

Automated Essay Type Paper Marking System

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Automated paper marking is a very important research tool for the education evaluation process. Some researchers indicated that almost every study's challenge was to get the semantic similarity of an essay rather than keyword matching. Another major problem is the lack of sufficient data that needed to train the system for a specific domain with a supervised learning approach and there are some issues with the unavailability of educator's involvement with the scoring systems, also there were no studies that behave like a complete system. The automated scoring or evaluation for written student responses have been, and are still a highly interesting topic for natural language processing (NLP) and Machine Learning (ML) research. This study is focused on building a complete system that automates essay paper marking with a novel approach using NLP and ML. Primarily, researchers have used a hybrid approach to get the semantic similarity between two textual objects which contain word-vector-similarity, knowledge-based- similarity, and word-order-similarity. As one of the main advantages, our system uses an unsupervised learning approach, so that the system can work independently without training for a specific subject domain. The emerging of word embedding encouraged the calculation of the word-vector-similarity with Vector Space Model and cosine-similarity mechanisms. On the other hand, the word-net knowledge base was used to calculate the semantic distance between the documents and word-order-similarity played a major role in the accuracy of the final result. Also, machine learning techniques and a vast number of NLP techniques have been used for implementation. Besides, the proposed study contains an OCR to identify student's handwritten characters and also a website to easily interact with the system. In conclusion, the system was tested and evaluated with 30 samples of essays and the manual scores given by the educators. As a result, it indicated a strong positive correlation of (0.882) between manual scores and the system scores.

Keywords: Automated essay scoring (AES), Natural language processing (NLP), Machine learning (ML), Optical character reader (OCR)