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Transformer-Driven Multi-Category Classification for an Automated Academic Strand Recommendation Framework

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Abstract : This study introduces a Bidirectional Encoder Representations from Transformers (BERT)-based machine learning model aimed at improving educational counseling by automating the process of recommending academic strands for students. The framework is designed to streamline and enhance the strand selection process by analyzing students' profiles and suggesting suitable academic paths based on their interests, strengths, and goals. Data was gathered from a sample of 200 grade 10 students, which included personal essays and survey responses relevant to strand alignment. After thorough preprocessing, the text data was tokenized, label-encoded, and input into a fine-tuned BERT model set up for multi-label classification. The model was optimized for balanced accuracy and computational efficiency, featuring a multi-category classification layer with sigmoid activation for independent strand predictions. Performance metrics showed an F1 score of 88%, indicating a well-balanced model with precision at 80% and recall at 100%, demonstrating its effectiveness in providing reliable recommendations while reducing irrelevant strand suggestions. To facilitate practical use, the final deployment phase created a recommendation framework that processes new student data through the trained model and generates personalized academic strand suggestions. This automated recommendation system presents a scalable solution for academic guidance, potentially enhancing student satisfaction and alignment with educational objectives. The study's findings indicate that expanding the data set, integrating additional features, and refining the model iteratively could improve the framework's accuracy and broaden its applicability in various educational contexts.

Keywords : tokenized, sigmoid activation, transformer, multi category classification
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