**PROJECT CODE: 2024-P07**

**Title: Optimal Ensemble Learning Model for Dyslexia Prediction Based on an Adaptive Genetic Algorithm**

**Abstract**

Dyslexia is a form of specialized learning disability that can lead to academic dissatisfaction. Detection is essential yet difficult, especially for languages like Arabic and Spanish that have straightforward orthographies. As seen by the abundance of work given in a wide range of scientific journals, the detection of dyslexia continues to be a key pursuit for the research efforts in a variety of domains. It appears that machine learning and other statistical approaches are quite useful for these tasks, such as those used in the classification of medical datasets. In this paper, we combined principle machine learning models for dyslexia detection. However, a lot of work remains to be done by hand in order to properly categorize the enormous dataset employed during training. Recent research has shown that machine learning models are effective, proving their ability to lessen the workload associated with feature engineering.

However, applying the machine learning model directly to the classification task yields no statistically significant gain in performance. For better machine learning prediction, we introduce an optimal ensemble learning model based on a **genetic algorithm**. Dyslexia feature extraction is first, followed by a hybridization of algorithms for machine learning in step tow of the model. After that, we use an **adaptive genetic algorithm** for select the most optimal weight to combine different machine learning models. We conducted trials on the Dyslexia dataset to show that our proposed technique significantly increases accuracy

This study introduces an optimal ensemble learning model enhanced by genetic algorithms to improve dyslexia detection. We first extract relevant features, then hybridize machine learning algorithms, and finally apply an adaptive genetic algorithm to optimize model weights. Our trials on the Dyslexia dataset demonstrate a significant increase in accuracy, validating the effectiveness of our approach. This method not only reduces manual workload but also offers a statistically significant improvement in predictive performance.