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Linguistic analysis in diagnosing dementia and depression

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ABSTRACT

Neurodegenerative and mental disorders significantly affect the manner of speaking, syntax, semantics and specific habits of word choice. The aim of this study was to examine whether speech analysis can be useful for screening test in neurology and psychiatry, due to the limited number of techniques supporting medical diagnostics in these fields. Our research used a database containing speech recordings: 4.5 hours of people suffering from dementia, 25.9 hours of the control group for dementia, 16.7 hours of people suffering from depression and 38.3 hours for the depression control group. By knowing features of speech samples recorded by the subjects and the control group, it is possible to create a classifier which distinguishes one group of recordings from the other. Two methods were used to diagnose dementia. The first method is based on the observation that statements made by people with dementia have lower vocabulary variations. The second diagnostic method is based on lemma probabilities. This method was also used in depression screening tests. For neurodegenerative and mental disorders, linguistic analysis frequently results in a more effective diagnosis than analysis of acoustic features. Linguistic changes are easily detectable in dementia, and less noticeable in depression. The data characterizing speech of people suffering from dementia and people from the control group are disjoint. We obtained 100% accuracy in diagnosing dementia for the tested speech samples. The results of comparisons of speech samples from people suffering from depression with speech samples from the control group show that the diagnosis accuracy in the control group is higher (by 6% on average) than in the group of patients. Moreover, the higher the severity of depression, the higher the accuracy of diagnosis, from 77% to 85%.

REFERENCE

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