**Digital Image Processing**

**Final Project Proposal**

**Fall 2020**

**Team Member List:** Matthew Carroll

**Contact Person:**

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**Project Plan:**

* 11/18 – Dataset Decided
* 11/19 – Project Proposal Due/Presentation
* 11/26 – Initial CNN backbone setup
* 12/1 – Preliminary results obtained, mid-project presentation
* 12/10 - Clean up and final touches, on to report
* 12/17 – Project finished and report submitted

**Project Description:**

* **Title:** Breast Cancer Classification using Convolutional Neural Networks
* **Overview:** Cancer has existed for the entirety of human existence. A key part of effective treatment is the ability to detect cancer early. The earlier it is detected, the quicker it can be treated and the more options doctors have to pursue. Since 2012 there has been a resurgence in deep learning and Convolutional Neural Networks have proven very effective tools in computer vision and have proved strong when attempting to map input images to output results. This can and should be applied to cancer datasets to detect images of tumors early and effectively. We will use transfer learning methods with a ResNet50 CNN backbone and a modified classifier to build a feature extractor and accurately classify harmful and non-harmful tumors in a breast cancer dataset.
* **Methods:** The primary backbone of this project will be ResNet50 as a solid foundation for a feature extractor. This will be implemented using PyTorch and adaptations such as squeeze theorem and freezing/unfreezing layers will be conducted as needed to improve accuracy and efficiency. In addition to this, data augmentation will be done so that invariance is accounted for and cancer types can be classified from more than the single type of image provided via the dataset and the classifier can become more robust.
* **Datasets:** The data was obtained from the Cancer Imaging Archive at this URL: <http://dx.doi.org/10.7937/K9/TCIA.2016.7O02S9CY> . Diagnoses were obtained as well for labeling purposes.

**Project Management:**

* Since this is an individual project the “meetings” will be staged on an agile style. This means having weekly deliverables and clearly stated goals. They are outlined in the project plan.
* The project will be hosted on github and will be run using my own personal computational hardware.
  + <https://github.com/MJC598/CNN_Breast_Cancer_Classification>
* As the sole member of the group, I will take on every aspect of the project.