Predicting the Progression of Multiple Sclerosis Using Image Features

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The purpose of my project is to predict the progression of Multiple Sclerosis (MS) by creating a computer aided diagnosis (CAD) system using image features from an MRI. I hypothesized that I would be able to estimate a patient's number on the Expanded Disability Status Scale (EDSS) after two years based on information extracted from the initial visit. To execute the project, I used a data table from 38 patients. For my procedure, I read the data table, and then modeled the data to find the significant variables to determine the EDSS after two years. Linear regression models failed to fit the data. Instead, taking into account model complexity, my best results used a seventh-degree polynomial, based on the grey white matter at six months, and the number of lesions at 0 months. My standard error resulted in 0.6, with an adjusted R-squared of 0.77 (adjusted for model complexity), which is the highest R-squared achieved. The overall p-value for my function was at 1.634*10^-8. I attempted the splines test (dividing the function into parts); however, it did not improve my results. By predicting a patient's MS, doctors can correctly prescribe medication. Correct prescription can result in less heightened symptoms (e.g., paralysis versus ability to walk), as well as drastically improve their MS throughout the years.

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