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Automatic Question Paper Generation System Using Shuffling Algorithm

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ABSTRACT: Education is the biggest weapon in today's fast-growing world. The Examination process is the king way to judge the knowledge of any person since from a long time ago we follow a manual paper generation system, now it's time to switch on advanced automatic paper generation system which is fast and easier. The main and integral part of the examination process is the generation of question bank, question types, mark priority for questions, and question paper format. In this paper, we have studied and reviews various mechanisms that can be used for automatic question generation.

KEYWORDS: automatic question generator, shuffling algorithm

I. INTRODUCTION

In this modern world, there is a change from manual to automated systems for different aspects of the education system. At every level of education, a test is the fundamental process of the education system. However, the main problem is Professors need to invest a lot of time and energy in composing examination papers, and also there is a chance of paper leaks. So, automation is required in the generation of test papers. It is very useful software for schools, Institutes, colleges and publishers, and paper setters who want to have a huge database of questions banks and produce test papers frequently in a simple manner. This software can be implemented in various medical colleges, technical institutes, and coaching institutes for paper. You can enter unlimited questions depending upon the system storage, capacity, and as per the requirement.

Producing quality graduates is one of the main objectives of any educational institution. The higher acceptance of their graduates in the work market indicates the quality of the institutions. The quality of graduates produced by any institution is determined by many factors. One of the factors is the quality of the evaluation system. An evaluation system could exist in many forms. A conventional evaluation system is normally based on the exam system. Before the exam could be given to the student, the instructors or lecturers must prepare the questions according to the topics covered for each of the subjects. Preparing test or exam questions is challenging, boring, and time-consuming for teachers. Usually, the instructors keeping their test bank in some form to help them prepare for future exams. Current technologies help teachers store questions in computer databases. The issue that arises is how the current technologies would also help the instructors automatically generate the different sets of questions from time to time without worrying about repetition and duplication of passing the exam while the exam bank grows. If we compare both manual paper systems and automated paper systems, then we can say that there is a lot of difference between them. As in a manual paper system, there is human interaction and it takes time in an automated paper system we can save time without interacting with a human. Security is the core part of a paper formation. In a manual system paper may be leaked but in an automated it can't happen (i.e. encryption) Manual based paper system has repetitions (question may be repeated) but in an automated paper system, we can avoid this problem using certain techniques, algorithms. [10]

Objectives

- 1) To applied the randomization technique for the Automatic Generator Question Paper System by using a shuffling algorithm.
- 2) To help lecturers preparing a set of question papers based on the learning outcomes elements.

II. LITERATURE SURVEY

Automatic Question Paper Generator System (QGS) [1] makes use of shuffling algorithm as a randomization technique. This system includes several modules such as user management, topic selection, difficulty level setting, question entry, question management, and paper generation.



In Question Paper Generator System [2] the administration of the database inputs a set of question papers with an option of the check box to tick the correct answer. More ever weightage of the particular question in terms of marks and hours and the complexity of the questions are determined. After this process, the whole question paper along with the weightage is stored in the database.

Semantic-based Automatic Question Generation System [3] is using both Semantic Role Labeling and Named Entity Recognition techniques to convert the input sentence into a semantic pattern. The question types considered here are a set of WH-questions like who, when, where, why, and how. Then a pattern matching phase is applied to select the best matching questions pattern for the test sentence.

Automated Question Generation [4] combines several distinct tools from very different areas of information technology, among other clustering and classification units. The researcher is going to use NLP (Natural Language Processing) for an automatic question generation system [5].

An automatic Question Generation system called G-Ask [6] generates particular questions as a form of guidance for student learning. To generate the question, the semantic role naming tool and NER (identified entity identifier) is used to determine the name, location, or name of the institute. Once the Question sentence is prepared, and then measures the resemblance between the Question sentence and each sentence from the Question knowledge-based. Sort the obtained similarity values from other sentences and Get three keywords from three different sentences as distracter values. The result of the research was nearly 145 parsed sentences, there were 109 considered better for the keywords obtained from them. The shuffling algorithm for the Automatic Generator Question Paper System (GQS) [7] uses a randomization technique for organizing sets of exam papers. An implementation of an automatic examination paper generation system [8] uses lightweight J2EE Tools is based on B/S architecture to design an automatically generated paper management system. With this algorithm, the user needs to select the topic, question type, and difficulty level. From this entry, the exam paper will be generated automatically. In Automatic Question Generation Using Software Agents for Technical Institutions [9], the focus is to take input in form of a text file from a user which contains the text upon which the user desires to get questions; the result is a text file with Bloom's taxonomy-based questions.

COMPARATIVE STUDY OF DIFFERENT ALGORITHMS

<p>Genetic algorithm: -the process carried in two steps. the entire process is carried out by the agent, which eliminates the manual work in the processing system. in the first step, the system takes a text file as input from the user, then the file is processed by an agent which extracts the word from a ranked list of words extracted from the text which has been given as an input by the user. the system processes the input by the tree tagger tool, which produces the output in the form of one word per line.</p> <p>In the second step, the processed output is ranked based upon the occurrence of word frequency. The steaming process is done to get the proper keyword, this is accomplished by filtering all the suffix and prefixes out of the given word.[11]</p>
<p>Ant colony algorithm: -this algorithm is a kind of colony intelligence searching method, adopts a positive feedback parallel mechanism. the strong searching capability leads to the proper solution of automatic paper generation.[11]</p> <p>Binary ant colony algorithm which enables ant to 1 and 0 in each moment due to its special random binary system chain structure. (yes/no type question in a database)</p>
<p>Utility-based agent: -In this system, the agent support in measuring the efficiency of a way of attending its goal. these agents are autonomous, dynamic, and responsive in behavior. the efficiency criteria can be any limiting factor. In some applications, this efficiency measure is the computation of the total expected utility of the goal.[11]</p>
<p>Apriori algorithm: -It is an itemset mining. it makes use of breadth-first search and a hash tree structure to count candidate item sets efficiently. In large databases, it can fetch the data from subsets. The algorithm closes when no further extension is found.[11]</p>
<p>Fuzzy logic algorithm: -Top N query is one of the methods of applying fuzzy logic. It is used for limiting the number of rows returned from ordered sets of data. It is useful for selecting a random question from a set. It holds entered questions in databases while a new question is entering in it, thus each time the question is generated in random form.[11]</p>
<p>Genetic algorithm: - traditional genetic algorithm uses binary code in which if the question in databases is large then the binary string is too high to control. therefore, it is replaced by decimal code. In this system, if the database is large then crossover point and mutation points are generated in the whole coding. The number of question kinds changes as a result.[11]</p>

Disadvantages of existing systems: -

1. Errors: The demerit of test checking is that errors are not disclosed by it. In the presence of error, a true and fair view is not possible.
2. Frauds: The demerit of test checking is that planned frauds may not be disclosed. The fraud discovery is the responsibility of management.
3. Responsibility: The demerit of test checking is that the auditor cannot shift his responsibility to management.
4. Report: The auditor report may fail to disclose a true and fair view of business matters.

III. PROPOSED METHODOLOGY

The keyword-based shuffling algorithm is an efficient algorithm for randomization to automatically generate question paper. The questions stored in a database are fetched to set question paper checking repetition using a logical keyword-based shuffling algorithm. This algorithm also fetches a particular diagram from the database if a question has a diagram.

The Detailed algorithm steps are implemented as follows:

- 1) Create an array for storing question numbers (e.g. arr[length])
- 2) Create an array for storing keywords (e.g. key[length])
- 3) Create an array for storing diagrams (e.g. Diagram[length])
- 4) Fetch question number from database which satisfies required criteria & store it in an array (for storing question number)
- 5) Generate a random number
- 6) If (position==0)
Store generated number in arr[0]
String s= select keyword from TABLE-NAME
Where question number= generated number
Store s in keyword array i.e. key[0]
End if
Else
Compare the number with previous numbers in an array
If it is present
Go to step 5
End if
Else
String s= select keyword from TABLE-NAME
Where question no=generated number
If s is present in key[length]
Go to step 5
End if
Else
Store the number in the next location array (question number array)
Store s in keyword array
End else
End else
End else
- 7) Select questions from the database which correspond to array position one by one
- 8) Fetch question number from database which satisfies required criteria & store it in an array (for storing question number)



Mathematical Model

Randomization Algorithm	Shuffling Algorithm
1. given a dataset d of n questions from 1 to n.	1. given a dataset d of n questions from 1 to n.
2. select number of questions in question paper q.	2. for all values from 1, n as i.
3. do.	3. choose random number k between 1 to n.
4. choose a random number k between 1 to n.	4. select question number k from a dataset. $k = \text{RANDOM}(1, n)$
5. select question number k from a dataset. $k = \text{RANDOM}(1, n)$	5. swap question number i with k.
6. add the question k to question paper dataset Q. $Q(1, q) = k$	6. while q questions completed.
7. while q questions completed.	7. select number of questions in question paper q.
8. display final question paper Q with questions from 1, q.	8. do.
	9. add the question i to question paper dataset Q. $Q(1, q) = i$
	10. while q questions completed.
	11. display final question paper Q with questions from 1, q.

The main aim of the system was to apply the randomization technique for the Automatic Question Paper Generator System by using a shuffling algorithm and to help lecturers preparing a set of question papers based on the learning outcomes elements.

The aim has been achieved when generating 5 sets of question papers with the same attributes. Results showed the questions are picking up randomly in the database according to the sequences. All 5 sets of question papers were generated by the same lecturer using GQS. The lecturer generated 5 sets with the same attributes and characteristics with 30 questions for each set. The shuffling algorithm is incontestable in that, the complete question in five different sets is generated randomly. The result conjointly indicates no duplication and repetition of the created question. The shuffling algorithm employed shows it effectively support the randomization techniques especially in selecting the random data in one population.

Execution for no. of Questions	Randomization Time(ms)	Shuffling Time(ms)
25	2459	987
50	4854	1978
75	6845	2072
100	8973	2504
150	11071	3157

Table 4.1: Comparative study of execution time for generation of question in both algorithms

Randomization results were generated on a different set of question paper and a system having a configuration as i3 processor 120 SSD.

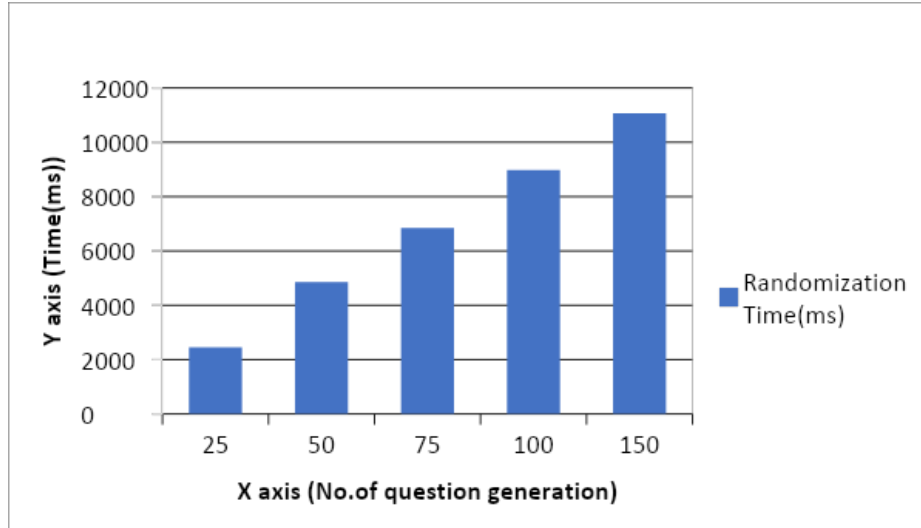


Figure 4.1: Question generation vs Time(ms) graph for Randomization Algorithm

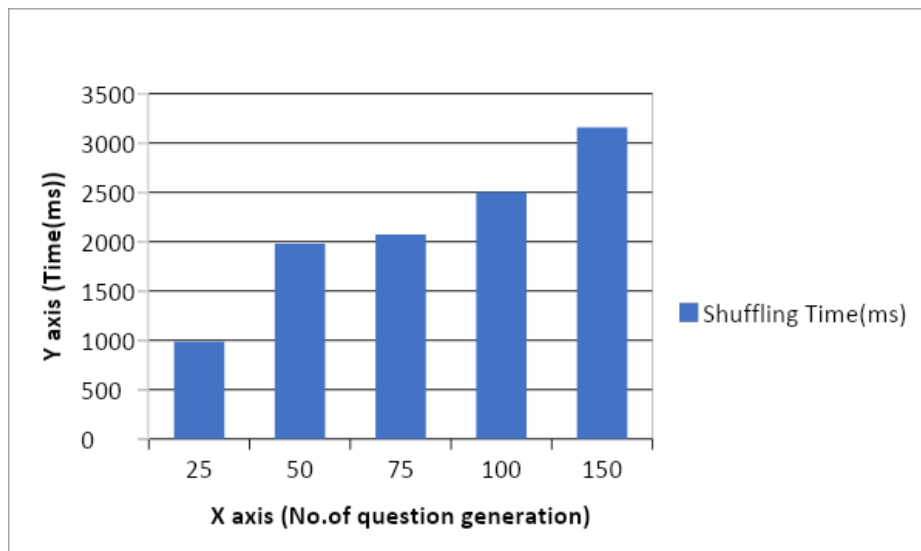


Figure 4.2: Question generation vs Time(ms) graph for Shuffling Algorithm

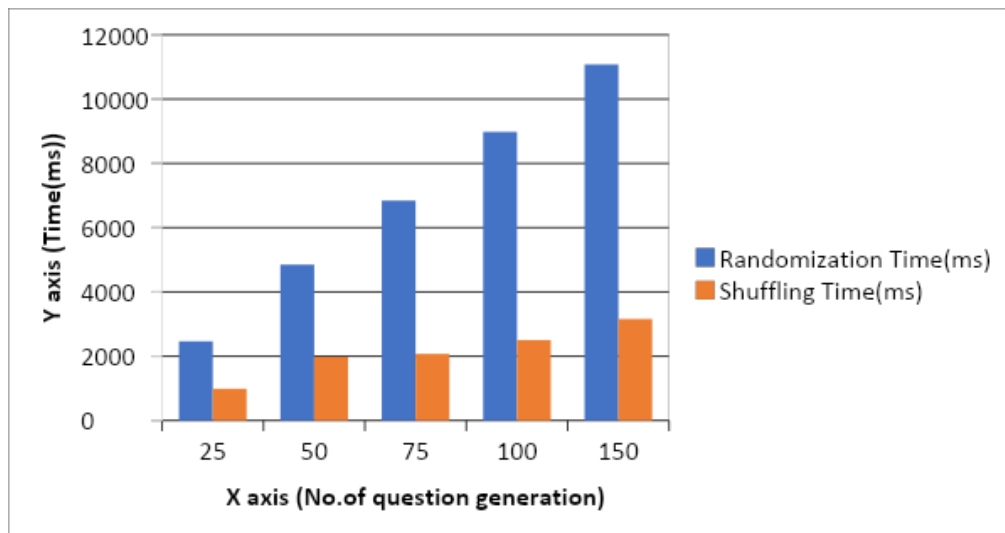


Figure 4.3: Comparison of question generation vs time(ms) graph for both algorithms

V. CONCLUSION & FUTURE WORK

The main purpose of this application is to describe Automatic Test Paper Generator using a shuffling algorithm for randomization. This system is a web-based as well as desktop-based application system with several features mainly producing unduplicated sets of the exam paper. Also, there is no chance of paper leaks and wide portion coverage. So, this system is very useful to schools, colleges, institutes, and universities. From the usability point of view, this technique is user-friendly and prepares test Paper in very little time in Easy Steps. As well as formatting can be done for the generated test paper.

Our future effort is to employ different types of randomization, as well as different security techniques, which can be added to login pages such as the Color Pass Technique and the database such as the AES encryption algorithm.

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