Collaborative Authorship in the Manuscript Development of Deep Learning Techniques and the Creation of a Medical Web App User Manual

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Background

During the summer, my collaboration with Dr. Jiang involved two distinct projects. Firstly, I contributed to the composition of a manuscript detailing machine learning hyperparameter meta tuning. Deep feed-forward learning, also known as deep learning, has gained significant traction in the commercialized market but is yet to be explored in-depth clinically. Our objective was to predict late onset breast cancer metastasis (BCM) using a grid search strategy called Single Hyperparameter Grid Seach (SHGS). Secondly, I created a comprehensive user manual for the iMed web application, which allows users to take raw information and manipulate it in a manner that gives results useful in decision making. This can be to train a model, plot ROC curves, or predict an outcome using models and analysis. The goal was to create a user-friendly guide that would enable anyone from professionals to patients to effectively utilize iMed's functionalities.

Methods

To pursue our research objectives, we used a wide range of methodologies. For the machine learning manuscript, extensive literature search was used to gain a knowledge base and add that information onto our results. Authors with agreeing views, disagreeing views, information that corroborated our hypotheses, or totally alternate ideas were discussed and included using a reference management software called Mendeley. I also used online resources such as Lucidchart, enabling me to create a flow chart for readers to visually understand how SHGS works. In terms of the user manual, a docx file with custom style formatting headers and table of contents allows the user to jump to find what they need, in addition to a browser pdf panel highlighting all enclosed information.

Results

The main subsections I focused on for the manuscript detailing machine learning hyperparameter meta tuning were successfully completed. Of the 8 hyperparameters discussed, I focused on the discussion of learning rate, momentum, and decay as well as their relationship to each other and how certain hyperparameters have more of an impact on model performance than others. The user manual was also completed and incorporated into the web application and can be found at http://imed.odpac.net/static/user_manual.pdf.