Detection of dyslexia in Danish based on eye tracking recordings

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Dyslexia is a learning disorder that affects around 10-20% of the world's population. In Denmark, an official nationwide diagnosis of dyslexia, *Ordblindetesten*, is used, which is designed to reveal phonological decoding difficulties. Technological diagnostic methods are under development internationally, and among these, eye tracking is particularly interesting, as it provides access to rich information about cognitive processing. The purpose of this study is to assess the extent to which machine learning classification of eye tracking data can be used as a diagnostic tool for dyslexia in Denmark. The data collection consists of eye tracking recordings from dyslexic and non-dyslexic readers during natural reading of Danish texts. Here we use an in-depth psycholinguistic analysis where the reading patterns from the two groups of participants are compared. The results show a significant difference in selected measurable eye tracking features. Based on this difference in the data between the two groups of readers, we selected machine learning classifiers among which the best performing model was a Random Forest classifier. This scored an accuracy of 85%, indicating that although there is still some uncertainty, our methods can detect measurable differences in eye movements in dyslexic and non-dyslexic readers, and can thus potentially be incorporated into a screening process.

KEYWORDS: eye tracking; machine learning; dyslexia; reading difficulties; psycholinguistics

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