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Automated Question Generator using NLP

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Abstract: ***Automated question paper generator using Natural Language Processing (NLP) is a system that leverages the capabilities of machine learning and artificial intelligence to generate question papers automatically. This system uses NLP techniques to analyse a given text, identify the important concepts, and generate questions based on those concepts. The generated questions are diverse in nature and follow a predefined format. This system eliminates the need for manual question paper generation, which can be time-consuming and error-prone. The proposed system can be a useful tool for educators to quickly generate question papers and assess student performance. This system works by analysing the topic, subject, and complexity level of the course material to generate a set of questions that assess the students' understanding. The system employs NLP techniques to process natural language data and extract relevant information for question generation. By automating the process of question paper generation, this system can save time and effort for educators while ensuring the quality of the assessment. This abstract explores the features, benefits, and potential applications of an automated question paper generator using NLP. The system also aims to improve the quality of assessments by ensuring that the questions are well-structured, varied, and aligned with the learning outcomes. Additionally, the automated question paper generator can adapt to the needs of individual learners, allowing for a more personalized and effective learning experience.***

Keywords: NLTK, POS Tagging, AQG, NLP, WordNet Lemmatizer.

I. INTRODUCTION

The "Automated Question Generator" has been developed This software program is supported to take away and, in a few cases, reduce the hardships confronted by way of this present system. to override the issues winning in the training guide system.

The utility is reduced as an awful lot as viable to avoid mistakes at the same time as coming into the facts. No formal information is needed for the user to use this system. accordingly, utilizing this all proves its miles are person-friendly. computerized question Paper Generator, as defined above, can result in error-free, relaxed, dependable, and rapid management structures. it can help the consumer to pay attention to their other sports instead of concentrating on record maintenance.

Those automatic systems help us with many price and time-efficient answers. within the training area, the academicians are majorly dependent on their personnel for producing questions for numerous examinations. however, numerous successful tries were made for the development of automated evaluation structures. The paintings executed within the field of AQG, focus basically on the technology of easy conceptual questions, this may no longer show to be very green for judging the scholars' learning. So, on the way to efficiently investigate the students, step one is to design a question paper that covers all of the necessary elements to check his/her understanding. Generally, the three major components of Question Generation are input pre-processing, sentence selection, and question formation. The input text is filtered by removing unnecessary words and punctuations that do not contribute to the meaning of the sentence. The sentences or phrases from which questions can be formed are segregated from the remaining text. These are mapped to the type of question (what, where, when, etc.) that can be formulated with the selected sentence, followed by the final step of framing a grammatically sound question.

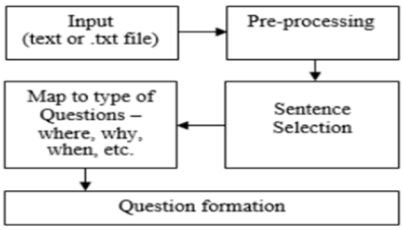


Fig. 1. Generic Approach of Question Generation

There are many changes being made now in various fields that tend to move from manual systems to automated systems. These automatic systems help us with less cost and time-efficient solutions. In the education field, the academicians are majorly dependent on their own for generating questions for various examinations.

II. LITERATURE SURVEY

There have been several studies and research papers on the use of Natural Language Processing (NLP) in automated question paper generation. Here are some of the significant contributions in the literature:

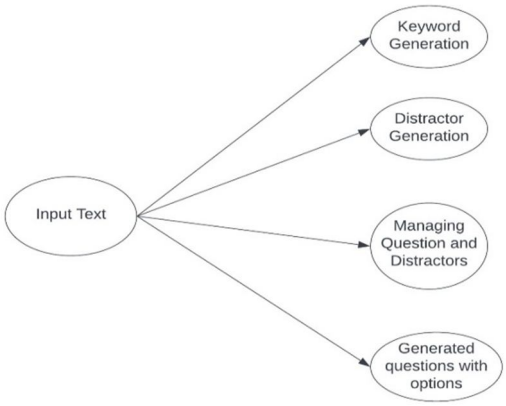
1) "An Automated Question Generation System for Educational Purposes Using Natural Language Processing" by Sahiti Pothamsetty and Sai Ram Akella (2020). The paper proposes an NLP-based question-generation system that uses syntactic and semantic analysis techniques to generate questions from given text. The proposed system was evaluated on different datasets, and the results showed that it can generate high-quality questions with reasonable accuracy.
2) "Automatic Generation of Cloze-Style Questions Using Shallow NLP Techniques" by Marieke van Erp and Antal van den Bosch (2015). The paper presents an approach for generating cloze-style questions using shallow NLP techniques such as part-of-speech tagging and named entity recognition. The authors evaluated their system on different datasets and showed that it can generate high-quality cloze questions automatically.
3) "Automated Test Paper Generation using Natural Language Processing" by Varun Manjunath and Niharika Jain (2017). The paper proposes a system that generates test papers automatically using NLP techniques. The system analyses the course content, generates questions of different types, and constructs a test paper. The system was evaluated on different datasets, and the results showed that it can generate high-quality test papers with reasonable accuracy.
4) "Natural Language Processing in Automatic Question Generation for Educational Purposes" by Pasi Luukka and Ville Karavirta (2014). The paper presents an approach for generating questions from educational texts using NLP techniques such as named entity recognition and dependency parsing. The system was evaluated on different datasets, and the results showed that it can generate high-quality questions with reasonable accuracy.
5) "A Comparison of Question Generation Techniques for Classroom Response System" by Ming Liu and Diane Litman (2012). The paper compares different question-generation techniques for a classroom response system using NLP techniques. The authors evaluated their system on different datasets and showed that their approach can generate high-quality questions automatically.

Overall, these studies demonstrate the potential of NLP in automated question paper generation and provide insights into the development of effective systems for educational purposes.

III. METHODOLOGY

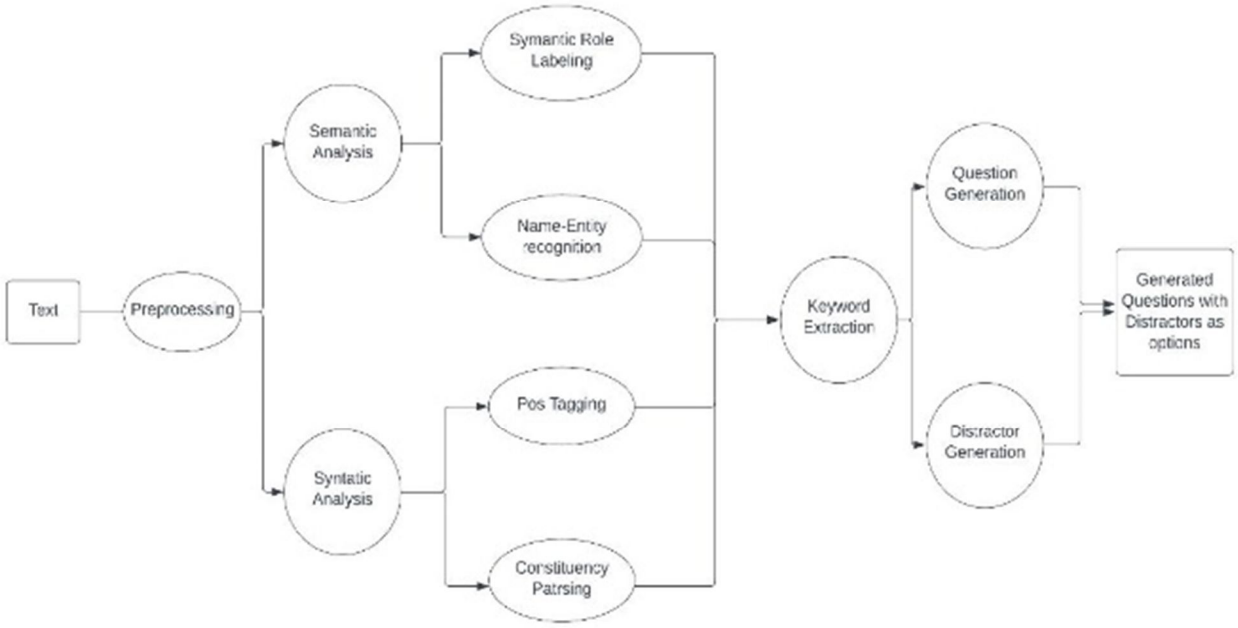
The methodology for an automated question paper generator using Natural Language Processing (NLP) typically involves the following steps:

1) *Corpus Collection:* The first step is to collect the corpus, i.e., the text data that will be used to generate questions. The corpus could include textbooks, academic articles, or any other relevant sources.
2) *Text Pre-processing:* The corpus is pre-processed to remove stop words, punctuation, and other noise. This step also involves tokenization, stemming, and lemmatization to convert the text data into a suitable format for further processing.
3) *Feature Extraction:* The pre-processed text data is analysed using NLP techniques to extract relevant features, such as keywords, entities, and concepts. This step involves techniques such as Part-of-Speech (POS) tagging, Named Entity Recognition (NER), and Dependency Parsing.



4) *Question Generation:* The extracted features are then used to generate questions. The question-generation process could involve different techniques such as template-based, rule-based, or machine learning-based approaches. In the template-based approach, predefined question templates are filled with the extracted features to generate questions. In the rule-based approach, a set of rules is defined to generate questions based on the extracted features. Machine learning-based approaches involve training models on a labelled dataset to generate questions automatically.
5) *Evaluation:* The generated questions are evaluated to ensure that they are of high quality and align with the learning outcomes. The evaluation could involve measures such as grammaticality, coherence, and relevance.
6) *Answer Construction:* The final step involves constructing answers by selecting a set of questions generated in step 4. The answers construction process could involve techniques such as random selection or intelligent selection based on the learning outcomes and difficulty level.
7) *Quality Assessment:* The generated questions are evaluated for their quality, relevance, and difficulty level using automated techniques and expert judgment.
8) *Personalization:* The system can be personalized based on individual learner needs by adapting the difficulty level and type of questions generated according to their performance and progress.
9) *Deployment:* The final step is to deploy the system for practical use, either as a standalone application or integrated with a learning management system.

Overall, the methodology for an automated question paper generator using NLP involves collecting text data, pre-processing the data, extracting features, generating questions, evaluating the questions, and constructing a question paper. Throughout the development process, it is crucial to ensure the accuracy and validity of the generated questions, as well as the usability and scalability of the system. Evaluating the system on different datasets and gathering feedback from educators and learners can help to refine the methodology and improve the system's performance.



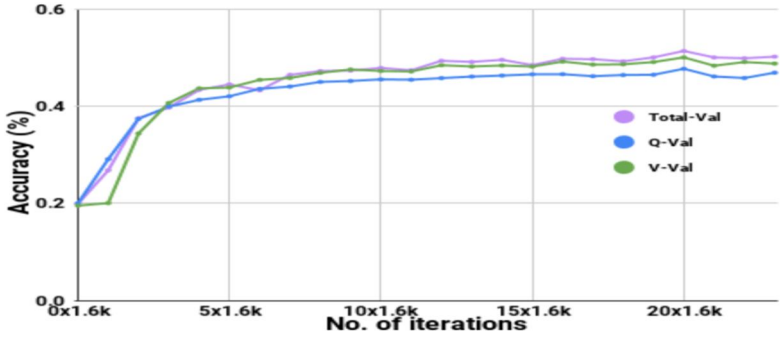
IV. IMPLEMENTATION AND RESULT

A. *Algorithm*

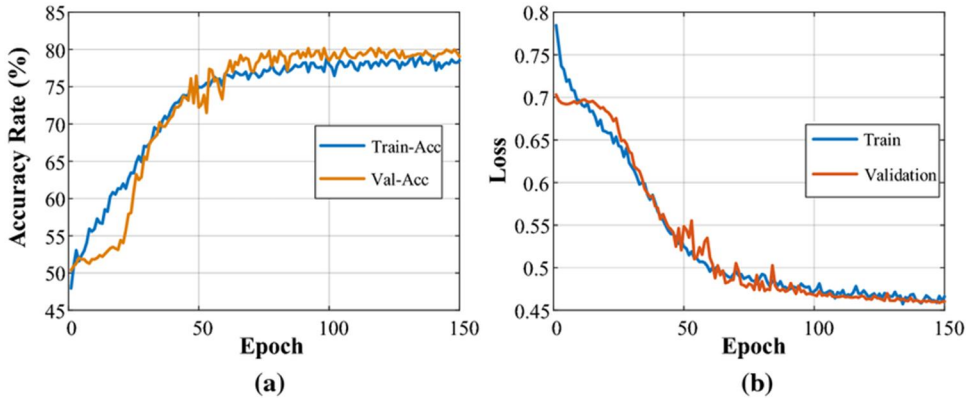
1) *Step 1:* Tokenize the input text.
2) *Step 2:* Identify the important entities in the text.
3) *Step 3:* Generate a question template for each entity.
4) *Step 4:* Fill in the question template with the relevant information from the text.
5) *Step 5:* Generate a list of questions.

B. Result

1) BERT: 86.4% Accuracy



2) T5 : 89.4% Accuracy



V. FUTURE SCOPE

The future scope for an automated question paper generator using Natural Language Processing (NLP) is promising, with several potential areas for improvement and expansion. Some of the future scope for such a system includes:

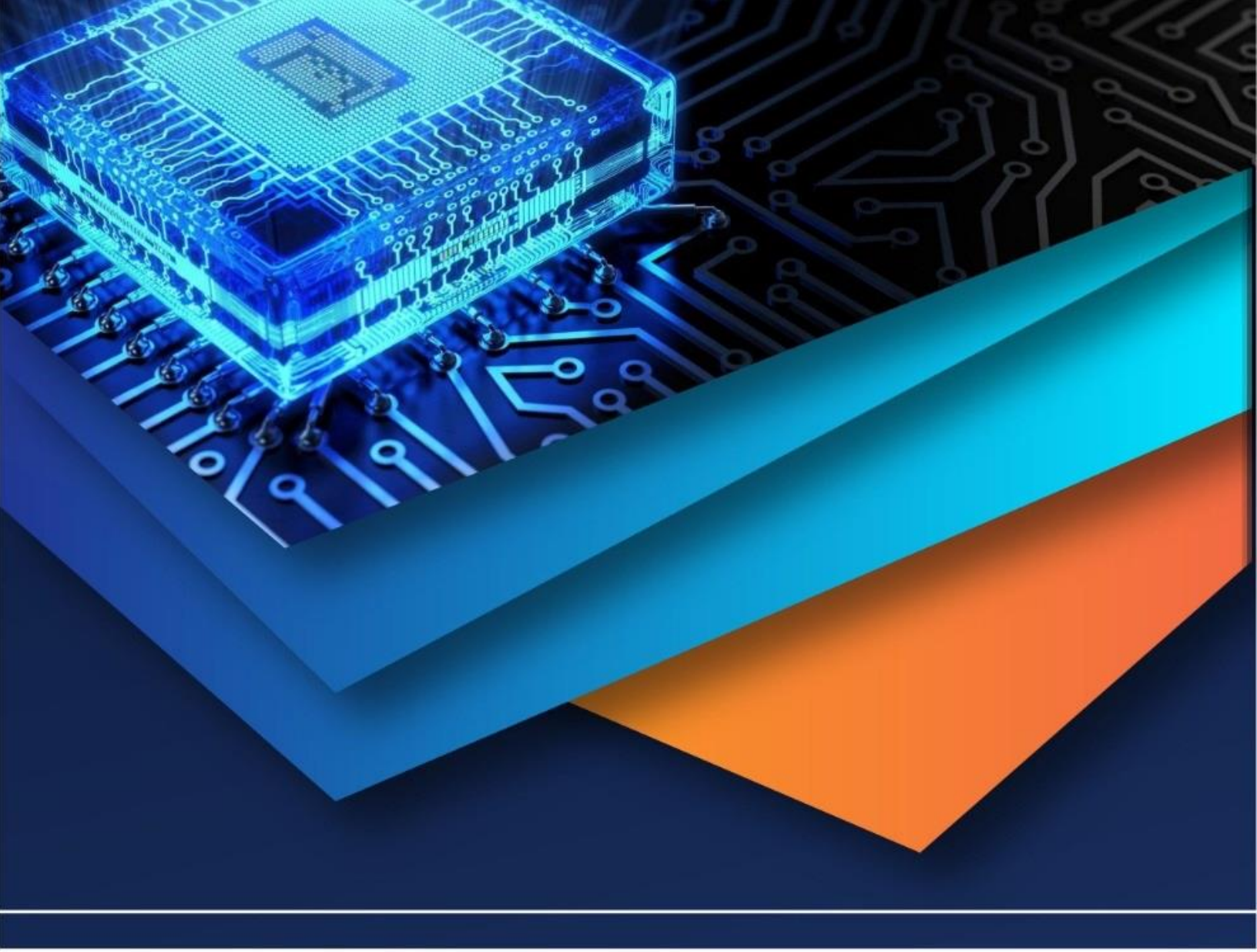
1) *Personalization:* The system can be further personalized by adapting the difficulty level and type of questions generated according to individual learner needs, performance, and progress.
2) *Multi-lingual Support:* The system can be expanded to support multiple languages, allowing educators to create question papers in different languages for learners.
3) *Improved Question Quality:* The quality of the generated questions can be improved by using more advanced NLP techniques, such as sentiment analysis and discourse analysis.
4) *Integration with Learning Management Systems:* The system can be integrated with learning management systems, allowing educators to seamlessly generate question papers based on the course material.
5) *Automated Feedback and Grading:* The system can be expanded to provide automated feedback and grading on the generated questions, saving time and effort for educators.
6) *Integration with Virtual Assistants:* The system can be integrated with virtual assistants, allowing learners to practice answering questions using natural language interactions.

Overall, the future scope for an automated question paper generator using NLP is significant, with the potential to improve the educational process's efficiency and effectiveness while providing personalized learning experiences for learners.

REFERENCES

[1] Vijay Krishan Purohit', Abhijeet Kumar', Asma Jabeen' ,Saurabh Srivastava', R H Gouda' , Shinagawa, “Design of Adaptive Question Bank Development and Management System”, 2nd IEEE International Conference on Parallel, Distributed and Grid Computing, 2012.
[2] G-Asks: An Intelligent Automatic Question Generation System for Academic Writing Support by Ming Liu and Rafael A. Calv
[3] D. R. CH and S. K. Saha , "Automatic Multiple Choice Question Generation From Text: A Survey," in IEEE Transactions on Learning Technologies, vol. 13, no. 1, pp. 14-25, 1 Jan.-March 2020, Doi: 10.1109/TLT.2018.2889100.

[4] Anderson LW, Krathwohl DR. A taxonomy for learning, teaching, and assessing: a revision of Bloom's taxonomy of educational objectives. New York NY: Longmans; 2001.
[5] Stephen A. Zahorian, Vishnu K. Lakdawala Oscar, R. Gonzalez, Scot Starsman, and James FLeathrum, Jr., "Question Model for Intelligent Questiong Systems in Engineering Education", 31st ASEE/IEEE Frontiers in Education Conferencee, October 10 - 13, 2001 Reno, NY, © 2001 IEEE.
[6] Noor Hasimah Ibrahim Teo, Nordin Abu Bakar and Moamed RezduanAbd Rashid, "Representing Examination Question Knowledge into Genetic Algorithm", IEEE Global Engineering Education Conference (EDUCON), 2014.
[7] Onur KEKL –"Automatic Question Generation Using Natural Language Processing Techniques.",July 2018. https://pdfs.semanticscholar.org/ec5e/fc74351f0339e34b91b965f99624aedf9200.pdf
[8] Aleena, Vidya – "Implementation of Automatic Question Paper Generator System", International Research Journal of Engineering and Technology (IRJET), Feb 2019.
[9] Antol, S., Agrawal, A., Lu, J., Mitchell, M., Batra, D., Lawrence Zitnick, C., Parikh, D. (2015). Vqa: Visual question answering, In Proceedings of the IEEE International Conference on Computer Vision (pp. 2425–2433).
[10] Onur KEKL –"Automatic Question Generation Using Natural Language Processing Techniques.", July 2018. https://pdfs.semanticscholar.org/ec5e/fc74351f0339e34b91b965f99624aedf9200.pdf
[11] Amruta Umardand, Ashwini – "A survey on Automatic Question Paper Generation System", International Advanced Research Journal in Science, Engineering and Technology (IARJSET), Jan 2017.
[12] Aleena, Vidya - "Implementation of Automatic Question Paper Generator System", International Research Journal of Engineering and Technology (IRJET), Feb 2019.
[13] Kalpana B. Khandale1, Ajitkumar Pundage, C. Namrata Mahender - "Similarities In Words Using Different Pos Taggers.", 10SR Journal of Computer Engineering (IOSR- JCE),(PP 51-55).
[14] Edward Loper and Steven Bird "Nitk: The Natural Language Toolkit.", July 2002.
[15] Ankita, K. A. Abdul Nazeer - "Part-Of-Speech Tagging And Named Entity Recognition Using Improved Hidden Markov Model And Bloom Filter, International Conference on Computing, Power and Communication Technologies (GUCON), 2018.
[16] Surbhi Choudhary, Abdul Rais Abdul Waheed, Shrutika Gawandi and Kavita Joshi, "Question Paper Generator System," International Journal of Computer Science Trends and Technology, vol. 3, issue 5, Sept–Oct 2015.
[17] Prita Patil and Kavita Shirsat, "An Integrated Automated Paperless Academic Module for Education Institutes," International Journal of Engineering Science Invention Research and Development, vol. I, issue IX, March 2015.
[18] Ashok Immanuel and Tulasi.B, "Framework for Automatic Examination Paper Generation System," International Journal of Computer Science Trends and Technology, vol. 6, issue 1, Jan - March 2015.
[19] Kapil Naik, Shreyas Sule, Shruti Jadhav and Surya Pandey, "Automatic Question Paper Generation using Randomization Algorithm," International Journal of Engineering and Technical Research, vol. 2, issue 12, December 2014.
[20] Dan Liu, Jianmin Wang and Lijuan Zheng, "Automatic Test Paper Generation Based on Ant Colony Algorithm," Journal of Software, vol. 8, no. 10, October 2013.
[21] D. R. CH and S. K. Saha, "Automatic Multiple Choice Question Generation From Text: A Survey," in IEEE Transactions on Learning Technologies, vol. 13, no. 1, pp. 14-25, 1 Jan.-March 2020, doi: 10.1109/TLT.2018.2889100.
[22] Narendra, A., Manish Agarwal and Rakshit shah, "Automatic Generation." RANLP, 2013. Cloze-Questions Agarwal, Manish & Shah, Rakshit & Mannem.
[23] Agarwal, Manish & Shah, Rakshit & Mannem, Prashanth, Automatic question generation using discourse cues, 2011, pp. 1-9.
[24] Kalpana B. Khandale, Ajitkumar Pundage C. Namrata Mahender, Similarities in words Using Different Pos Taggers, IOSR Journal of Computer Engineering (IOSR-JCE) e-ISSN: 2278-0661,p-ISSN: 2278-8727, PP 51-55
[25] Deokate Harshada G., Jogdand Prasad P, Satpute Priyanka S., Shaikh Sameer B., Automatic Question Generation from Given Paragraph, USRD International Journal for Scientific Research & Development Vol. 7, Issue 03, 2019 | ISSN (online): 2321-0613
[26] Automatic Generation of Question Bank Based on Pre-defined Templates by Ahmed Ezz Awad and Mohamed Yehia Dahab in International Journal of Innovations & Advancement in Computer Science IJIACS ISSN 2347 – 8616 Volume 3, Issue 1 April 2014.
[27] Automatic question generation in multimedia-based learning by Yvonne SKALBAN , Le An HA , Lucia SPECIA , Ruslan MITKOV.
[28] G-Asks: An Intelligent Automatic Question Generation System for Academic Writing Support by Ming Liu and Rafael A. Calvo
[29] Mihir Joisher, Swapnil Ghagare, Mittal Patel, and Ritesh Rathi, "Automatic Question Paper Generation System" International Journal of Advanced Research in computer and communication Engineering (IJARCCE), vol.4 Dec 2015.
[30] Mrunal Patangare, Rushikesh Pangare, Shreyas Dorle, Uday Biradar, Kaustubh Kale, "Android Based Exam Paper Generator" Proceeding of the Second International Conference on Inventive Systems and Control (ICISC 2018).
[31] Noor Hasimah Ibrahim Teo, Nordin Abu Bakar and Moamed RezduanAbd Rashid, "Representing Examination Question Knowledge into Genetic Algorithm", IEEE Global Engineering Education Conference (EDUCON), 2014.
[32] Vijay Krishnan Purohit, Abhijeet Kumar, Asma Jabeen, Saurabh Srivastava, RH Goudar, Shiwangowda, "Design of Adaptive Question Bank Development and Management System", 2nd IEEE International Conference on Parallel, Distributed and Grid Computing, 2012.
[33] Suraj Kamya, Madhuri Sachdeva, Navdeep Dhaliwal and Sonit Singh, "Fuzzy Logic Based Intelligent Question Paper Generator" IEEE International Advance Computing Conference (IACC),2014.



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