Available online at www.sciencedirect.com

ScienceDirect

Procedia - Social and Behavioral Sciences 94 (2013) 271

Procedia
Social and Behavioral Sciences

51st Academy of Aphasia Proceedings

Differentiating Types of Aphasia: A Case Study in Modern Data Mining Techniques

Makris C.*, Todd T.

Graduate of Carnegie Mellon University; Master of Statistical Practice

One of the most complex and unique functions of the human brain is its ability to both understand and generate speech. Every day billions of people around the world communicate with each other through verbal and written means. Arguably, these skills are vital to an individual's wellbeing. Unfortunately, each year approximately five to six hundred thousand people worldwide develop a condition known as aphasia that threatens to destroy the victim's communication skills. Aphasia usually results from stroke or head trauma and impairs an individual's language ability. The ailment can manifest in many ways, and often greatly depends upon the part of the brain that has been affected. Severity can range from mild speech impairment to complete inability in communicating one's thoughts.

Currently, there are eight different types of aphasia that are generally used among clinicians for patient classification. To test for the various types of aphasia, several methods may be employed. The most widely used is the Western Aphasia Battery (WAB) test. Additionally, specific examinations concerning repetition, verb naming, or even a brain MRI scan can also help aid in classifying patients. Among experts in the field, there is large debate over both the classification methodology and the groups themselves. Many speech pathologists believe that the current aphasia types are outdated, should be modified, and that other groupings may be more informative.

Our primary goal is to help in better understanding how to classify aphasic patients based on speech patterns and ability in verbal skills such as repetition, naming, comprehension, and fluency. We would also like to determine if there are other groupings that may not specifically align with the existing eight aphasia categories. If there is an underlying structure within our data, highlighting it may be more helpful in classifying patients than the current clinician labels. Ideally, we would like to either better define the current groups or create new classification groups. Our findings could help decide specialized treatment plans for past and present patients in order to ensure an efficient recovery.

Implemented methodology includes a principal components analysis and various K-means simulations in order to determine the appropriate number of clusters. We also use random forest, tree, and iterative spectral clustering algorithms to ultimately propose five new groupings for new patient classification based upon four basic verbal measurements: repetition skill, naming skill, comprehension skill, and fluency.

* Corresponding author.
E-mail address: PEMAK@aol.com .

Selection and peer-review under responsibility of The Academy of Aphasia.
doi:10.1016/j.sbspro.2013.09.135