

## Automatic Question Paper Generator System

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**Received date:** May 04, 2020; Manuscript No. IPACSIT-20-3990; **Editor assigned date:** May 08, 2020; PreQC No. IPACSIT-20-3990; **Reviewed date:** May 22, 2020; QC No. IPACSIT-20-3990; **Revised date:** August 04, 2022; QI No. IPACSIP-20-3990; Manuscript No. IPACSIT-20-3990; **Published date:** September 01, 2022; DOI: 10.36648/2349-3917.10.8.001

**Citation:** Jawere A, Soni A, Tejra N (2022) Automatic Question Paper Generator System. Am J Compt Sci Inform Technol Vol.10 No.8:001

### Abstract

Curiosity is the fuel for discoveries and learning, and we humans are always curious about learning novel things. Asking different types of questions is a tendency of a good learner and so the students ask a variety of questions from their teachers. Similarly to examine the students, the teachers also ask questions from the students and also evaluate their performances. Because of their inconsistent minds in certain situations, sometimes humans are not very skilled in asking good questions and because of that we have come with the idea of a system with the help of which we would be able to generate the questions from a text automatically. The system is known as the Automatic Question Paper Generator System, which is a fast and secure system and which can also generate questions in a random way. The document or pdf file or simply text can be provided as an input to this proposed system. NLP technology is used for preparing the proposed system.

**Keywords:** Dependency parsing; Key phrase extraction; NLP; Question paper generation; Sentence segmentation; Stop words; Text lemmatization; Word tokenization

### Introduction

Traditionally question papers were generated manually. Preparing any exam paper is a very challenging task for the educators because they have to check whether there is any repetition in the pattern or not, and other than that security is one of the major concerns for them, also due to lack of teaching staff in any institute, creation of paper is not at all an easy task. Therefore, here we are proposing an Automatic Question Paper Generator System, which provides storage of the data, fast operations, and high security for all its tasks. It can be helpful to many educational as well as NGO institutes. Tasks performed by this system are automated and because of that storage space, security is not a concern anymore. Proposed system works upon Natural Language Processing, and is fast due to computer-based automation, streamlined, randomized and unbiased, secure and generates unique questions and overcomes the problems of Human based paper generation.

Automatic question paper generation has been an area of interest for many researchers and a lot of research has been done for the question paper generation system. Researchers are very interested in this field and they are showing their interest too. The reason for the interest is basically the time taken by the professor to write the thesis. In addition, every researcher has undergone the university processes. AUTOQUEST was one of the first automated QG systems proposed to support novices to learn English. A method for generating questions based on both syntactic and semantic information (space, time, and agent) so that he could generate more types of questions (where, when and who) [1]. Most recently, Mostov and Chen proposed an approach for generating deep questions based on a situation model. It can generate questions about what, how and why. Several approaches to automatic QG with multiple selection of reading materials have been proposed. Coniam deleted every nth-word in the text to be a test item, and distractors were identified by choosing the same part of speech and similar word frequency to a tagged corpus. Mitkov and Ha extracted key terms that are noun phrases with a frequency that exceeds a certain threshold.

Limitations to the existing paper generator include:

- Inadequacy of storage space.
- May be harmed.
- Indigent environmental credentials.
- Incapable document transportation.
- Collaboration restricted.
- Problems related to modification.

### Problem statement

The main task is to create questions automatically based on the given text, i.e. sentences or groups of sentences. The basic input is a positive or declarative sentence or group of sentences. The output should be different kinds of questions depending on the type of sentences. We can say that the input would simply be the text whereas output would be a number of questions. The basic goal of this system is to offer a solution to the problem of first breaking down the paragraph and then turning it into questions [2]. There are different types of problems that exist in the current manual system of question paper generation. These problems are-

- Low security as paper is not secured using any mechanism.

- Patterns or repetitions may occur in paper.
- Slow as human labour is involved.
- Less variety of different types of questions.

Thus, there are many problems associated with manual human based question paper generation, therefore to overcome this we came up with 'Automatic Question Paper Generator System'.

## Literature Review

### Proposed solution

In today's ambition, examination plays an important role in ensuring students' academic progress and the era of information technology is now being replaced by the productive application of technology. In the "information society", the production of utility from knowledge is important for the development of society. For various examinations conducted in any academic course in one year, teachers are required to make a variety of question papers as per the guidelines and evaluation requirements of the autonomous college. It is a tough task for the teachers to cover all the characteristics of the course results and avoid duplication of questions in successful exams. Many times, this entire element may degrade the standard of the question paper. Automated creation of exam paper provides a platform to create a streamlined exam paper and at the same time, automation is easy to incorporate many elements that determine the quality of the question paper. An efficient question paper is generally suitable for ordinary students, but it also engages the demanding item for clever students. Thus automatically creating a question paper from a description entered by a teacher uses a word-labelled question bank that is currently required by the hour. Here we are implementing a system, which accordingly creates the question paper from this semantically labelled question bank.

It is necessary to categorize queries as different class of queries need different methods for automatic generation of Question-type:

- Also known as polar questions, whose expected answer is either yes or no.
- Wh-questions use interrogative words, such as why, when, who, where, what, which, etc. to request information.
- Also known as cloze questions. Fill-in-the-blank questions could be a sentence with one or a lot of blanks in it with four alternatives to fill those blanks [3].

### Qualities of a good question

- A good question is appropriate. It focuses on memorizing only the content included in your lesson and aligns well with the overall learning objectives.
- A good question is usually concise and crisp. This leaves out any unnecessary information that students have to spend time understanding correctly.
- A good question is formulated in clear, easily understandable language without any ambiguity. Students should understand what the question requires, even when they do not know the answer.

- A question without a specific purpose has no value. The purpose helps evaluate the question based on some defined benchmarks. A good question can seek both innate and specific knowledge.
- A good question guides the students to understand the concept in the image. However, at the same time, it does not give them specific answers.
- A good question requires learners to think and remember through the concepts taught. It does not protect them by asking explicitly.
- A good question focuses on one dimension at a time. If there are multiple ideas to evaluate, it is better to split them into multiple questions [4].

### Proposed system implementation

The Automatic Question Paper Generator System is developed using the Python programming language. In a fully functional system, there is a repository of syllabus, questions and pattern of question papers. It takes a simple text, a document or a pdf file as an input and provides a list of questions as an output. Process that is followed for generating questions automatically has the following steps (Figure 1).

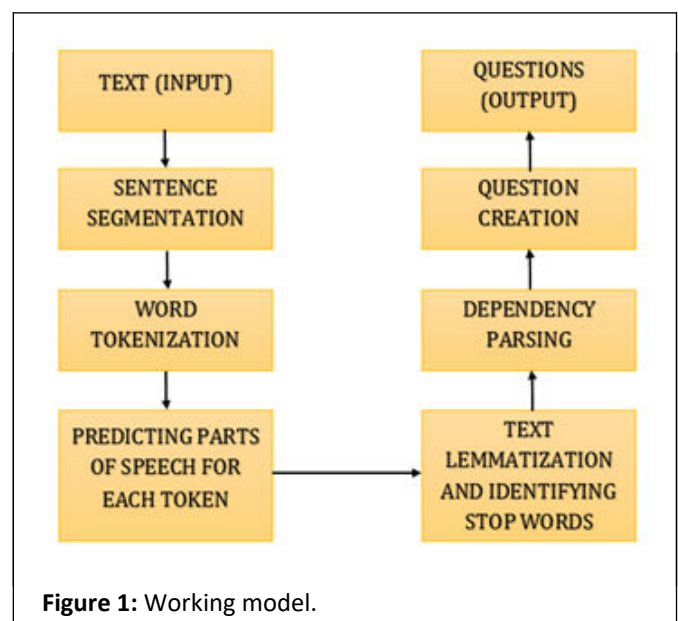


Figure 1: Working model.

Description of all the steps of Figure 1. are as follows:

**Step 1: Sentence segmentation:** The very first step in the pipeline is to break the text in the document into separate sentences. Now that we have divided our document into sentences, we can process them one at a time [5].

**Step 2: Word tokeniation:** The second step in our pipeline is to break this sentence into tokens or separate words, which is called tokenization. In tokenization, we will just split apart words whenever there is a space between them. In addition, we will treat punctuation marks as separate tokens since punctuation also has meaning.

**Step 3: Predicting parts of speech for each token:** Next, we will look at each token and try to guess its parts of speech whether it is a noun, a verb, an adjective. Knowing the role of

each word in the sentence will help us start to figure out what the sentence is talking about [6].

#### Step 4: Text lemmatization and identifying stop words:

Lemmatization means figuring out the most basic form or lemma of each word in the sentence. Stop words are usually identified by just checking a list of known stop words.

**Step 5: Dependency parsing:** The next step is to figure out how all the words in a sentence relate to each other. This is called dependency parsing. So far, we have treated every word in our sentence as a separate entity. However, sometimes it makes more sense to group together the words that represent a single idea or thing. We can use the information from the dependency parse tree to automatically group together words that are all talking about the same thing.

**Step 6: Question creation:** At this point, we already have a useful representation of our sentence. We know the parts of speech for each word, how the words relate to each other and which words are talking about named entities. Now we will create 'Wh' questions from this information.

#### Exclusion criteria

- First trimester bleeding which ended up in complete, incomplete or missed abortion in first trimester itself.
- Women opting for termination
- Women with multiple pregnancies
- Hydatidi form mole.

Estimated sample size was based on maternal and neonatal morbidity. Sample size of 125 was needed in each of two groups for a case control study to be 95% confident and power of 80% of estimating the NICU admissions. Odd's ratio which was believed to be in the vicinity of 3.0 and exposure rate among control was estimated to be 5% [7].

The study design chosen to study the correlation of the first trimester bleeding with feto-maternal outcome was case control study. Patients were recruited from Gynaecology OPD/Casualty. Informed consent was taken. Detailed obstetric history was taken including timing and intensity of bleeding. General Physical Examination for detection of pallor, icterus, recording of pulse and blood pressure was done. Obstetric examination was carried out including per abdomen examination, per speculum and per vaginum examination and noted in the proforma used for study. Baseline investigations were conducted. USG for gestational age, fetal viability, placental localization was done at first complaint of bleeding per vaginum in first trimester of pregnancy. Patients of threatened abortion who recovered were followed up antenatally till one week post-delivery. Women were followed up fortnightly from 6<sup>th</sup> month of pregnancy and weekly in 9<sup>th</sup> month of pregnancy. Ultrasound was performed in all enrolled women at 18-20 weeks and 34 to 36 weeks of gestation. Consequences of pregnancy were evaluated by close observation on progress and antenatal care. All observations noted were subjected to statistical analysis [8]. Statistical testing was conducted with the statistical package for the social science system version SPSS 17.0. continuous variables will be presented as mean +/-SD or median if data is unevenly distributed. Categorical variables were expressed as frequencies and

percentages. The comparison of normally distributed continuous variables between the groups were conducted using student's T test Nominal categorical data between the groups were compared using chi-square test or fisher's test as appropriate. Non normal distribution continuous variables were compared using mannwhitney u test. Odds ratio, 95% CI was also calculated for factors associated with cases. For all statistical tests, p value<0.05 was taken to indicate a significant difference.

## Discussion

Compared to other algorithms, 'Artificial Intelligence Algorithm (using NLP)' is one of the best algorithms, which we have used in automatic question paper generators, and has few advantages over traditional methods. When compared to other question paper generating methods such as Backtracking Algorithm/Random algorithm, Artificial Intelligence Algorithm has higher processing speed, generation success and quality ratio. We have used Python as the main language to implement the generator due to its flexibility, ease of use and extensive collection of libraries for natural language processing its simple interface improves the ease of data updating and retrieving. Generates and prepares the Question Paper in seconds. Questions can easily be edited. Question Type can be Memory-based, Logic-based, Knowledge-based and Application-based [9, 10] (Figures 2 and 3).

The input that is provided to the system:

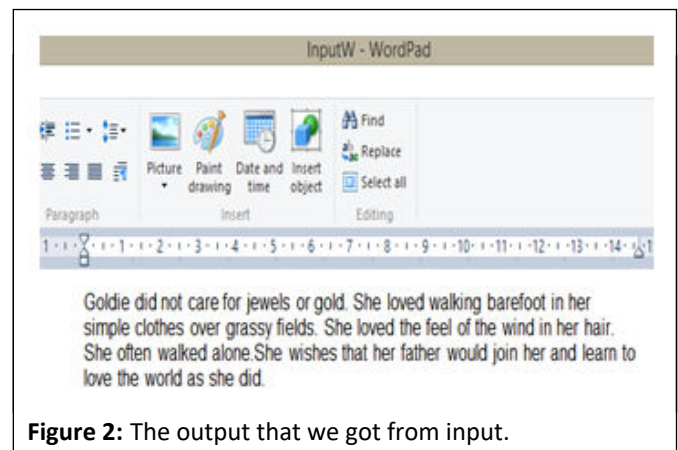


Figure 2: The output that we got from input.

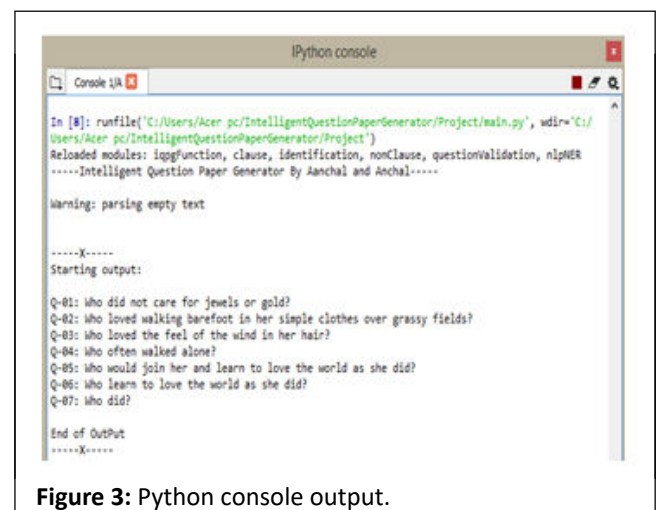


Figure 3: Python console output.

## Conclusion

The question selection difficulty has been formulated as a multi-constraint optimization issue, which aims to produce question papers that meet several constraints stated by the paper setter. Automatic Question Paper Generator will generate a well-formatted question paper in a matter of a few seconds i.e. saving a lot of time when compared to traditional systems. With the use of this system for question paper generation, there are no chances of exam paper being leaked as paper is generated just before the test. It will save a lot of time for teachers and thus will improve efficiency. The implemented process strives to solve the problems listed above in a positive way. The implemented work narrates an automated system that heads away from the traditional process of paper generation to an automated process, by giving controlled entry to the resources that is attained by involving users and their roles in the colleges.

We have also considered the importance of randomization in the process of paper generation. This system uses a logical algorithm, which is absolutely randomized in nature, and it also avoids duplication of questions. Therefore, the resultant automated system for Question Paper Generation will yield a growth in phrase of random creation of question papers and a secured platform.

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