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AUTOMATED ASSESSMENT QUESTIONS GENERATION SYSTEM USING SUPERVISED ALGORITHMS

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ABSTRACT
Assessments are crucial for evaluating students' knowledge and improving instructional effectiveness. However, designing high-quality exam questions manually is both time-intensive and complex, particularly in technical subjects. This paper introduces an Automated Assessment Question Generation System that employs supervised learning techniques such as K-Nearest Neighbors (KNN), Random Forest, and Decision Tree to create tailored exam questions. By analyzing a structured database of subject concepts, the system ensures assessments are both comprehensive and adaptive. The platform includes an intuitive user interface, automated scoring, and efficient result storage, enhancing the overall assessment process for educators and recruiters. This system not only streamlines test creation but also enhances the accuracy and fairness of student evaluations.

Keywords:
Automated assessment, questions generation, supervised learning, KNN, Random Forest, Decision Tree, machine learning

INTRODUCTION

With the rising demand for personalized education and efficient evaluation methods, the need for automation in assessment processes has grown significantly. Traditional methods of test creation require considerable time and effort, leading to inconsistencies in evaluation. This project addresses these challenges by introducing an automated approach to question generation that not only creates diverse and high-quality assessments but also utilizes machine learning techniques for precise evaluation.

Implementing automation in question generation offers multiple advantages, including faster test creation, improved consistency, and alignment with specific learning goals. In adaptive learning environments, it is essential to have assessments that match students' competency levels. Our system ensures the relevance and diversity of generated questions by incorporating an evaluation module that checks for clarity, coherence, and suitability.

Automated Question Generation (AQG) systems generate test questions by analyzing textual content and formulating meaningful queries. These systems are widely utilized in digital education platforms, machine reading comprehension, and AI-driven learning applications. The goal is to ensure that generated questions are structurally sound, semantically accurate, and contextually relevant, providing a standardized evaluation method for students.

LITERATURE SURVEY

Several research studies have contributed to advancements in automated question generation techniques:

- Rahim et al. (2017) proposed an approach utilizing Genetic Algorithms to generate multiple-choice questions, ensuring comprehensive coverage of Bloom's Taxonomy. The study reported a 90% success rate in maintaining exam question quality.
- Pisat et al. (2017) introduced a digital assessment framework that shifts from traditional exam settings to an objective-based automated system, improving evaluation accuracy.

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- Kamya et al. (2014) implemented a fuzzy logic-based method in MATLAB® to streamline question paper generation, which proved to be faster and more reliable than conventional methods.
- Ramli et al. (2020) conducted a review on the difficulties of manual question paper creation, advocating for automated solutions that enhance efficiency while maintaining cost-effectiveness.

EXISTING SYSTEM

Current question generation systems rely on several traditional approaches:

- **Template-Based Question Generation:** This method utilizes predefined question formats where specific details are inserted. While efficient, it often results in repetitive question structures.
- **Question Answering-Based Systems:** These systems generate questions by analyzing texts and deriving question-answer relationships, enhancing question quality with the help of machine learning techniques.
- **Rule-Based Techniques:** This approach applies linguistic rules to convert statements into questions, offering greater flexibility compared to template-based methods.
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PROPOSED SYSTEM

Our system enhances the question generation process by implementing machine learning techniques to tailor assessments to candidates' skill levels. The key features include:

- **Supervised Classification Algorithms:** Utilizes Decision Trees, Random Forest, and Support Vector Machines (SVMs) to classify candidates based on skill level.
- **Dynamic Question Selection:** The system generates unique and appropriately challenging questions, ensuring a balanced assessment.
- **User-Friendly Interface:** A web application provides an intuitive experience for candidates and administrators.
- **Automated Scoring & Performance Analysis:** Scores are stored in a centralized database for efficient data management.

METHODOLOGY

The methodology follows a structured approach:

1. **Data Collection:** Gathering candidate data and creating a categorized question database.
2. **Feature Extraction:** Extracting key attributes from candidate responses and questions.
3. **Model Training:** Training supervised learning algorithms such as Decision Trees, Random Forest, SVMs, and Neural Networks to classify candidates.
4. **Evaluation Metrics:** Assessing the model using precision, recall, F1-score, and accuracy.
5. **Adaptive Algorithm:** Dynamically selecting questions based on skill levels to ensure an appropriate challenge.
6. **Web Application Development:** Creating an interactive assessment platform with real-time feedback mechanisms.

RESULTS AND DISCUSSION

The implemented system successfully automates the process of generating assessment questions based on predefined criteria. By leveraging supervised learning techniques, the system effectively classifies students and assigns suitable questions, ensuring a balanced evaluation process. Experimental results indicate that the model achieves high accuracy in predicting the appropriate question difficulty based on student performance data. Furthermore, the automated scoring system provides instant feedback, enhancing the assessment experience. The user-friendly interface allows seamless interaction, making the platform a valuable tool for educational institutions and recruitment processes. Overall, the system demonstrates efficiency, reliability, and adaptability in automated question generation.

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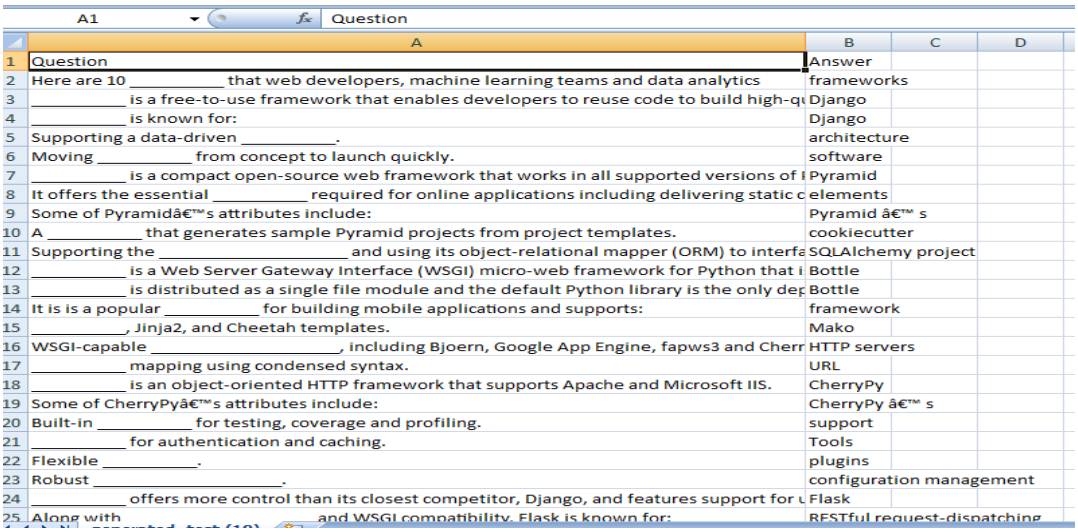

	A	B	C	D
1	Question	Answer		
2	Here are 10 _____ that web developers, machine learning teams and data analytics	frameworks		
3	_____ is a free-to-use framework that enables developers to reuse code to build high-q	Django		
4	_____ is known for:	Django		
5	Supporting a data-driven _____.	architecture		
6	Moving _____ from concept to launch quickly.	software		
7	_____ is a compact open-source web framework that works in all supported versions of	Pyramid		
8	It offers the essential _____ required for online applications including delivering static c	elements		
9	Some of Pyramidâ€™s attributes include:	Pyramid â€™ s		
10	A _____ that generates sample Pyramid projects from project templates.	cookiecutter		
11	Supporting the _____ and using its object-relational mapper (ORM) to interfa	SQLAlchemy project		
12	_____ is a Web Server Gateway Interface (WSGI) micro-web framework for Python that i	Bottle		
13	_____ is distributed as a single file module and the default Python library is the only dep	Bottle		
14	It is is a popular _____ for building mobile applications and supports:	framework		
15	_____, Jinja2, and Cheetah templates.	Mako		
16	WSGI-capable _____, including Bjoern, Google App Engine, fapws3 and Cherr	HTTP servers		
17	_____ mapping using condensed syntax.	URL		
18	_____ is an object-oriented HTTP framework that supports Apache and Microsoft IIS.	CherryPy		
19	Some of CherryPyâ€™s attributes include:	CherryPy â€™ s		
20	Built-in _____ for testing, coverage and profiling.	support		
21	_____ for authentication and caching.	Tools		
22	Flexible _____.	plugins		
23	Robust _____.	configuration management		
24	_____ offers more control than its closest competitor, Django, and features support for u	Flask		
25	Along with _____ and WSGI compatibility, Flask is known for:	RESTful request-dispatching		

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FUTURE WORK

Future enhancements include:

- **Automated & Live Proctoring:** AI-based proctoring using facial recognition, eye tracking, and keystroke analysis to prevent cheating.

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- **Personalized Assessments:** Adaptive learning approaches to tailor question difficulty based on individual learning styles.
- **Data Privacy & Security:** Implementing robust measures to ensure compliance with data protection regulations.

CONCLUSION

This study presents a machine learning-based Automated Assessment Questions Generation System that enhances test creation, ensuring a dynamic and personalized evaluation process. By leveraging supervised classification algorithms, the system categorizes candidates based on skill levels and generates appropriate questions accordingly. A web application with an intuitive interface allows seamless user interaction, while automated scoring and result storage improve efficiency. The proposed system is highly beneficial for educational institutions and corporate training, offering a reliable and scalable assessment solution.

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