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<p><b>Project Group ID:</b> TBD</p>
<p><b>Project ID:</b> TBD_Data_Science_winter 2024</p>
<p><b>Project Title:</b> Machine Learning and Deep Learning Approaches to Predict Multiple Sclerosis</p>
<p><b>Project Short Description:</b> As a part of this course work Multiple Sclerosis (MS) prediction has been chosen. It is estimated that MS affects 1.8 million people worldwide [1]. It is the most common in young adults ages 20 to 50 [2] and especially in females [1]. MS affects the cognitive, emotional, motor, visual, and sensory functions of a person as it attacks their brain and spinal cord [1].</p> <p>As MS is the most common immune-mediated inflammatory demyelinating disease of the central nervous system, its prediction and diagnosis will help a lot of people. Employing Machine Learning (ML) or Deep Learning (DL) techniques available will aid medical professionals in their diagnosis.</p> <p>The project will begin with a literature survey to understand what has worked in the past [2,3,4,5,6,7,8,9]. Following this, potential sources of data will be identified, and the data will be extracted. Upon collection of data, ML 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 the MS and its prediction capabilities will be understood by us and the class</p>
<p><b>Project Context and Data Plan:</b></p> <p>The following is the list of external systems that are needed:</p> <ul style="list-style-type: none"> <li>• <b>GitHub:</b> Code related to the project will reside here</li> <li>• <b>Heroku:</b> Will be the cloud deployment environment for testing this project</li> <li>• <b>BrianWeb[10]:</b> A tool to generate synthetic MRI data for lesions</li> <li>• <b>eHospital [11]:</b> The production deployment of this will be integrated with eHospital for the final demo</li> </ul> <p>The following is a list of individuals/organizations needed:</p> <ul style="list-style-type: none"> <li>• <b>Prof. Ali Abbas</b> – for guidance and knowledge (3 hours per week)</li> <li>• <b>TA: TBD</b> – for information on data accusation and knowledge transfer of the eHospital system (1 hour per week)</li> <li>• <b>Database Admin (eHospital) [11]</b> – for making the data available to us for the demo (3 hours per month)</li> </ul> <p>Based on the initial survey of literature, synthetically generated MRI data can easily be accessed from [10]. The following is a list of potential data sources that will be needed for the diagnosis:</p> <ul style="list-style-type: none"> <li>• Age</li> <li>• Gender</li> <li>• Brain MRI (Magnetic Resonance Imaging)</li> </ul>

- Spinal Cord MRI

### Example Application of the Proposed Project:

The proposed project will aid medical professionals in quicker diagnosis of MS. The solution will mark/highlight parts of the MRI that are likely lesions from MS.

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

The following is the list of tools and hardware needed:

- Brain Web [10]
- Visual Studio Code [12]
- Python [13]
- PyTorch [14]
- Scikit-Learn [15]
- FastAPI [16]

### Project Notes:

References:

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