar builds up leading to damage to retain [1]. The project is named Eye Vision Network (VN).

DME is common in diabetic patients, especially in pregnant women. Its prediction and diagnosis will help a lot of people. Employing available Computer Vision (CV) or Deep Learning (DL) techniques will aid medical professionals in their diagnosis.

The project began with a literature survey to understand what has worked in the past [2,3,4,5,6,7]. Following this, potential sources of data have been identified [8,9,10]. CV and DL algorithms will be applied to the data to see which works the best and the result will be shared with the class. As a result of this process, a greater understating of DME and its prediction capabilities will be understood by our team and the class.

Project Context and Data Plan:

The following is the list of external systems that are needed:

- **GitHub:** Code related to the project will reside here
- **Heroku:** Will be the cloud deployment environment for testing this project
- **eHospital [11]:** The production deployment of this will be integrated with eHospital for the final demo

The following is a list of individuals/organizations needed:

- **Prof. Ali Abbas** – for guidance and knowledge (3 hours per week)
- **TA:** for information on data accusation and knowledge transfer of the eHospital system (1 hour per week)
- **Database Admin (eHospital)** [11] – for making the data available to us for the demo (3 hours per month)

Based on [2], there are multiple sources of data available. The following is a list of potential data sources that will be needed for the diagnosis:

- Fundus images
- DME severity label

Example Application of the Proposed Project:

The proposed project will aid medical professionals in quicker diagnosis of DME. The solution will classify the fundus images into DME severity or normal eye images.

Tools (Hardware and Software needed for the project / needed to build a prototype):

The following is the list of tools and hardware needed:

- Visual Studio Code [12]
- Python [13]
- PyTorch [14]
- Scikit-Learn [15]
- FastAPI [16]

Project Notes:

References:

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degeneration from optical coherence tomography images. Biomed Opt Express. 2014 Sep 12;5(10):3568-77. doi: 10.1364/BOE.5.003568. PMID: 25360373; PMCID: PMC4206325.

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