

QUESTION PAPER GENERATOR

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Abstract: Information and intelligence are two vital columns on which development of humankind rise and knowledge has significant impact on operating of society. Student assessment is a crucial part of teaching and is done through the process of examinations and preparation of exam question papers has consistently been a matter of interest. Present-day technologies assist the teacher to stock the questions in a computer databases but the problem which emerges is how the present day technologies would also assist the teachers to automatically create the variety sets of questions without worrying about the quality of the question paper generated. Hence there appears a requirement to have a system which will automatically create the question paper from teacher entered description within few seconds. Our proposed system follows a crowdsourcing model which allows a group of contributors to contribute questions which ensures a database consisting of a wide range of quality questions.

Keywords – Crowdsourcing model

1. INTRODUCTION

In today's current ambitious world, an examination plays a crucial role in checking the academic development of students and the era of information technology is now substituted by productive application of the technology. So producing utility from knowledge is crucial for development of society into an "Information Society". For various examinations conducted in a year in any academic course, teachers need to create variation of question papers as per the University guidelines and assessment requirements. It is very difficult for the teachers to cover all features of the course outcomes and evade duplication of questions in the succeeding exams. There is no systematic procedure and hence the quality of the question paper relies entirely on an individual teacher's experience and proficiency. At times, this entire element may degrade standard of the question paper. As per research, a quality question paper is a real combination of questions supervised by varied criteria such as difficulty level, distribution of marks across the question paper in form of paper pattern and the type of examination. We aim to generate a quality question paper in order to assess the capabilities of students satisfactorily.

2. LITERATURE REVIEW

The system implemented in [2] facilitates automatic generation of question paper from semantically tagged question repository. The system would be useful for institutes, publishers and test paper setters who have a huge repository of tagged questions and need to frequently generate question paper with ease. The system uses exhaustively tagged question repository as an input to the system. User will be asked to enter the values for each tag in the form of lower and upper bounds. The search engine extracts questions from question repository based on the specifications entered by the user. A well tagged question repository contains questions with four tags: topic (content), question type, cognitive level, and difficulty level. We are using Bloom's taxonomy for cognitive level. The problem here will be that if whether the question in the database if faulty or do not conform to the subject maybe a problem. Also, no new question being added in the database, i.e. less variety in the question database.

The system implemented in [3] deals with the gathering, sorting, and administration of a large amount of questions about different levels of toughness from scientific as well as non-scientific subjects related to various classes. The system uses Shuffling algorithm. The main part of the shuffling algorithms is to provide randomization phenomena in question paper generation system, thus different sets of question paper could be generated with less chances of repetition and duplication. But shuffling algorithm doesn't completely remove repetition. The current systems do not provide the facilities to provide unit-wise marks, various cognitive level and difficulty level marks as a constraint to generate the paper.

3. PROPOSED SYSTEM

Our proposed system follows a crowdsourcing model which means a group of people is responsible for building the questionnaire database of our system. We have split the entire question paper generation process into three phases.

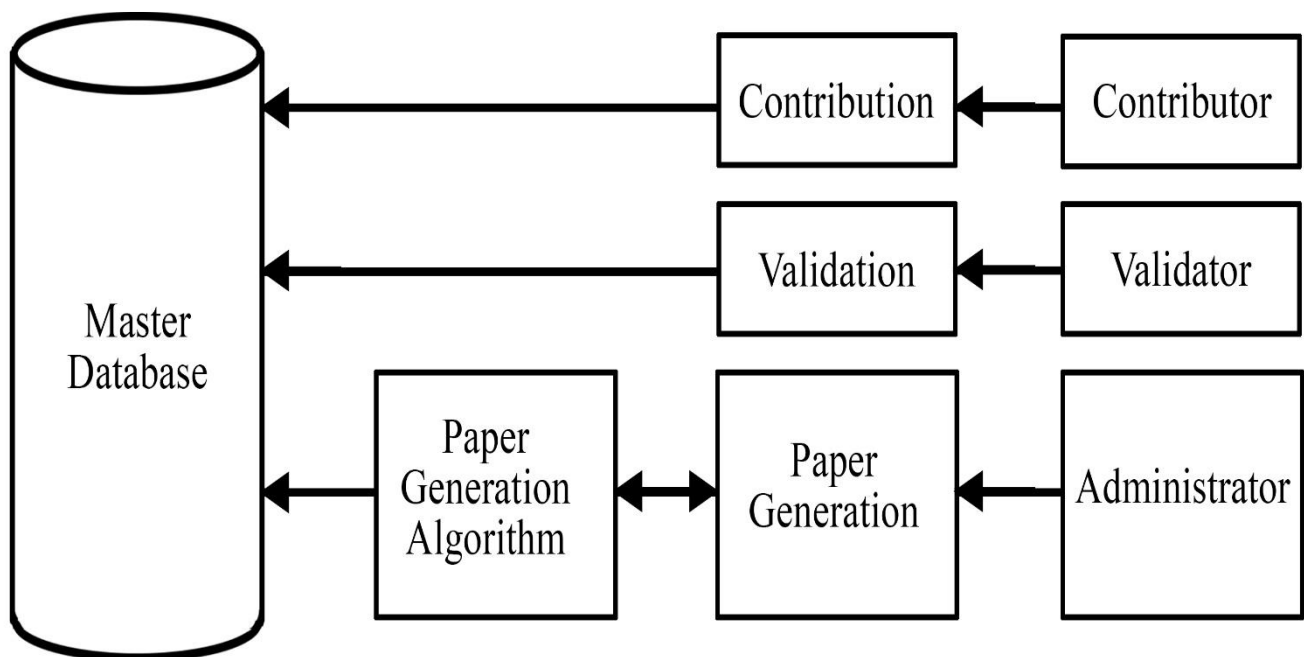


Figure 1

These phases are: **Contribution Phase, Validation Phase, and Generation Phase**. The three main actors who are going to interact with our system are Contributors, Validators and Administrator. We have used Angular for front-end development, MongoDB for database and Node for sever side programming.

3.1 PHASES

3.1.1 Contribution Phase:

- In this phase the contributors will contribute the questions for the subject assigned to him by the Admin.
- He will also enter the marks for which the question can be asked for as well as the difficulty level.

3.1.2 Validation Phase:

- This phase commences after the end of the collection phase.
- In this phase the validator will be randomly assigned questions contributed by the contributors.
- He needs to check if the question contributed is correct and accept or reject the question based on that.

3.1.3 Generation Phase:

- Once the contributed questions have been validated and locked into the database, the question paper can be generated.
- The admin will now enter the desired constraints into the system and a question paper matching to those constraints will be generated.

3.2 ACTORS AND THEIR ROLES

3.2.1 Admin:

- Has got the privilege of adding subjects, their max marks of each question, number of modules and their description
- Can add contributors and assign particular subject in to them

- Can add validators
- Admin assigns the date for contributions and validations.
- Also, he has the right to generate the question paper.

3.2.2 Contributor:

- When contributor logs into the system he/she gets to see the subject that has been assigned to him by the Administrator and can immediately start contributing questions for that subject.
- In each card he could see the module content at one side and on the other side he can see the space to write the question.
- He should also assign maximum weightage to all the questions (for example, MCQs can be asked as a 1 mark question).
- In the end after contributing the last module's question his response would be recorded.

3.2.3 Validator:

- Whenever validator logs in the system, he/she can see the subjects he has been assigned and can select any of the one subject of which question would be displayed.
- Validators only job is to check whether the question is appropriate according to the syllabus and module assigned.
- Also, he has to say that whether the question provided is hard or easy or of medium difficulty level.

4. ALGORITHM

Generation of paper requires multiple constraints which are specified by the Administrator.

Constraints such as unit-wise marks distribution, question paper format (It specifies the marks allotted to each question), difficulty-level and cognitive level.

The algorithm which our system uses is divided into two parts which are Question paper template generation and the second part is fetching of questions from database and also checking whether the same type of question isn't asked in the same paper.

So the first part which is Question paper template generation provides a template for the paper which satisfies all four constraints mentioned above. For generating the template, we've used the algorithm which was published by Vaibhav Kale and Arvind Kiwelekar [4].

Question paper template algorithm requires $n-1$ rounds for satisfying n constraints, also each round consists of 3 steps.

Say for example, if we consider unit-wise marks distribution and question paper format as the 1st round,

Step 1: If the marks of a particular question is same as exact marks required by a unit, then that unit is allotted to that question.

Step 2: If marks of any two questions (no unit allotment yet done) are equal to marks required by a unit, then that unit is allotted to those 2 questions.

Step 3: Perform this step until all units have been assigned. Now if any unit (i.e. marks of any unit) are still left, then if a question that has not been allotted any unit yet is having greater marks than unit then that question is broken into two part and the first question is allotted the unit. And if the question is having less marks than the unit, then the question is allotted that unit and respective marks from the unit are deducted (as not total marks of the unit was allotted to the question).

In this way we assign, by running this algorithm for two times we can satisfy the remaining two constraints.

After getting the template of the question paper, we fetch the question from the database using the constraints for each question provided by the template.

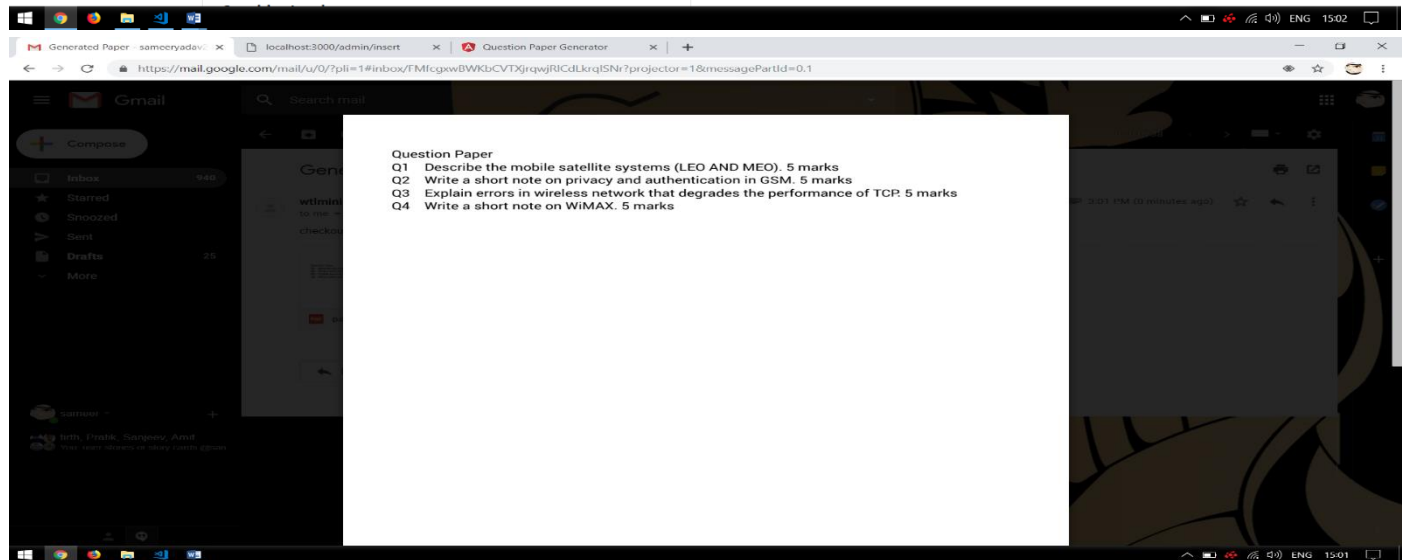
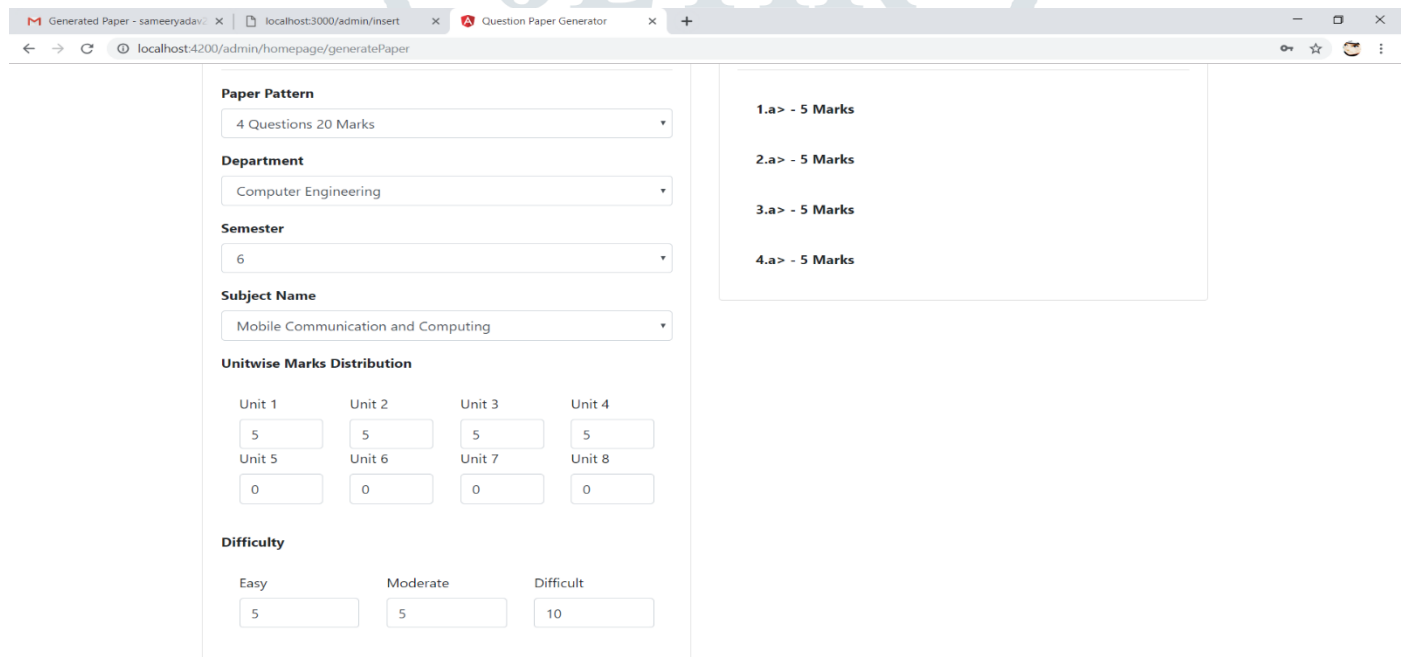
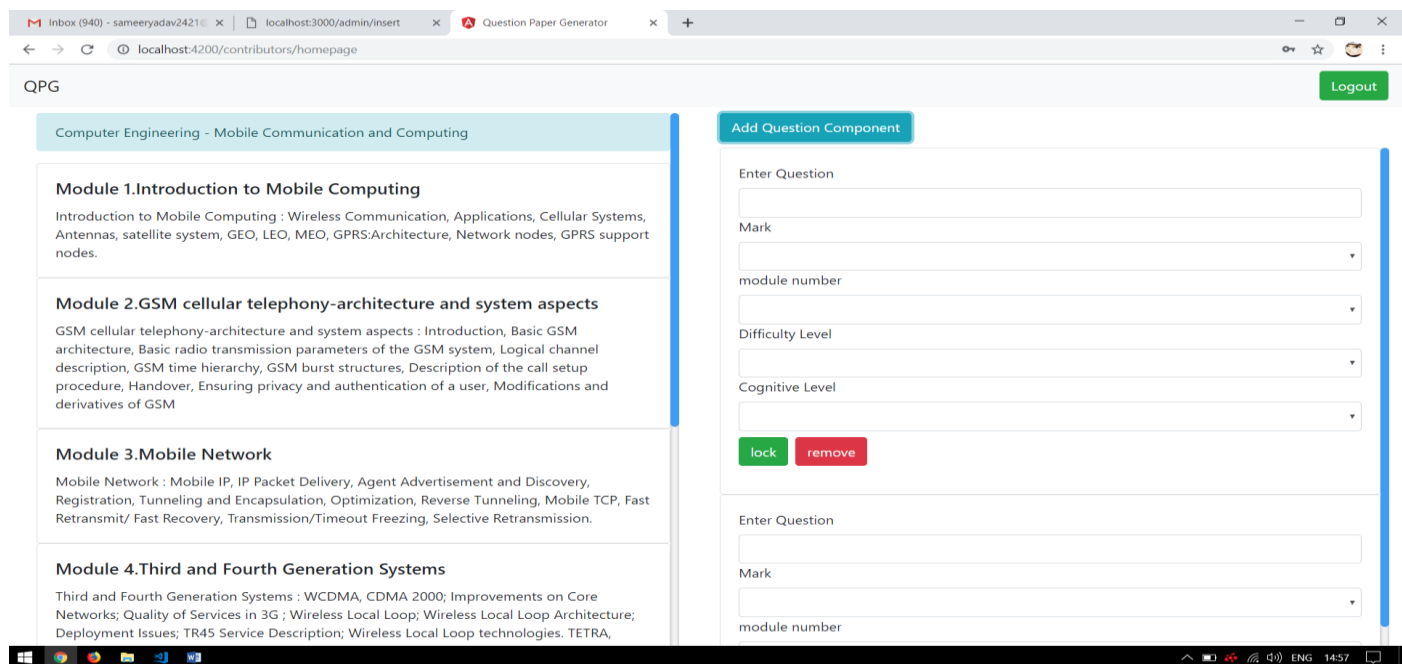
Since we are using the crowdsourcing model, it might be the case that same type of question contributed by different contributors gets fetched by the algorithm.

Also, we can note that questions from the same unit will face the above problem, we used StringSimilarity package provided by NodeJS which helps in determining the same question from the same unit, the string-similarity package uses dice's constant and returns the result between 0 and 1.

1 indicates that the two questions are exactly similar and 0 indicates that the two questions are totally dissimilar.

So using the package we try to eliminate the same question from the same unit being asked in the paper.

5. RESULTS



6. CONCLUSION

It has become imperative for the question paper to be set considering various constraints such as proper coverage of units from syllabus, coverage of difficulty levels, coverage of cognitive levels so as to assess the students' academic development effectively. The algorithm implemented in our system creates a question paper template that is used in the generation of the actual question paper. This algorithm considers all of the above mentioned constraints thus generating a good quality question paper. Our system also allows the user to specify their own question paper format that they follow at the University level.

7. REFERENCES

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