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A RAG-ASAG HYBRID MODEL FOR FORMATIVE ASSESSMENT IN INFORMATICS EDUCATION AT UNIVERSITY

Abstract. The article examines the integration of retrieval-augmented generation (RAG) technology into formative assessment in computer science teaching. Traditional automatic short answer grading (ASAG) methods based only on text similarity do not allow for a deep analysis of student responses in terms of content and context. To solve this problem, a hybrid model combining RAG and ASAG technologies is proposed. As a result of the proposed assessment criteria, the model evaluates student responses not only in terms of language, but also on the basis of computer science knowledge, teaching materials, and expert examples. This approach allows for a more objective and transparent assessment of students' knowledge application, critical thinking, and creativity skills. The research results show that the RAG-based hybrid model provides personalized feedback, facilitates monitoring of the learning process at both the individual and group levels, and develops students' self-directed learning skills.

Keywords: formative assessment, automatic short answer grading (ASAG), RAG technology, computer science teaching, coding skills.

INTRODUCTION

Formative assessment plays an important role in teaching computer science. Formative assessment is a type of assessment used during the teaching process. This assessment is intended to monitor how the student has mastered practical knowledge and skills in the field of computer science and to adjust the teacher's teaching methods [1–3].

The essence of formative assessment is that the weaknesses and strengths of students in the learning process are identified in a timely manner and the course of the lesson is adjusted based on this information. This is especially evident in the teaching of computer science. Computer science, as a field closely related to logic, structured thinking, problem solving and practical applications, requires students to acquire not only theoretical knowledge, but also technical skills that can be applied in real life. The integration of retrieval-augmented generation (RAG) technology into formative assessment gives very successful results [4–6]. This technology is used to visually, clearly and intuitively reflect the current state of students on the subject. The RAG approach demonstrates the extent to which students have progressed and allows the teacher to intervene immediately [7]. As a result of the application of this method, the learning process is accompanied not only by teacher control, but also by the development of student self-learning skills. As a result, RAG technology makes formative assessment in computer science transparent, dynamic and individualized.

1. FOUNDATIONS

Computer science is a subject that requires the formation of algorithmic skills and technical knowledge. The short answers given by students in the process of teaching computer science (for example: explanation of the algorithm, the result of the code, analysis of the programming structure, etc.) cannot be objectively measured by conventional text similarity-based assessment methods. Because the