

## AUTOMATED ASSESSMENT QUESTIONS GENERATION SYSTEMS USING SUPERVISED ALGORITHMS

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### ABSTRACT

Examinations are the only reliable method for assessing the effectiveness of a teacher's lessons and the learning outcomes of students. Traditionally, creating exam questions and assigning them randomly to tests is a time-consuming and labor-intensive process. Manually producing test papers that meet high standards is particularly challenging and time-consuming, especially when evaluating students on technical concepts. Recruiters also prefer to understand students' knowledge and skills through such tests.

Our system automates the generation of test questions from a database containing various technical concepts. To create test papers tailored to candidates' known performance levels, we employ classification algorithms like KNN (k-nearest neighbors), Random Forest Classifier, and Decision Tree, all of which are supervised learning algorithms. By providing questions that match the candidate's knowledge areas, we can more effectively evaluate their expertise. This approach ensures that candidates are tested on relevant concepts, allowing recruiters to accurately assess their capabilities and assign tasks based on their performance.

To assess candidate performance, we have developed a graphical user interface using HTML and CSS. This interface generates questions based on the classified and analyzed data provided by the candidates. Scores are automatically calculated and displayed immediately after the assessment, and they are stored in a database for further evaluation by recruiters.

**Keywords:** Automated questions generation, KNN, Random Forest Classifier, Decision Tree, logistic regression

### 1. INTRODUCTION

The need for personalized education and efficient assessment tools has surged in recent years. Traditional methods of generating questions for educational assessments can be laborious and inconsistent, highlighting the necessity for automated solutions. Concurrently, career pathways are becoming increasingly complex, necessitating advanced predictive tools to guide learners towards suitable roles. This project addresses these demands by offering a framework that automates question generation, evaluates the quality of the generated questions, and predicts user designations using machine learning techniques.

Automating question generation presents several advantages. It enables educators to swiftly create customized tests, alleviating the burden of manual question crafting. This is particularly advantageous in dynamic learning environments where assessments need to be tailored to specific learning objectives. Additionally, automated question generation ensures consistency across tests, leading to a more standardized evaluation process. Assessing the quality of generated questions is crucial to ensure that the tests are educationally meaningful. This project introduces an evaluation component that examines factors such as question clarity, relevance, and diversity, ensuring that the generated tests are not only efficient but also effective in measuring learning outcomes.

Automatic Question Generation (AQG) systems generate questions based on a topic, idea, or context in natural language, derived from either text paragraphs or images. These systems are gaining popularity in applications such as machine reading comprehension, conversational systems, and educational tools. The ultimate goal of AQG systems is to produce questions that are syntactically and semantically correct, and contextually meaningful. For example, some AQG systems aim to generate questions on a specific topic or based on different spans of text in a passage. In conversational systems, like question-asking bots, it is essential to maintain consistency with the conversation context while keeping the user engaged.

### 2. LITERATURE SURVEY

Automated Exam Question Generator Using Genetic Algorithm:

In their 2017 study, Rahim, Aziz, Rauf, and Shamsudin address the challenge educators face in manually preparing high-quality exam questions, particularly within limited time frames. Their research presents an automated system for generating multiple-choice questions using a Genetic Algorithm. This system aims to produce exam questions

covering all six levels of Bloom's Taxonomy, ensuring a comprehensive evaluation of different cognitive domains. Their prototype, tested with 500 sample questions across various chapters, demonstrated a high success rate, achieving a 90% maximum weightage for exam questions. The study highlights the potential for this system to be adapted for various types of exams, quizzes, and test preparations (Rahim et al., 2017).

Question Paper Generator and Answer Verifier:

Pisat, Modi, Rewagad, Sawant, and Chaturvedi (2017) explore the shift from traditional paper-based exams to digital formats. Their system generates objective-based questions, which provide a more consistent and rapid assessment compared to subjective grading. This automated approach not only saves time but also allows teachers to focus on more productive activities. By generating and grading question papers automatically, the system aims to enhance the accuracy and efficiency of student evaluations (Pisat et al., 2017).

Fuzzy Logic Based Intelligent Question Paper Generator:

Kamya, Sachdeva, Dhaliwal, and Singh (2014) propose a model using fuzzy logic for autonomous question paper generation, implemented with MATLAB®. The fuzzy logic model is compared to traditional methods and found to be more reliable, faster, and logical. This approach underscores the importance of efficient exam paper creation, which is crucial for educational institutions to maintain high standards in student evaluations (Kamya et al., 2014).

Review on Automated Examination Question Paper Template Generator:

Ramli, Sivan, and Razalli (2020) review the critical role of examinations in evaluating student performance and the challenges of creating high-quality exam questions. They emphasize the need for careful preparation, proper formatting, and appropriate question selection to ensure the effectiveness of exams. Their review highlights the tedious, time-consuming, and costly nature of manual question paper creation, advocating for automated solutions to improve the process (Ramli et al., 2020). Each of these studies underscores the importance and potential of automated systems in transforming the traditional methods of exam question preparation and student assessment, aiming for efficiency, consistency, and enhanced evaluation quality.

### 3. EXISTING SYSTEM

Template-Based Generation:

□ This method uses predefined templates to create questions. The templates typically contain placeholders that are filled in with specific information from a given text. This approach is relatively simple but can lead to repetitive question formats.

Question Answering Systems:

□ These systems, often designed for information retrieval, can generate questions by reversing the question-answer relationship. They analyze text to identify potential answers and then create questions to match. Some implementations use machine learning models to improve the quality and context of generated questions.

Rule-Based Approaches:

□ This method relies on specific linguistic rules to generate questions. It typically involves identifying particular patterns in the text and transforming them into questions. Although similar to template-based generation, rule-based approaches offer more flexibility due to their dynamic nature.

### 4. PROPOSED SYSTEM

This innovative system revolutionizes the process of generating assessment questions by leveraging advanced machine learning techniques to tailor questions based on the specific skills and capabilities of each candidate. By utilizing supervised classification algorithms, the system accurately identifies and categorizes the skill levels of candidates, ensuring a personalized assessment experience. This approach not only highlights the strengths of each candidate in a precise manner but also aids recruiters and examiners in making informed decisions based on the comprehensive analysis of scores and performance metrics. Unlike traditional assessment systems that rely on static question sets, our system introduces a dynamic element by automatically generating questions that are both random and appropriately challenging. This ensures that each assessment is unique, minimizing the chances of predictability and enhancing the evaluation process. The difficulty levels of the questions are carefully calibrated to match the assessed skills, providing a balanced and thorough assessment experience. To further enhance usability, our system features a user-friendly interface and a robust web application, facilitating seamless interaction for both candidates and administrators. Candidates can easily navigate through the assessment process, while administrators can effortlessly manage the assessments and access real-time performance data. The system automatically stores scores in a centralized database, enabling efficient data management and further analysis.

## 5. METHODOLOGY

The methodology for developing an automated assessment questions generation system using supervised algorithms involves several key steps. First, relevant skills and competencies are identified, and a question database categorized by skill type and difficulty is created. Historical candidate data is collected for model training. Features are extracted from candidate data and questions. Supervised learning algorithms like Decision Trees, Random Forests, SVMs, and Neural Networks are chosen and trained to classify candidates into skill levels. The model's accuracy is evaluated using precision, recall, F1-score, and accuracy metrics, with cross-validation for robustness. An adaptive algorithm dynamically selects questions based on the candidate's skill level and performance, ensuring appropriate difficulty and randomness. A user-friendly web application interface is developed for candidates to take assessments, featuring interactive elements like timers and feedback.

## 6. FUTURE WORK

In the future, enhancing the system with features like automated proctoring and live proctoring can make it more robust and secure. Automated proctoring utilizes AI and machine learning technologies to monitor and analyze test-takers' behavior during assessments, detecting patterns of cheating, unauthorized aids, or suspicious activities through techniques like facial recognition, eye tracking, and keystroke analysis. Live proctoring involves a human proctor who monitors test-takers in real-time via video conferencing, verifying their identity, observing their behavior, and ensuring compliance with exam rules throughout the assessment. Proctoring systems must prioritize data privacy and security, implementing measures to protect the confidentiality and integrity of test-taker data and ensuring compliance with relevant data protection regulations. Another promising feature is personalization, similar to how Netflix suggests shows based on user preferences. Future assessment systems could tailor questions to individual learners by analyzing their learning styles and knowledge levels. For example, if a student is struggling with fractions in math, the system could provide additional questions focused on that topic until the student improves.

## 7. CONCLUSION

The proposed system effectively addresses the primary goal of automatically generating test questions based on candidates' performance. It includes a user-friendly interface that allows candidates to take assessments, with their scores stored in a database for future reference. Various algorithms are employed to classify students based on their performance with high accuracy. The automated question generation component utilizes techniques such as sentence tokenization and noun phrase extraction to create objective test questions that are clear, relevant, and varied. The designation prediction component employs a Random Forest classifier to accurately predict user designations based on their test results and other skills. Overall, this platform provides a comprehensive solution for automated assessment and designation prediction. It is valuable in both educational and corporate training contexts, supporting efficient and meaningful evaluation processes.

## 8. REFERENCES

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