Product Name: AutoCorrect+

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Abstract

AutoCorrect+ is an innovative solution designed to automate the correction of descriptive answer sheets. This solution attempts to simplify the grading process for educators while guaranteeing accuracy, consistency, and time efficiency by utilizing cutting-edge natural language processing (NLP) and machine learning techniques.

There have been several attempts to use computer science to grade students responses. To do this, the majority of the job, however, makes use of conventional counts or certain terms. Additionally, there aren't enough carefully chosen data sets. In order to automatically assess descriptive responses, we suggest a novel method that makes use of a variety of machine learning, natural language processing, and toolkits, including Wordnet, Word2vec, word mover's distance (WMD), cosine similarity, multinomial naive bayes (MNB), and term frequency-inverse document frequency (TF-IDF). Answers are assessed using solution statements and keywords, and the grades are predicted by training a machine learning model.

Literature Review

The advent of technology has drastically changed traditional testing methods, especially in post transcriptional analysis. Several research papers investigate the automation of this important aspect in detail, presenting various techniques and strategies. This literature review brings together the insights of five major papers on the automation of external inference analysis.

The first paper [1] highlights the need for automatic evaluation of descriptive answers. The current framework uses Natural Language Processing(NLP), Data mining, using the concepts of text vectors, keywords, and text summarization. Based on similarity indexes given by examiner in the system uses various NLP tools using semantic analysis.

In the second paper [2], the authors introduces an automated computer assessment approach, offering a step-by-step algorithm considering syntactic, semantic, conceptual similarities, and word sense disambiguation. The proposed model demonstrates convincing results, aligning closely with human evaluations, addressing the longstanding issue of cumbersome manual assessment in descriptive examinations.

The third paper [3], acknowledges the time spent manually finding descriptive answers and emphasizes the need to obtain accurate scores immediately. In contrast to traditional approaches, this paper introduces a contextual research framework. Using natural language processing (NLP) techniques, pre-trained transformer network(BERT) the proposed framework considers the context of the query, which resulted in an impressive accuracy of 95.88% This highlights the importance of information a relevance along with the response assessment emphasis.

The fourth paper [4], emphasizes the importance of reliable and quality automated feedback and grading systems in teaching. Unlike traditional programs, this approach is to check the student codes not only based on running some test cases but also to check the quality of code in cases where test case fail using BASH scripting. The frameworks used are Virtual Programming Lab(VPL) is a plugin for learning and MULE is browser based integrated developed environment(IDE).

The fifth paper [5], proposes a new method of combining artificial neural network (ANN) and natural language processing (NLP) algorithms to find descriptive answers In this comprehensive approach pre-processing techniques . General Answer Comparison using ANN, NLP includes grammar checking using. The results of this fusion approach are compared with faculty evaluations, demonstrating the potential for more efficient and accurate performance in automated grading.

Drawing insights from these documents, AutoCorrect+ aims to combine the strengths of different methods. Recognizing the importance of automation in reducing faculty load, ensuring prompt feedback, and improving the overall grading process, the proposed system provides assessment including context, graphical feedback, and a hybrid of NLP and machine learning techniques. Learning from comparative analysis and the strengths of existing methods, AutoCorrect+ seeks to be a robust and scalable tool for deciphering descriptive answer sheets, and ultimately contributing to educational research more efficient and effective systems.

Product Vision

Purpose of the Product:

AutoCorrect+ seeks to provide educators with a tool that automates the correction of descriptive answers, reducing manual effort and improving grading consistency.

Target Audience:

This product is intended for educators, educational institutions, and examination boards looking for a reliable and efficient solution for grading descriptive answers.

Long-term Vision:

Our vision is for AutoCorrect+ to become the standard in automating descriptive answer sheet correction, evolving over time to meet the diverse needs of educational curriculum.

Product Value

Benefits:

- Time Efficiency: Significantly reduces the time required for grading.
- Consistency: Ensures uniform and unbiased grading across all assessments.

Cost Analysis:

Time and Effort Investment:

Project Planning and Research:

Time: 2 weeks

Effort: 20 hours

Design and Architecture:

Time: 2 weeks

Effort: 45 hours

Development:

Time: 5 weeks

Effort: 75 hours

Value Proposition:

AutoCorrect+ offers speed, accuracy, and efficiency, making it a compelling value proposition. For educational institutions, the product offers a high return on investment because its advantages vastly exceed its associated costs.

Product Creation Outline

Design Overview:

- Utilizes NLP algorithms and machine learning models for accurate assessment.
- Features a user-friendly interface for easy integration into existing workflows.

Development Plan:

- Dataset collection
- Research and Algorithm Development: Investigate and design effective NLP and machine learning models.
- Tokenization using NLKT
- Training NLP and LSTM deep learning model

Resource Requirements:

Python, Tensorflow, Keras, NLP,Front end web applicaion

Quality and Evaluation

Quality Standards:

The autocorrection feature need to reliably offer precise recommendations, reducing false positives and guaranteeing that the text's intended meaning is maintained.

Testing Procedures:

Continuous Testing: Ongoing testing throughout development phases.

Evaluation Metrics:

- Comparative Analysis of Grading Accuracy: Evaluation metrics include a comparative analysis of the grading accuracy achieved by AutoCorrect Pro against traditional manual grading. This involves quantitative measures to demonstrate the efficiency and effectiveness of the automated grading system.
- User Satisfaction Surveys: Surveys of customer satisfaction are carried out to obtain qualitative input from end users. These surveys aid in determining areas for improvement, evaluating the entire user experience, and determining how satisfied users are with the product.

Conclusion

In conclusion, AutoCorrect+ is positioned to revolutionize the grading process for descriptive answer sheets. Its robust value proposition, comprehensive development plan, quality assurance measures, and thoughtful deployment and maintenance strategies make it a reliable and sustainable solution for the education sector.

References

[1] Manjunath, Ravikumar & Kumar, S. & Guruswamy, Shiva. (2021). Automation of Answer Scripts Evaluation-A Review. 10.1007/978-981-33-6691-6_20.

[2] Mohammad Shaharyar Shaukat, Mohammed Tanzeem, Tameem Ahmad, Nesar Ahmad,Chapter 16 - Semantic similarity–based descriptive answer evaluation, Editor(s): Sarika Jain, Vishal Jain, Valentina Emilia Balas,Web Semantics,Academic Press,2021,Pages 221-231,ISBN 9780128224687,https://doi.org/10.1016/B978-0-12-822468-7.00014-6.

[3] A. S. Oasis, A. E. M, D. Sharma, R. Sada and A. Arya, "Question-Centric Evaluation of Descriptive Answers using Attention-Based Architecture," 2022 12th International Conference on Cloud Computing, Data Science & Engineering (Confluence), Noida, India, 2022, pp. 20-25, doi: 10.1109/Confluence52989.2022.9734117.

[4] Emlyn Hegarty-Kelly and Dr Aidan Mooney. 2021. Analysis of an automatic grading system within first year Computer Science programming modules. In Proceedings of the 5th Conference on Computing Education Practice (CEP '21). Association for Computing Machinery, New York, NY, USA, 17–20. https://doi.org/10.1145/3437914.3437973

[5] Lakshmi, V., and V. Ramesh. "Evaluating students' descriptive answers using natural language processing and artificial neural networks." International Journal of Creative Research Thoughts (IJCRT) 5.4 (2017): 3168-3173.