AI-BASED AUTOMATIC TEST GENERATION FOR SECONDARY SCHOOLS

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Annotation. Artificial Intelligence (AI) is becoming an important part of modern education. It provides new opportunities to improve the teaching and learning process, make educational activities more effective, and reduce teachers' workload. One of the key challenges in secondary schools is preparing test questions that evaluate students' knowledge, skills, and understanding of different subjects.

Keywords. Artificial Intelligence (AI), Automatic Test Generation, Secondary Education, Natural Language Processing (NLP), Educational Technology, Machine Learning, Question Generation, Student Assessment, Digital Learning, Automated Evaluation.

АВТОМАТИЧЕСКАЯ ГЕНЕРАЦИЯ ТЕСТОВ НА ОСНОВЕ ИИ ДЛЯ СРЕДНИХ ШКОЛ

Аннотация. Искусственный интеллект (ИИ) становится важной частью современного образования. Он открывает новые возможности для совершенствования процесса преподавания и обучения, повышения эффективности образовательной деятельности, а также для снижения рабочей нагрузки на педагогов. Одной из ключевых задач в средней школе является составление тестовых заданий, позволяющих оценить знания, умения и понимание учащимися различных учебных предметов.

Ключевые слова. Искусственный интеллект (ИИ), автоматическая генерация тестов, среднее образование, обработка естественного языка (NLP), образовательные технологии, машинное обучение, генерация вопросов, оценивание учащихся, цифровое обучение, автоматизированное оценивание.

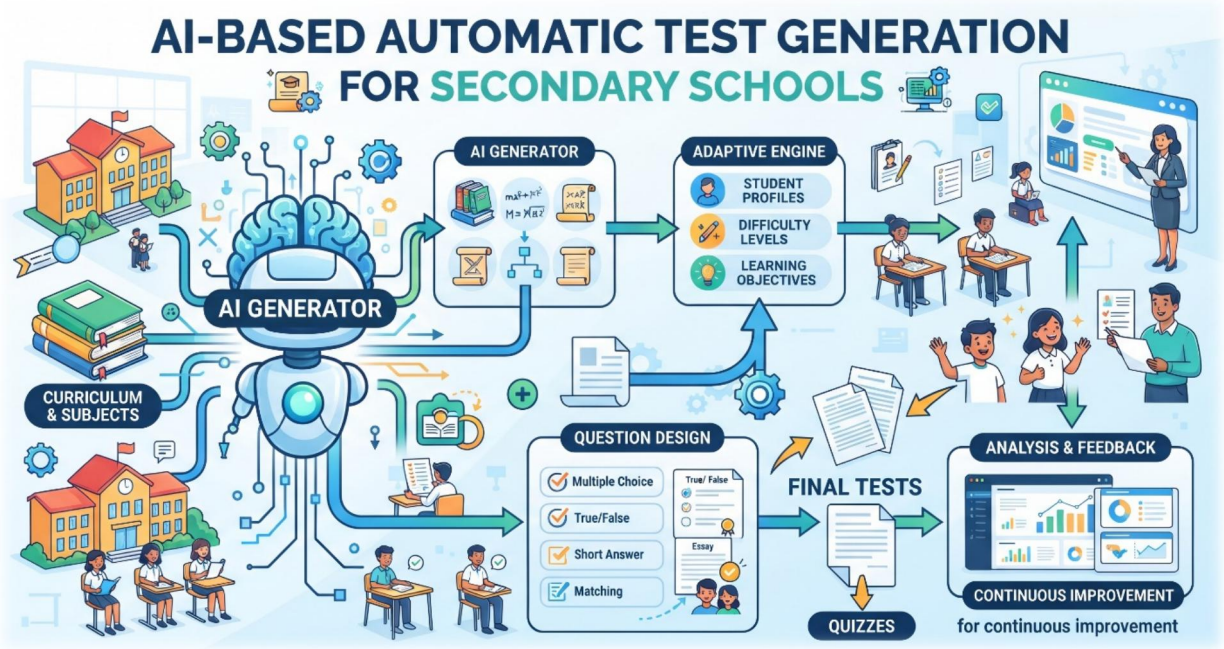
Traditional test preparation requires teachers to spend considerable time creating questions, selecting correct answers, and organizing tests according to students' learning levels. To solve this problem, AI-based automatic test generation systems can be developed. Such systems use artificial intelligence and Natural Language Processing (NLP) techniques to analyse educational materials, identify important concepts, and automatically generate relevant test questions. The proposed system aims to develop an AI-based platform that generates multiple-choice and other types of test questions from textbooks, educational documents, and learning materials used in secondary schools. It can help teachers save time, improve assessment quality, and provide students with more opportunities to practice and evaluate their knowledge. This system can contribute to the digital transformation of secondary education by making the assessment process faster, smarter, and more efficient [1].

The development of an AI-based automatic test generation system involves several important stages. First, the system collects educational materials from different sources, such as PDF files, Word documents, electronic textbooks, and text documents. These materials are processed using Natural Language Processing (NLP) techniques to identify key information, important terms, definitions, and concepts. After analysing the content, the AI model generates different types of questions based on the extracted information. For example, the system can create multiple-choice questions, true/false questions, and short-answer questions. Each question can include several answer options, with one correct answer identified automatically.

Another important feature is the ability to adjust question difficulty levels. The system can generate easy, medium, and difficult questions depending on the educational level and learning

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objectives of secondary school students. This helps teachers prepare suitable tests for students with different knowledge levels.



Picture.1*. AI-based automatic test generation for secondary schools.*

The given (look pic.1) illustrates the working process and main components of an AI-Based Automatic Test Generation System for Secondary Schools. It demonstrates how artificial intelligence can be used to create educational tests, adapt questions to students' knowledge levels, and improve the assessment process [1][2].

1. *Curriculum and Subjects.* The process begins with collecting educational materials from school curricula and different subject areas. These materials provide the basic information required for generating test questions. The system can use textbooks, study materials, and digital documents as input data.

2. *AI Generator.* The AI Generator is the central component of the proposed system. It analyses uploaded educational materials, identifies important concepts, extracts key information, and generates relevant questions. Artificial intelligence helps automate the question preparation process and reduces teachers' manual workload.

3. *Adaptive Engine.* The Adaptive Engine adjusts the generated questions according to students' profiles, difficulty levels, and learning objectives. It helps ensure that tests are appropriate for students' knowledge and educational needs. Questions can be classified into easy, medium, and difficult levels.

4. *Question Design.* The system supports different question formats, including multiple-choice questions, true/false questions, and short-answer questions and matching questions. These formats allow teachers to evaluate students' knowledge from different perspectives and make assessments more effective.

5. *Final Tests and Quizzes.* After question generation and organization, the system produces final tests and quizzes. Teachers can review the generated questions, make necessary corrections, and use them in classroom examinations or practice activities. Students can complete these tests through a digital platform.

6. *Analysis and Feedback.* The final stage focuses on analysing students' test results. The system can automatically evaluate answers; calculate scores, and present performance statistics through charts and reports. This information helps teachers identify learning difficulties and understand students' academic progress.

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7. *Continuous Improvement.* The feedback obtained from students' results can be used to improve future test generation. The system can adjust question difficulty, improve question relevance, and support more effective learning activities.

The diagram presents an integrated approach to automating the educational assessment process in secondary schools. By combining artificial intelligence, natural language processing, adaptive question generation, and automatic evaluation, the proposed system can reduce teachers' workload, save time, and improve the quality of student assessment [3]. Ultimately, it provides an opportunity to make the testing process more flexible, intelligent, and student-centred.

Table 1. *Main Components and Functions of the Proposed AI-Based Automatic Test Generation System.*

No.	Components	Main Functions	Expected Benefits
1	***Curriculum and Subjects***	*Collects textbooks and educational materials.*	*Provides relevant learning content.*
2	***AI Generator***	*Analyses texts and generates test questions.*	*Saves teachers' time.*
3	***Adaptive Engine***	*Adjusts questions according to students' knowledge levels.*	*Supports personalized learning.*
4	***Question Design***	*Creates multiple-choice, true/false, short-answer, and matching questions.*	*Provides different assessment methods.*
5	***Final Tests and Quizzes***	*Organizes questions into complete tests.*	*Simplifies test preparation.*
6	***Analysis and Feedback***	*Evaluates answers and analyses test results.*	*Identifies students' weaknesses.*
7	***Continuous Improvement***	*Uses results to improve future tests.*	*Improves assessment quality.*

As shown in Table.1 (look Tab.1), the proposed system consists of seven main components that work together to automate the test generation and assessment process. Each component performs a specific function, starting from collecting educational materials and generating questions to evaluating student performance. The integration of these components provides an efficient approach to modernizing the assessment process in secondary schools.

The implementation of an AI-based automatic test generation system requires the integration of several modern technologies. Natural Language Processing (NLP) plays an important role in understanding educational texts and identifying meaningful information. Machine Learning algorithms can support the classification of questions according to their difficulty levels and educational objectives. The system can be designed as a web-based application that allows teachers to access its functions through a computer or mobile device. Teachers can upload educational materials, select the required topic, specify the number of questions, and choose the preferred question format. After processing the uploaded content, the system automatically generates a structured test [3]. *An important aspect* of the system is the quality of generated questions. Each question should be relevant to the selected subject, grammatically correct, understandable, and appropriate for the students' age and knowledge level. Therefore, teacher supervision and manual verification remain important parts of the proposed solution.

The proposed AI-based system offers several advantages for secondary educational institutions. *First,* it significantly reduces the time required for preparing examination materials. Teachers can generate multiple test versions from the same educational content without creating every question manually.

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Second, automatic question generation supports personalized learning. Students can receive questions based on their current knowledge and learning progress. This approach provides additional opportunities for independent study and knowledge improvement.

Third, the system improves the efficiency of educational assessment by providing automatic scoring and immediate feedback. Teachers can analyse test results, identify common mistakes, and determine which topics require additional explanation.

Despite its advantages, the development of an AI-based test generation system involves several challenges. One of the main difficulties is ensuring the accuracy and reliability of automatically generated questions. Sometimes, AI models may produce unclear questions, incorrect answer options, or information that is not directly related to the learning material.

Another important challenge is adapting the system to different school subjects, educational standards, and languages. The system should be capable of processing educational materials in Uzbek and other languages used in secondary education.

Future development may include integrating advanced language models, expanding multilingual support, introducing more question formats, and developing personalized learning recommendations. These improvements can make the system more effective and suitable for different educational environments [3][4].

The expected result of this project is the development of an intelligent platform that automates the preparation and evaluation of educational tests in secondary schools. The system is expected to reduce teachers' workload, improve the accessibility of assessment materials, and support students in identifying their knowledge gaps.

Furthermore, the proposed solution can contribute to the digitalization of educational institutions and encourage the effective use of artificial intelligence in the teaching and learning process.

The proposed system can also include a user-friendly interface where teachers can upload learning materials, select a subject, choose the number of questions, and generate tests automatically. Teachers should have the opportunity to review, edit, and approve generated questions before using them in classroom assessments. Furthermore, the system can provide automatic evaluation of students' answers and calculate test results [3][4]. This feature reduces manual checking and allows teachers to identify students' strengths and weaknesses. Based on the results, teachers can improve their teaching methods and provide additional learning materials when necessary.

In conclusion, for this article, implementing artificial intelligence in test generation can make the assessment process more flexible, accurate, and time-efficient. The proposed solution is intended to support secondary school teachers, improve students' learning experiences, and contribute to the development of modern digital education.

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