

Smart Faculty Assistant for Time Table and Question Paper Generation

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Abstract—Intelligence and information both are the two faces of same coin which has very much impact on the development of the rise of knowledge which further improves the operating of society. Examination is a requisite for students in knowing how far the concepts have been understood, also the great task is to draft the time-table which distributes the subjects in regular class. In the present competitive scenario, it is necessary for examiners to dive into technology to make the system computerized, traditional technology which included manual data though having some advantages, it is ineffective sometimes due to security and repetition. Hence, this system is a great challenge to present situation that is fast, accurate, safe and consumes time. Overall meaning is moving from traditional paper-based work to system work which have already proven that system work is more consistent and accurate comparatively. Out of existing question bank in the database, question paper is generated by the college authorities automatically which generates Question Paper in Portable Document Format (PDF) and Docx Format with template, each question will be assigned with difficulty level and marks weightage which helps during the generation of question paper. If not satisfied with automated question paper, there is availability for admin to select the desired questions from the question bank itself. Proposed system for timetable generation will help to distribute subjects and allocate particular lecturer for the same automatically. It avoids the complexity of setting and managing timetable. The methods discussed in this project strives to handle both soft and hard constraints. After the timetable being generated it can be accessed with views of class and lab timings with break. In this paper, a detailed review of latest works which are implemented is presented.

Keywords—Faculty Assistant; Genetic Algorithms; Time Table & Question Paper Generation

I. INTRODUCTION

In today's competitive world, an examination is critical in determining student's academic progress, and the era of information technology has been replaced by productive application of technology. This allows an educational institute

to generate questions which has high security and non-repetitiveness quality of question papers, which is a great advantage for organizations with little personnel and resources. In a university or institution, creating a question paper is a long and burdensome process. The proposed system saves time and effort by allowing them to create question papers with a single. The system also provides security to the database so that only permitted and trusted people can access it, where each staff will be registered will separate mail id and password and each time login sends OTP to the same registered mail id hence making the system more secure so that anonymous are strictly prohibited. The questions are saved in a database, and new ones can be added at any time if necessary. With the help of this approach question paper is generated in less than a second. Its most distinguishing feature is the automation of the question paper creation process, which significantly minimizes human work. Administrators can see the generated question paper sets and make changes to the institutions. Usage of technology is been increased. Also, administrator has all rights to modify the database. It will help an administrator to access or view the questions and edit them on the go. The timetabling in educational institutes is basically a process of scheduling and assigning the lecturers into appropriate time slots and allocate resources respectively, without causing time-clashes for the students, the lecturers and room numbers. It is an allocation process which subject to constraints, of given resources to objects being placed in space time in such a way as to satisfy as nearly as possible set of desirable objectives. Currently timetable is managed manually. It will help to manage all the periods automatically and also will be helpful for faculty to get timetable. Timetabling is known to be a non-polynomial complete problem. Heuristic approach is chosen to tackle the problem of time tabling, which leads to a set of good solutions. Objective is to be able to optimize the algorithm used in recent timetabling systems in order to generate the best timetables with fewer or no clashes. The second objective is to expand the

scope of timetable automation systems by making it generic thereby bringing about uniformity in the creation of timetable as it applies to different universities or educational institutions.

A. Figures

After logging into the system, it asks for the branch and semester where the subjects are organized based on them. Now personnel have to select the subject for which question paper has to be generated. Here there are three options provided, first option is to add new questions to the database or, to delete or edit the existing questions. Second option is to select the questions manually if the admin is not satisfied with the generated question paper from the system. Last option is to generate the question paper automatically, where the admin has two options, either question paper is generated using total marks or difficulty level. After the question paper is generated with existing college question paper template, it is further converted to PDF/DOX format for the official use.

Generating timetable initially begins with setting lab subject allocation for first year students, lab subject name, code and other course related details required are provided to the system. After the specifications the faculty name, department, work load is fed to the system along with the syllabus details. System analyses all these details and allocated faculty to each subject and allocates time for each subject. Higher semester time table is generated based on the availability of the timing of students and lecturer and then it is generated to avoid clashes.

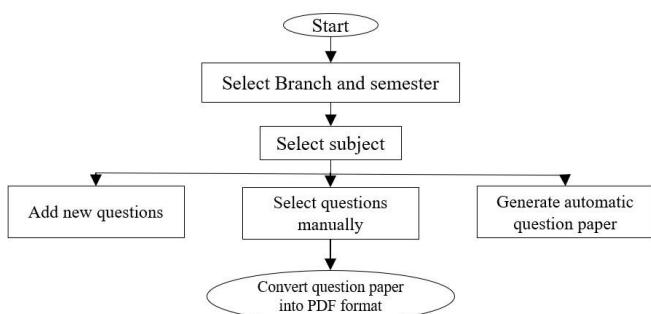


Fig. 1. Flow chart to generate question paper automatically.

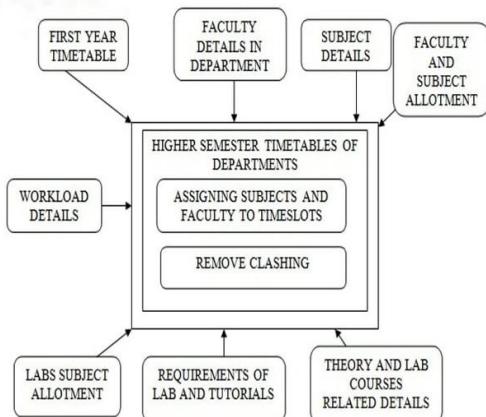


Fig. 2. Flow chart to generate timetable.

II. LITERATURE REVIEW

Rohan Bhirangi, Smita Bhoir [1] both proposed a model which uses a probability for non-repetitiveness of questions in question paper at the time of question paper generation. The

system takes input where the questions can be of knowledge based, memory based, logic based and application-based types. Algorithm uses randomization of questions which is the main task to avoid the repetitiveness of questions. Here the task is been divided between administrator and subordinates based on their task. This automatic question paper generator system proposed by them is implemented with Java which consist of three groups, i.e., Administrator, Data Entry user and Paper generator. This system has many advantages like updating the data is easy task, as it reduces the man work and question paper is generated within seconds, also the questions in database can be edited easily. There is a controlled access to all the contained resources because there is a division of task between administrator and subordinates. For security purpose algorithms are used to store both user and admin password which enhances the security. Even for non-repetitiveness nature, algorithms are used i.e., shuffling algorithm which further uses randomization algorithm where selected questions are marked using flag system. The main advantage of this system is, it is role-based hierarchy where admin's work is to enter the data and generate the question paper, data entry user is allowed to enter the data but restricted to generate the paper, and Paper generator is not allowed to enter the data except generating the question paper. Considering all the advantages, the template contains all logins in one window where it is quite confusing, so instead of dividing small tasks to so many different batches in this system only two hierarchies are provided like admin and user where the works are divided among them.

Gauri Nalawade, Rekha Ramesh [2] proposed a model and have come up with semantically tagged question repository from which the question paper is being generated. As per the user's selection and specification questions are extracted from question repository and question paper is set up in xml format and also in pdf format is the user wishes to have. This system first asks for selection skeleton of paper format i.e., university name, course, semester, year, subject etc. and next level of exact specifications for which the question paper is asked like difficulty level. This system is so flexible that user can extract question paper for different user like MCQ's, term test assessments etc. With existing disadvantage of lack of tags, they have come up with four tags where it supports all the tags and allows user to enter the specifications for each with lower bound and upper bound saying that the value must not exceed the upper bound and must not be lower than the minimum value. This system is mainly useful for the institutes or organizations who has large number of tagged question paper repository and needs to generate the question paper easily. As mentioned, the four tags are topic, question type, cognitive level where it uses bloom's taxonomy for them and difficulty level. Concept table stores question id, topics name, chapter name, whereas question table contains the semantically tagged questions. While generating the question paper, user will be given two options for specification entry to choose between header/preamble or question paper specification, after all the specifications, search engine searches for the questions from the repository and converted into xml format. Here the algorithm which search engine uses is little complicated and this system nowhere talks about security and the non-

repetitiveness nature of the questions in accurate manner, so implementing the system with high security and randomness in questions during the generation of question paper.

Mr. Amit Sanjay Khaire, Mr. Bhagwat Chintaman Jadhav, et. al. [3] This proposed model uses the database in which all the questions are stored, this database doesn't have any limits for storing of questions. While paper is being generated, it chooses the questions from database and selects the questions randomly. This system provides the flexibility for the admin to do the changes in the database. The main thing in this model is "difficulty level", each question is assigned with its difficulty level and this is a base for generating the question paper. They have used shuffle algorithm for randomizing of questions during generation of the paper, this allows to generate the question paper without repetition and duplication. Advantage of this system is the algorithm used is easy to understand and straight forward, where the questions are stored in the database which is further stored in tables. Each subject has different tables assigned in the database, every question here is differentiated by id, marks and unit number which ease the selection of question from the database. Once the admin login to the system they are asked to select the subject from the list and then system asks for the total marks weightage then the system shows the generated question paper indicating no error, finally admin has the option to save it to .docx format where they have the option either to printout or to save it into PDF format, this system is secure due to login option. In the final stage where the system shows the generated question paper indicating no error, if the admin is not satisfied with the questions that are generated, they do not have any option rather than again generating new set of question paper, this repeats until the admin is satisfied make the system a bit disadvantageous. Taking this to consideration system have added manually setting of questions from the database, i.e., the user is allowed to select the question according to their wish directly from the database which makes the system efficient.

Prof. Mrunal Fatangare, Rushikesh Pangare, et. al. [4] They proposed a system that contains modules such as admin module and user module. This is an android application model in which random questions are picked from the conditions provided by the admin in accordance with randomization algorithm questions will be generated based on marks, chapter and bloom's taxonomy, where admin can format the questions in the database. With respect to some disadvantages like static databases, one tier specification, non-portability etc., this system is been proposed. This system has some advantageous functionalities like Non repetitiveness of questions, Level wise entry, formatting the pattern of question paper according to institution needs, exact number of specific questions as per the specifications given by the admin with no extra questions and errors. The proposed system contains three modules. Admin module, instructor module and user module. During the testing the system is been tested over the manual setting of question paper with equal number of attempts. Average time taken to set the question paper manually is 10-15min whereas using this system took around 5-10sec. Average repeated questions in manual setting is 2-4 but there are no repeated questions in the

system generated questions. This system also contains some disadvantage as above system which is rectified in this system. Dubey Harish, Tamore Hardik, et. al. [5] They have utilized a "Fuzzy logic" algorithm using python to randomize the questions. This system generates the question paper in the format which the user chooses. This system is role-based hierarchy. User has to give the subject name and particular module name while selecting. Here administrator is the one who controls the whole model, where admin allows users and also, he/she specifies a specific role for each of them. Only the authorized admin has the chance to edit/delete/add the questions in database. This system consists of two portals, one is for adding the questions to database, other is for automatically generating the question paper. When total marks are given for the model as input, system divides it and generates the question paper, hence this system has some accuracy while generating the question paper. Here the system comprises of two portals, one is for adding questions to the database and the other is to generate the question paper. While generating the question paper system asks for some specifications like date, instructions, duration etc., later the questions are selected from the database. Here the questions are stored along with the weightage in tuple form, where the tuples are immutable i.e., it cannot be modified. Questions will be allocated with their respective marks and will be grouped under certain tags, say for example 10 marks question under t-marks, 5 marks questions under f-marks etc., which will help during the generation of question paper. The explained algorithm takes previous generated question paper into consideration before generating the question paper. Previously generated question paper is stored in unique folder, system checks for the same and if such file exists, they are scanned and procured which are stored in set-1 in the form of tuples which has questions and their weightage. If the user needs some number of questions which has to be repeated from previously generated paper, they have to mention the percentage say X% from set-1 and save it into next set that is set-2. Hence this system is more reliable in terms of duplicity removal, security and compromise issues.

Anisha Jain, Ganapathy S C Aiyer, et. al. [6] They have proposed an optimized technique to generate automatic time table using genetic algorithm. Genetic algorithm generates an optimized solution that overcomes all the hard and soft constraints such as faculty, classrooms and courses and labs. Genetic Algorithm are search algorithms, it helps to mimic the selection and natural evolution. Genetic algorithm is more vigorous than conventional AI, i.e., algorithm is not disturbed even if there are slight changes in input given and even in the presence of noise. The three most outlook of using genetic algorithms are [1] definition of objective function, [2] definition and implementation of the genetic representation and, [3] definition and implementation of genetic operators. The proposed method takes four parameters as its inputs that is person/lectures name, subject name and code, room number and capacity, time internal. The action to be executed is selected by genetic algorithm, hence it is used to generate an optimized solution. This approach has simplified design and minimum error, which means it has most of the constraints involved in timetable generation. Comparison is made between

Genetic algorithm, Heuristic approach and BFOA-GA algorithm. Here the performance is good in genetic algorithm whereas it is better in other two. Time taken in GA is high and less in BFOA-GA but in heuristic approach it is less in the presence of plenty resources and high when there is presence of less resource.

Yash Lahoti, Aaditya Punekar et. al. [7] In this project they have used time table object. This object contains classroom object and time table for them. This classroom object comprises of week object. Hence this week objects comprises of days. These days also comprises time slots. So, this time slots have so many data such as address. This classroom object gives fitness core for timetable. There is no permutations and combinations are performed. It simplifies the manual work. The only disadvantage here is that the user has to verify the model manually once after it is prepared. Due to some drawbacks like, increased source document which is led by increased transaction leads through which maintenance becomes difficult, if the entry of either student or staff is made wrong maintenance become even more difficult, hence taking these into consideration this system was designed so that it must be efficient compared to actual manual system. The main task here is, one institution has so many courses and each course has different subjects but the faculty number will be less which leads to one faculty taking more than one subject, hence timetable must be designed in such a way that there are no clashes and overlap in specific time slot. Therefore, customized algorithm is used to build this system. System is built using Microsoft .Net Framework for front-end technology, Microsoft SQL server for back-end technology and Active data Objects.Net overview for middleware technology. This system is technically feasible because all the technology needed for this project is readily available for example, operating system must be windows 7 or higher, Language is Asp.Net with C# (.Net 2010), MSSQL Server 2008 is the database system used and MS-Word 2010 is the documentation tool. Cost of the development of this project is minimal compared to financial benefit hence the proposed system is economically feasible. Though the system generates the timetable it has to be formatted a bit after it is prepared which is one of the drawbacks and is been resolved.

C L T H Gajanayake, W P J Pemarathne [8] The main agenda of this paper is to create dynamic scheduling system, which generates time table according to the situation. The scheduling system must be flexible i.e., it must not be static or fixed. Genetic algorithm is used to meet the hard and soft constraints involved in timetable generation. They tried to develop chromosome representation of genetic algorithm for time table generation. Random chromosomes were generated based on the needs and fitness function was built to check the fitness of each chromosome. The one with more fitness is the best chromosome /solution. Say for example if the lecturer cannot attend the class the next day the system will be able to swap the classes of the lecturer with no clashes. The main constraint should be considered is availability of time of the lecturer, subjects and resources, these are the factors that must not be clashed with each other. This paper has explained about some of the technologies and algorithms that are most commonly

used, like Local search procedures, Simulated Annealing (SA), Tabu search, Genetic Algorithm (GA), The Constraint Programming (CA), Heuristic Selection Methodologies. Among these Local search procedures are most commonly used. But according to the most of the literature survey Genetic Algorithm is used in many projects. This project has some constraints that should be taken into consideration, like soft and hard constraints, sometimes soft constraints can be ignored. Some main constraints are, visiting lecturers are given highest priority according to their available time, no lecturer can have two lectures at the same time, selective lecturers cannot be clashed. After constraints are identified chromosomes representation of genetic algorithm is done for timetables. Project has conclusion saying that algorithm gives approximation which is considered to be an acceptable solution.

Mallikarjuna Nandi, R.Priyadarshini, et.al. [9] The proposed model will generate the time table based on some inputs like number of teachers, number of subjects and number of lectures a teacher can handle etc. There are so many difficulties encountered during the time table set up, hence while constructing the model they have used heuristic algorithm. At the time of timetable generation there are two logins, one is admin login, other one system login, both the login pages had different user ID and passwords. This timetabling has different scenarios of time table formation. Example time table for college courses, timetable for examination etc. The main objective of this project is to automatically generate the timetable for individual classes and staff. To increase the work efficiency. To view the timetable in easy manner. The modules this system is using is, information feeding for subject and staff. Feeding of the requirement. Verification and validation. Storing in database and retrieval. This system is feasible due to Intel platinum processor, 2GB RAM, Windows OS, NetBeans software. System uses Java as front-end and MySQL for back-end purpose. The flow of result will be like, home page, login form, entry tab, subject entry form and timetable generation. The main agenda of this algorithm is to improve the efficiency of search operation. The main hard constraints like clashes between the availability and soft constraint like optimization for objectives for the search operation is handled effectively. This algorithm operation is more general that it can be further be adapted in many of the specific scenarios.

Kehinde Wiliams, Micheal Ajinaja [10] In this paper genetic algorithm technique has been used to solve the timetable generation problem. In real world circumstances the general timetabling system is difficult to solve like, set of events such as courses and exams are assigned into certain timeslots. The main aim of this project is to automatically schedule through the use of computers in such a way where there is optimal and complete with little or no redundancy. Also, to expand the scope of automatic timetabling by making it generic which brings uniformity in creation of timetable. The system is operated by the administrator, where he needs to login into the system and provide necessary inputs such as courses with their codes, number of classroom available. Based on the inputs provided system generates timetable. Using genetic algorithm

method has reduced the errors to minimum and also allows the admin to remove the wrong courses if applied. The program modules and interfaces involved in this system are “login section” and “course input section”. Genetic algorithm method is the most effective one in generating the automatic timetable even though it does not provide 100% accuracy. Some of the constraints like one room is allocated to one lecturer, each and every class must be scheduled exactly once, there must not be any clashes in the class of students and there must be break after every 2-3 classes are used in this genetic algorithm. Use of this algorithm is little slow due to its steps. By generating random numbers and by mutating and crossing over parameters is received before the final result, hence it still remains as the best way to solve this problem.

III. CONCLUSION

Automatic question paper generation is an intelligent way for generating question paper for schools and colleges. The main purpose of this application is to reduce man power and computerize the work. There is a minimal data entry required and also minimum time required. As stated earlier the main agenda of this system is to provide high security and data accuracy. Therefore, the system has greater efficiency with better service. For timetabling generation, we used heuristic approach which leads to a set of good solutions. The system will generate even number of classes with no clashes. It replaced paper work and man work, hence reduced timing and complexity.

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