



ISSN: 2350-0328

**International Journal of Advanced Research in Science,
Engineering and Technology**

Vol. 11, Issue 3, March 2024

DEEPQUEST: A Deep Learning Approach for Generating Questions in Paper Format for Context Relevant Data

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ABSTRACT:

In the modern era, the automation of things in the field of teaching pedagogy plays a key role in better efficiency and creativity. The proposed system utilizes advanced Deep learning (DL) algorithms such as natural Rule-based to analyze and understand the context of the input text. Additionally, the system leverages DL models to identify key concepts, topics, and their interrelationships by tokenization of words and sentences. The project also incorporates mechanisms, allowing educators to provide input on question styles and preferences. This adaptive approach helps in fine-tuning the system to better suit the specific requirements of different educational settings. The proposed system reduces the time and effort required for the creation of a question paper but also enhances the quality and relevance of the questions generated. By leveraging NLP and DL techniques, this project contributes to the evolution of educational assessment systems, providing a more efficient and adaptive approach to question paper generation. This system can handle multiple types of user input data and can generate questions from the syllabus, question bank, and particular text. Question papers generated can be instantly used for teaching purposes because the suggested solution automates the process of creating them in PDF format.

Index terms:

Question paper, Natural language tool kit, NLP, rule-based, Tokenization, PDF format, instant solution.

I.INTRODUCTION

The creation of question papers stands as a pivotal aspect of educational assessment, serving to evaluate students' comprehension and mastery of various subjects. However, conventional methods of question paper generation often entail substantial manual effort and may not consistently yield assessments aligned with learning objectives. In response, this project presents an Automated Question Paper Generation System, harnessing advanced Natural Language Processing (NLP) and Deep Learning (DL) techniques to streamline the process and enhance customization based on user preferences.

Within the framework of this system, word and sentence tokenization constitute fundamental preprocessing stages in the question generation pipeline. Word tokenization involves segmenting the input text into individual tokens, facilitating the analysis and comprehension of linguistic structures. Similarly, sentence tokenization partitions the input text into sentences, aiding in discerning key concepts and contextual relationships.

Upon receiving user input, encompassing specific topics, difficulty levels, and other preferences, the system initiates tokenization to extract pertinent information. Word tokenization enables the identification of relevant keywords and concepts from the user's input, while sentence tokenization enhances comprehension of the provided information's context and structure.



ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

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Furthermore, the system integrates feedback mechanisms, empowering users to contribute insights on question styles and preferences and fostering iterative refinement of the question generation process. Upon generating questions, the system compiles them into a structured question paper format and utilizes PDF generation libraries to create a finalized PDF document, facilitating convenient distribution and accessibility.

A. Limitation of Paper-based Systems:

As with most human working processes, this system suffers due to bias. There might be some questions that are repeated in many question papers as the professor has a personal inclination towards them. So there is no guarantee of the pure randomly generated question paper. Other problems that may plague this system are the non-availability of staff and resources, natural calamities and accidents. Also, the security of the system can be easily compromised if leverage over the person responsible for generating question papers is obtained.

- Insufficient storage space
- Easy to Damage
- Inefficient document transportation
- Supply costs.
- Poor environmental credentials
- Limited collaboration
- Editing problems

B. Analysis of Paper-Based System:

From the above analysis, we know that we need an integrated Question Paper Generation System with improvements in speed, efficiency, controlled access to the resources, randomization of questions, and security. In addition, the system should perform tasks in the fastest way without violating the rule-based hierarchy and their access rights policy, provide a central database for data storage, ensure security and optimize the system's overall performance.

C. NLTK:

NLTK, an abbreviation for Natural Language Toolkit, serves as an essential tool in the domain of Natural Language Processing (NLP), where data, text, or speech undergo manipulation through software or devices. In essence, NLP endeavors to simulate human interactions, comprehending diverse nuances and furnishing relevant responses, albeit executed through computational methods rather than human cognition. NLTK, a prominent NLP library, offers a comprehensive suite of tools and functionalities to empower machines to grasp human language and produce fitting responses. Its extensive collection of libraries encompasses tasks such as text processing, classification, tokenization, stemming, tagging, labeling, parsing, and semantic reasoning. Tokenization, a pivotal aspect of NLP, involves the segmentation of sentences into tokens and punctuation marks before proceeding with data processing. This meticulous procedure ensures that textual data is appropriately dissected and prepared, laying a solid foundation for subsequent NLP tasks and analyses.

D. Tokenization.

In this project, tokenization plays a pivotal role as an initial step in preprocessing user input and text data. Tokenization involves breaking down the input text into smaller, more manageable units such as words or sentences. Word tokenization segments the input text into individual words or tokens, facilitating the extraction of key concepts and relevant information. Similarly, sentence tokenization partitions the text into coherent sentences, providing a deeper understanding of the context and structure of the input. By integrating both word and sentence tokenization techniques, the system improves its ability to accurately interpret user input, identify essential concepts, and generate customized question papers tailored to the user's preferences and specifications.



ISSN: 2350-0328

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E. Summarization.

In the project, tokenization is a crucial step in the preprocessing of textual data, particularly in the context of Natural Language Processing (NLP). Tokens are essentially the individual units into which a piece of text, such as a sentence or a paragraph, is divided. This division allows the system to process and analyze the text more effectively, as each token represents a distinct element that can be examined independently.

To summarize how tokens are utilized in the project:

1. input processing
2. word tokenization
3. Sentence tokenization
4. combining sentences
5. analysis and generation

F. PDF FORMAT

The system we've developed generates question papers formatted in PDF, providing a flexible and universally compatible method for presenting and circulating these assessments. Within this digital document, each page meticulously organizes the questions, adhering to the structure of a typical question paper. By opting for the PDF format, we ensure that the paper's layout, fonts, and graphics remain consistent across diverse devices and platforms, thereby guaranteeing readability and coherence for all users. Moreover, PDF documents support an array of advanced functionalities such as hyperlinks, bookmarks, and metadata, enabling seamless navigation and efficient content indexing. Given its robust features and widespread acceptance, the PDF format emerges as an optimal medium for creating and disseminating question papers in educational settings.

G. Deployment:

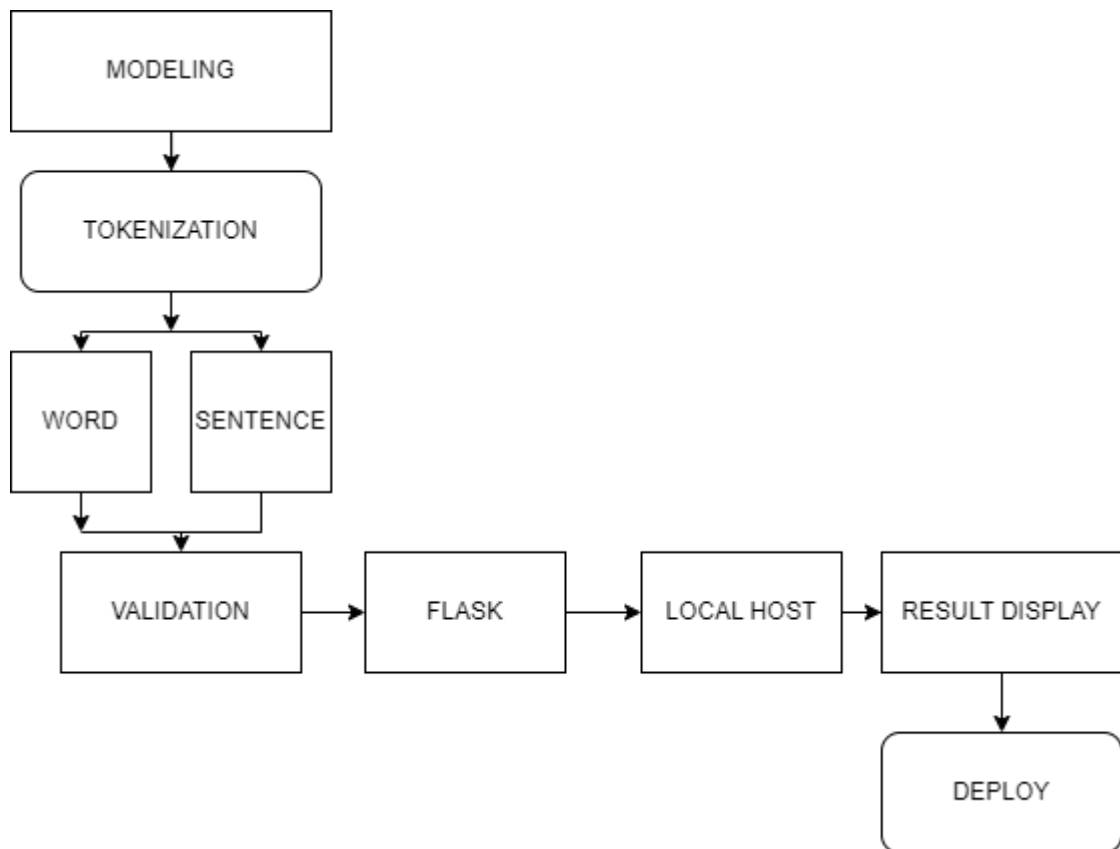
This project is deployable on platforms like Streamlit and AWS, enhancing its accessibility and scalability. Streamlit offers a user-friendly interface for deploying data science projects, allowing seamless interaction with the system's features. By integrating our question paper generation system with Streamlit, users can input preferences, generate papers, and visualize results in real time. Additionally, AWS provides robust cloud infrastructure for hosting and scaling applications. Leveraging AWS services like EC2 and S3, we've successfully deployed our system, ensuring reliability and scalability. Overall, deploying on platforms like Streamlit and AWS enhances usability and accessibility, empowering users to efficiently generate question papers.

II. LITERATURE REVIEW

1. In a literature review from 2022, R. K. Singh and P. Kumar conduct an analysis of methodologies utilized in question paper generation systems. Their examination encompasses rule-based, template-based, and machine learning-based approaches. They underscore the critical importance of meticulous system design and thorough evaluation processes to guarantee the efficacy and dependability of these systems.
2. In a comparative literature review dated 2023, P. S. Reddy and S. V. Rao delve into various methodologies employed in the development of question paper generation systems. They meticulously examine the merits and demerits of rule-based, template-based, and machine-learning-based approaches. The authors accentuate the significance of taking into account the difficulty level and the quality of questions generated, underlining the importance of these factors in the evaluation and enhancement of such systems.
3. In their literature review dated 2024, S. S. Srivastava and N. K. Singh introduce a framework aimed at automating question paper generation. They advocate for the inclusion of a question database and a robust question selection algorithm as essential components for ensuring the efficacy of such systems. Additionally, the authors delve into the potential of language processing techniques, including tokenization, part-of-speech tagging, and named entity recognition, highlighting their significance in optimizing the generation process.
4. In a literature review published in 2021, S. Patil and A. Deshpande explore the application of natural language processing (NLP) in question paper generation systems. The authors advocate for the utilization of machine learning techniques to enhance the quality of generated questions. They propose leveraging tokenization, part-of-speech tagging, and named entity recognition to augment the system's accuracy and effectiveness in processing textual data for question generation.

5. in 2024, A. K. Sharma and A. Kumar delve into the application of machine learning techniques in question paper generation systems. They propose leveraging a substantial dataset comprising past question papers to train machine learning models for the purpose of generating new questions. Additionally, the authors underscore the significance of meticulously considering the difficulty level and the diversity of the questions generated, emphasizing the importance of these factors in ensuring the effectiveness and relevance of the generated questions.

III. PROPOSED SYSTEM



Our proposed system aims to revolutionize the process of generating question papers by harnessing state-of-the-art Natural Language Processing (NLP) and Machine Learning (ML) techniques. By seamlessly integrating these technologies, our system offers a streamlined and customizable approach to question paper creation while ensuring the highest standards of quality and relevance. At the core of our system lies a robust preprocessing stage, where diverse textual data sources, including textbooks and previous question papers, are carefully curated and analyzed. Through sophisticated NLP algorithms, key concepts and semantic relationships are extracted, providing the foundation for question generation. Machine learning models are then employed to craft questions tailored to user preferences, such as topic, difficulty level, and question type. Additionally, our system incorporates robust evaluation mechanisms to assess the efficacy and diversity of the generated questions, facilitating continuous improvement based on user feedback. Hosted on cloud-based platforms for scalability and accessibility, our system represents a game-changing solution for educators seeking efficient, personalized, and reliable question paper generation aligned with educational objectives.



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IV.RESULTS:

AI questions Generator

GENERATE QUESTIONS

Input Text

Input Text?

Choose Question Type

Objective

No. of Questions

No. of Questions

Generate

AI questions Generator

GENERATE QUESTIONS

Input Text

models, but typically allows for much more flexible structure to exist among those alternatives. The three main classes of ensemble learning methods are bagging, stacking, and boosting, and it is important to both have a detailed understanding of each method and to consider them on your predictive modeling project

Choose Question Type

Subjective

No. of Questions

10

Generate



ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 11, Issue 3, March 2024

Environment overview - events x KKR and KSR inmstitute of Tech x +

Not secure project-ai-env.eba-bqbpjuj.us-east-1.elasticbeanstalk.com/test_generate

Gmail YouTube Maps Dashboard - Great L... AWS Free Tier YouTube CollegeVine Student Login Internet Speed Test... All Bookmarks

Generated Questions

Copy CSV Excel PDF Print Search:

Questions

Define MODELING PROJECT.

Explain in detail INTELLIGENCE PROBLEM.

Explain in detail UNDERSTANDING OF EACH METHOD.

Showing 1 to 3 of 3 entries Previous 1 Next

made by CSE-AI

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about:blank

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Questions

Define MODELING PROJECT.

Explain in detail INTELLIGENCE PR

Explain in detail UNDERSTANDING

Print 1 page

Destination Save as PDF

Pages All

Pages per sheet 1

Margins Default

Options Headers and footers Background graphics

Save Cancel

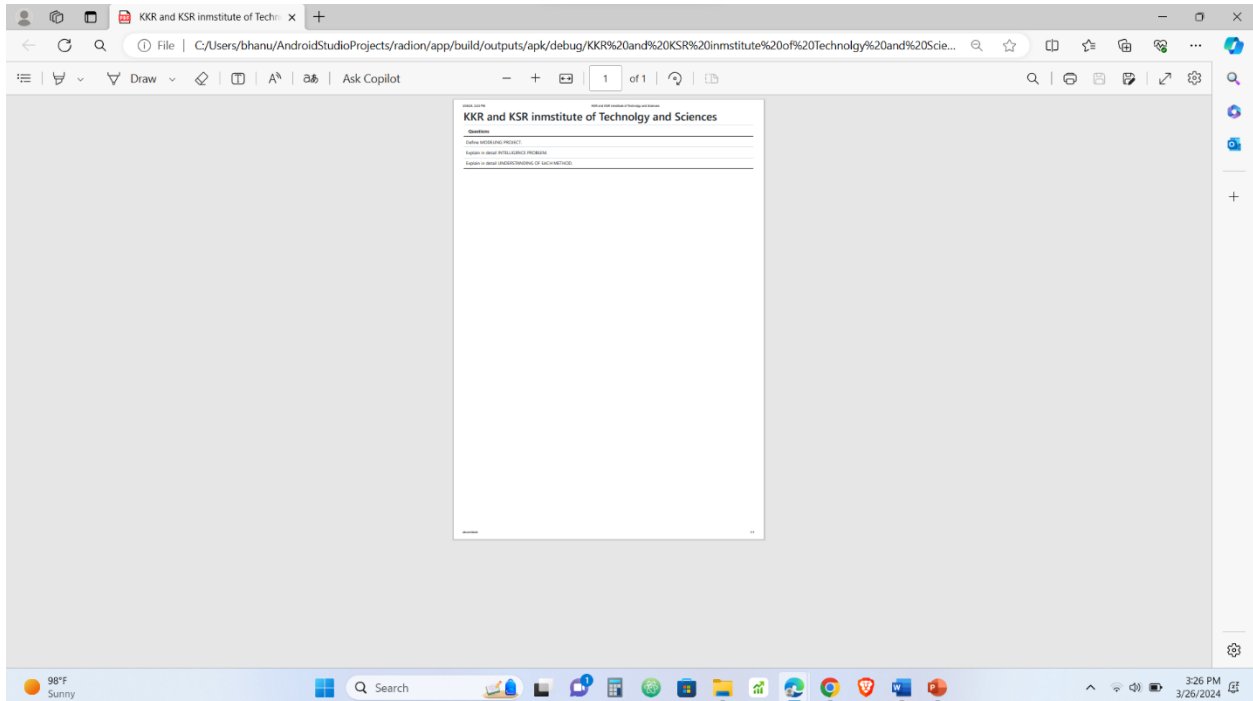
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V.ACCURACY:

sno	asked	generated	accuracy
1	2	2	100%
2	3	3	100%
3	5	5	100%
4	8	5	70%
5	10	10	20%

The project highlights a notable trade-off between the quantity and quality of questions generated. When tasked with producing a smaller number of questions, the system may prioritize efficiency, employing simpler algorithms and fewer computational resources to expedite the process.. Conversely, when generating a larger volume of questions, the system can allocate more resources and utilize more advanced algorithms, leading to improved accuracy.. Therefore, while the system can efficiently generate question papers for both small and large sets, users should consider the potential trade-off between quantity and quality based on their specific needs and priorities.

VI.ACKNOWLEDGEMENT

This paper introduces an automated model for Question Paper Generation, successfully deployed as a real-time application at KITS College in Guntur. Departing from traditional methods, our system represents a shift towards automation while ensuring controlled access to resources. Central to our approach is the understanding of users and their roles within the institution, enabling tailored access and permissions. A critical aspect of our system is the incorporation of randomization in the paper generation process, ensuring variability and unpredictability to prevent pattern emergence. We have implemented an efficient algorithm facilitating total randomization, eliminating question repetition across consecutive papers. Additionally, our system differentiates between administrators and subordinates based on their roles, ensuring refined and controlled resource access. In summary, our automated Question Paper Generation system offers advancements in controlled resource access, randomized question papers, and a secure platform, enhancing the efficiency, integrity, and security of the paper generation process at KITS College and similar educational institutions.



ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 11, Issue 3, March 2024

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