An Intelligent Question Paper Generator using Randomized Algorithm

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Abstract:- This is a problematic era because of the boom in the subject of advanced technology and the demand we are dealing with nowadays. Therefore, examinations play a crucial role in checking out an individual's performance, and preparation of exam question papers has consistently been a matter of interest. And this is why it's far critical to have an intelligent system for the growth of students in addition to checking their learning skills, thereby retaining a check on student performance. Faculties generate various question papers in keeping with the university's assessment requirements. It's very challenging for the teachers to make question papers with multiple questions that meet the course's learning targets. We have proposed an automated process of question paper generation that is fast, streamlined, randomized, and secure. Every action executed task by the system is automated, so that storage space, bias, and security are not a challenge anymore. It automatically creates a variety of sets of questions now and then without worrying about replication and duplication from the initial exam at the same time as the question bank keeps growing.

Keywords: Paperless, randomization, automation, assessments, question taxonomy.

I. INTRODUCTION

In today's modern, ambitious world, an exam plays a vital role in checking the educational improvement of students, and the technology of the information era is now substituted through the productive application of the technology. Any product which can correctly reduce time and power consumption is accepted and preferred. So producing software from knowledge is a crucial task to do. In all the academic courses that reject a variety of tests, the instructor intends to create important documents in accordance with the guidelines and assessments of the autonomic university. It is much more challenging to deal with all the course features for teachers and avoid duplicating questions from subsequent estimates. There is no systematic process, and for this reason, this problem's paper quality is predicted for individual teachers and qualifications.

The truth that there is a shortage of experienced teachers makes the situation even worse for specifying courses, semesters, syllabus, and patterns. At times, all these factors might also deteriorate the quality of the question paper. The researcher says a good questionnaire is the right combination of subjects (questions) guided by various parameters: cognitive level, difficulty and distribution of scores on the questionnaire. Creating a good questionnaire that contains many questions related to gaining knowledge about the purpose of a course in terms of content and cognitive level is a difficult task. So, we are presenting an Automatic Question Paper Generator System which could reduce time intake by replacing the traditional approach of question paper generation. There are provisions to enter and edit data suitable to any educational organization with complete freed. Automatic test paper generation refers to questions selected from the question bank and automatically generates different kinds of papers that meet the requirements of teaching, so it is a typical solution process of the constraint satisfaction problem (CSP). We have implemented a role-based hierarchywhich will restricts access to the users. The system also deploys security mechanisms that prohibit duplication of question papers. This enables an educational institute to generate questions ensuring security and non-repetitiveness of question papers and is a boon for organizations with limited staff and resources. Our system aims to provide fast operations, data storage, and high security for all its tasks. Theevolution of traditional and existing Question Paper Generationsystems and the need for an automated system is unraveled. We have proposed our revised system of an Intelligent Automated Question Paper Generation.

Literature Survey is discussed in **section 2**. Methodology & Algorithm is available in **section 3**. **Section 4** consists of result analysis of the project. **Section 5** includes the conclusion.

II. LITERATURE SURVEY

For the automated generative system of examination papers, first, it needs to be designed by the exclusive varieties of type, the number of questions, the difficulty, and the score in order to establish the corresponding test database. Second, the papers is composed of random. Third, in a paper automatically generated, the knowledge keys concerned can now not arise. When the check paper is made, the questions are selected through the gadget within the questions database. They can meet the person's requirements, and the performance and probability of achievement are high. The user interface of this soft is friendly. The user's requirements can be set by way of human-computer interaction, such as: the scores for all kinds of questions in the test paper, the overall difficulty, thedistribution of knowledge points and the proportion of various types of questions, and so on [9].

A. *Problem with Current Scenario*:
- Traditionally, there was no such system that would easily generate a question paper by just inserting set of question papers to the system.
- In existing system, university use to generate question papers and distribute the question papers to respective

colleges manually.
- There might be chances of paper leaks due to the existing manual system.
- The system is relatively inefficient because question papers may not reach the respective colleges on time.

B.   *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. Other limitations include: -

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

C.   *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 role-based hierarchy and their access rights policy, provide a central database for data storage, ensure security and optimize the system's overall performance.

III.   METHODOLOGY & ALGORITHM

A)   *Proposed System*: To overcome the existing system anomalies, this question paper generator system is developed.
- We present a smart question paper generating system for universities.
- It is made to permit universities to generate question papers with random but even questions to cover maximum chapters of subject with difficulty level within seconds and mail them to colleges immediately.
- In our system we allow administrators to enter a fixed of questions and respective answers for option ticking.
- We additionally permit admin to offer weightage & difficulty level for every questions.
- After this the questions are stored in database along with their weightage.
- While generating question the admin simply has to choose the level of difficulty.
- On this feature, the system selects questions randomly in a way that their weightage makes up for 100 marks and according to the difficulty the admin chooses thequestions are chosen based on their complexity level. Thequestions are also added for numerous difficulty levels sothat as soon admin selects the type of paper difficulty

(easy, medium, difficult) the system automatically generates paper, prepares document file as per selected paper format.
- We can also email it to other colleges. After this question paper is converted to pdf file and emailed to colleges on button click.

B)   *Random Algorithm*: The random Algorithm has instances to generate exam papers. One is to randomly choose questions from the question bank and then choose whether they meet the paper's constraints. The alternative is to find out all the meet questions according to the given rules from the database, randomly selecting a number of them to constitute a take a look at the paper. Considering the low performance within the first case, in this paper, we adopt the second way toapply a random algorithm to generate test papers. In this paper, the overall parameters in the automatic test paper generation include paper title, examination time, the coefficient of difficulty, syllabus, question type and so on. Among the paper parameters, the coefficient of difficulty is one of the most important factors.
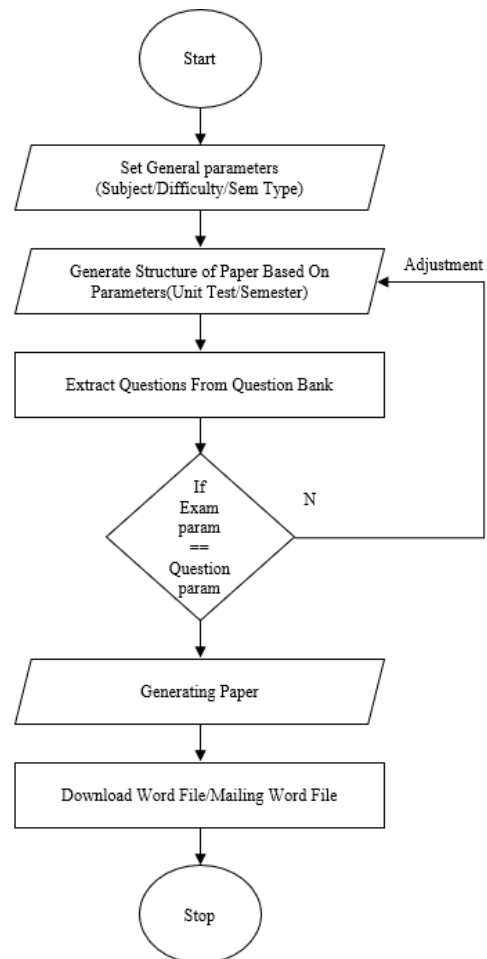

Fig 1. Random Algorithm

According to the analysis of the most exam results, the test score and the paper's coefficient of difficulty are in reverse proportion. In most cases, the test scores are required to be normally distributed [5], and the average score of all trainees should be consistent with the expected score of the paper.

Therefore, the number of questions with different coefficient of difficulty in the paper should be determined by the normal distribution function.

The normal density function can be described as follows:

$$f(x) = \frac{1}{\delta\sqrt{2\pi}} e^{\frac{-(x-\mu)^2}{2\delta^2}} \quad \ldots\ldots \text{ Eqn 1}$$

Where x C (—œ, +œ), μ and ð are constants. μ is the average of normal random variable, and ð is variance. Firstly, the expected average test score and the distribution range of scores are set according to the range of average scores, which are determined by the paper's coefficient of difficulty, and then the average of normal random variable and variance can be figured out. Finally, the difficulty proportion of questions in the paper can be calculated according to the normal density function. So let us assume that the score range of lower and upper bounds from Easy to Difficult are $l_{i\,nin}$ and $l_{i\,nas}$, i = 1,2, … ,5 . And E_i are 5 probabilities followed by the coefficient of difficulty from easy to difficult.

The variable E_i can be calculated by the function described as follows:

$$E_i = \int_{l_{i\,min}}^{l_{i\,max}} \frac{1}{\delta\sqrt{2\pi}} e^{\frac{-(x-\mu)^2}{2\delta^2}} dx \quad \ldots\ldots \text{ Eqn 2}$$

To improve the success rate of automatic test paper generation, the random algorithm will appropriately adjust the parameters in the above equation when the examination questions in the question bank do not meet the requirements in the parameter table. Thus change the proportion of different difficulty of the examination questions. There are two ways to adjust the parameters. One is the adjustment of μ and ð values. The other is to adjust the values of $l_{i\,nin}$ and $l_{i\,nas}$. If there is insufficient number of some coefficient of difficulty, then reduce the value of $l_{i\,nin}$ properly. Otherwise, increase the value of $l_{i\,nas}$. The goal of both adjustments is to try to increase the number of questions with a larger number in question bank in the coefficient of difficulty as much as possible, and reduce the number of questions with less in question bank in the coefficient of difficulty. Thus try to avoid causing the failure of the automatic test paper generation because of the insufficient questions. The automatic test paper generation system, whose Algorithm is designed according to what is designed above, can work very well and generate test papers by setting up the parameters.

2)

IV.   RESULT ANALYSIS

The Automated Question paper generator has been implemented in C sharp language, which is a general-purpose, multi-paradigm programming language. The fully working system stores courses, subjects, questions and

patterns of question papers. It then applies the Algorithm to the stored question set and prints the question paper in word format. This project is implemented as a web application using Visual Studio 2019 IDE. We used Visual Studio for the Design and coding of our project. We Created and maintained all databases into SQL Server 2018, in that we created tables wrote a query to store data or records of the project.

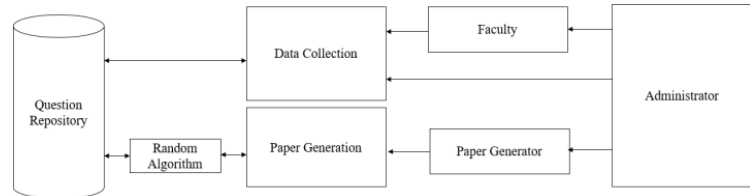System Architecture of implementation is given by :

Fig 2. System Architecture

A)   *Login Form*

The first web interface allows the user to select the role given while after that user needs to enter credentials to log in into the system.

Fig 3. Login Form

1)   *Admin*: This Role has full access to the system, which includes
- Adding Teachers
- Adding Course & Subjects
- Generating Question Paper
- Directly Emailing the generated Question Paper
- View Question Paper Logs from Master Database
- Adding/View MCQ Question

Fig 4: Admin Role Menu

2)   *User:* Teacher/Faculty is the user role here. The main objective of the user is to add the question to the database of a particular course assigned by the admin.

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Fig 5. Question Insertion

B)   *Question Paper Generation*

After the test subjects and questions are set, the parameters of the papers need to be checked in order to ensure the correct parameter settings. After the confirmation, the user can click the button to generate the papers. If not satisfied, the system will notify the admin regarding it.

The following process would combine the preamble information with question paper table contents to produce question paper in word format. Once all the info is passed to the system admin can move ahead and download the Question Paper.

Fig 6: Question Paper Generation

V.   CONCLUSION

In this research paper, an automated design model for Question Paper Generation has been proposed which is implemented as a real time application. The proposed work explains an automated system that shows progression from the traditional method of paper generation to an automated process, by providing controlled access to their resources. This can be achieved by comprehension of users and their particular roles in the institute. We have considered the importance of randomization in the task of paper generation and has deployed an efficient algorithm that is completely randomized and also restricts repetition of questions in question papers. We can differentiate between administrators and subordinates by their respective tasks. Hence, the resultant automated system model for Question Paper Generation provides progression in terms of controlled access to the resources, random generation of question papers and an independent , fully secure platform.

Our system is a valuable resource for teachers in automatically generating question papers from the question repository. However, while the system designed by us stands out in all available systems, there's scope for extra enhancements to make it more useful. For example, depending on the kind of evaluation required, the system can be made to select specific question types.

For example, if the user wants an assessment for an online quiz, it could smartly include all MCQs. Or, if a user is choosing the term test assessment, more objective type and short answer questions should be preferred. Also, users would be overjoyed to have a feature to provide statistics for gaps in user given specifications and system- generated specs[10]. Now the system is just up to generating question paper, but in the future, the system can even be implemented with separate student login for online test assessment with randomly generated questions at that moment, making it more efficient for Exam conduction.

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