Abstract:

Disrupting handwriting and written expression, dysgraphia is a distinct learning disability that presents a rich challenge for learners, teachers, and clinicians. Clinical testing is currently expensive, time-consuming, and often not accessible in schools, even though early identification of dysgraphia is important for early intervention and therapy. We probed the application of the Florence-2-base vision foundation model for analyzing handwriting samples, to bridge this gap. The model transcribed photographs of handwriting into text using Optical Character Recognition (OCR) and its performance was evaluated against ground-truth labels in the presence of provided prompts. A dataset of Malay handwriting samples was used, consisting of 249 photos from primary school children, who were labeled as having “potential dysgraphia” or “low potential dysgraphia”. The model achieved an average accuracy of 67% (accuracy varied by prompt: 76% for the best prompt, and 61% for the worst). Performance variations were probably due to language differences in the English-trained model and the Malay dataset. Receiver Operating Characteristic (ROC) analysis was conducted, which facilitated the selection of appropriate thresholds based on operational requirements. This work showcases the promise of low-cost, scalable AI-driven tools for dysgraphia detection. Educators may use this as a classroom solution, by grading handwriting assignments through a mobile or web-based application. Further research is needed to adapt models to multilingual, real-world datasets, to enhance robustness in less-controlled environments, and to design user-friendly interfaces for teachers. These innovations will empower many students to access the assistance they need to succeed in their education, marking a significant leap toward equitable education.. We investigated the use of the Florence-2-base vision foundation model to examine handwriting samples in order to close this gap. The model converted handwritten photographs into text using Optical Character Recognition (OCR), and its accuracy was evaluated in comparison to given prompts. The study used a collection of Malay handwriting samples, which included 249 photographs from primary school kids classified as either having "potential dysgraphia" or "low potential dysgraphia." The model obtained an overall accuracy of 67% with accuracy changing by prompt: 76% for the highest-performing prompt and 61% for the lowest. Variability in performance is likely caused by a language mismatch between the English-trained model and the Malay dataset. Receiver Operating Characteristic (ROC) analysis was performed, which would allow for selecting thresholds according to operational needs. This work highlights the potential of AI-driven tools for detecting dysgraphia at low costs and on a large scale. Teachers can use this technology as a classroom solution by assessing handwriting assignments via mobile or web applications. Future work should include adapting the model to multilingual real-world datasets, improving resilience in less-controlled conditions and creating user-friendly interfaces for educators. These developments will allow many students to receive the support necessary to thrive academically, symbolizing a tremendous step forward in equitable education.