EXAM INVIGILATION SCHEDULER

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Abstract—The process of room allocation for faculty during examinations has been a traditionally manual process, but now, we are embarking on the journey of developing an application centered on room allocation for faculty online. The current manual method involves significant time and complexity in assigning classes without any confusion. Additionally, a considerable amount of paperwork is required for manual allocation, demanding substantial efforts. To counter these challenges, we are presenting the creation of a web application known as the Exam Invigilation Scheduler. In this web application, the admin holds the key to managing all data. Through this application, the admin can efficiently schedule invigilation by allocating tables based on the provided data. Preparation for the invigilation schedule entails storing various details in the system database, including information regarding branches, faculty members, number of rooms, faculty email addresses, and other necessary information. To utilize this application, the admin must log in and, if desiring to arrange exam invigilation schedules, provide details such as the examination date, the number of branches involved in the exam, the faculty availability on the examination day, and the available number of classrooms. Based on the admin's input, the system will construct the exam invigilation timetable. Once the invigilation table is prepared, emails will be dispatched to the respective faculty members, specifying their allocated room number, date, time, and examination details. The final invigilation table serves as a critical tool for conducting examinations. Through this web application, automatic class allocation during examinations is achieved without manual intervention, effectively reducing paperwork, saving time, and preventing confusion among faculty members during exam invigilation.

Index Terms—invigilation, scheduling, allocating rooms, examination, sending mail,reducing time,tearchers satisfaction etc..

I. INTRODUCTION

Preparing the exam invigilation schedule can be a daunting task for any examination department. Various factors come into play, such as ensuring the schedules are ready in a timely manner, avoiding disruptions to lecturers' marking duties, and preventing lecturers from invigilating their own subjects. The random assignment of invigilation duties often led to confusion, misunderstandings, and complaints about the uneven distribution of duties. To address these challenges, we have developed the "Exam Invigilation Scheduler" software. This innovative tool automates the process of scheduling faculty members for invigilation duties based on the rules set by the examination department. All relevant information is securely stored in a database, including faculty details, email addresses, classroom assignments, and academic departments. When creating the invigilation schedule using the software, emails are automatically sent to the faculty members with details of their assigned classes, examination dates, times, and names. The allocation process takes into account faculty availability, seniority, and other factors to ensure a fair distribution of duties. The system is administered by an admin who can customize the schedule according to specific requirements. By implementing the Exam Invigilation Scheduler, examination departments can streamline the scheduling process, eliminate manual errors, and ensure a fair and efficient assignment of invigilation duties. This innovative solution not only simplifies the scheduling process but also enhances the overall invigilation experience for both faculty members and students

II. LITERATURE SURVEY

This research delves into the significance of organizing invigilation responsibilities to uphold the integrity of exams. It supports the use of modern automated methods over traditional manual allocations and assesses their efficacy, focusing on efficiency, fairness, and invigilator contentment. By introducing a new system utilizing the Round Robin algorithm, it delivers practical insights and comparisons, enhancing scheduling methods in educational institutions. [1]

ExIMS is a major advancement in managing invigilation duties in academic settings, addressing invigilator dissatisfaction with its web platform. Developed using the SDLC waterfall model, ExIMS employs the multi-selection control algorithm for seamless task swapping. With user-friendly features and high approval ratings (95per satisfaction), it notably boosts invigilator happiness during exams (99per comfort). Ongoing enhancements ensure its effectiveness. [2]

The study focuses on the hurdles of manually assigning supervisors for exams in educational institutions, exploring

algorithms like QAP and ANP. It emphasizes the use of a shuffling algorithm to tackle duplication issues, effectively producing supervisor data automatically. This method saves time and effort, boosts efficiency, and minimizes the need for human input. Additionally, the online platform has features to prevent duplicate supervisors, further improving the process. [3]

The algorithm in the paper increases invigilator satisfaction by reducing assignment time from multiple days to one day, in contrast to manual methods. Although it takes into account the constraints and parameters of invigilators, manual adjustments are still necessary for accommodating empathetic scheduling. enhancements are needed for constraints, especially when dealing with numerous hard constraints The examination committee is to simplify exception filtering to cater to requests, those based on religion, while prioritizing preferences for pleasant invigilation tasks. [4]

This study aims to develop a mathematical model to efficiently solve the exam scheduling problem in academic settings, minimizing the total number of classrooms assigned. While the model optimally assigns exams across sessions and classrooms, its real-life applicability remains untested for larger-scale scenarios. It suggests that if frequent rescheduling isn't common, longer computation times for optimal solutions may not be problematic. However, for cases requiring frequent rescheduling due to requests, heuristic or metaheuristic methods may offer quicker yet acceptable solutions. [5]

This study examined the capacitated scheduling issue for exam invigilators. To formulate the problem, a goal programming framework was used, where a variety of restrictions linked kind of.Primary and secondary limitations were defined as exam, invigilator type, time availability, and other preferences. At Bogor Agricultural University's Department of Mathematics, the model was then used to simplify an exam invigilator task. [6]

In this research, a unique approach for invigilator scheduling at Universiti Malaysia Pahang (UMP) is introduced, which outperforms the existing software at the university in terms of solution quality. This approach improves invigilator satisfaction by taking into account both hard and extra limitations depending on feedback from the invigilator. It covers a number of practical scheduling issues that were not previously discussed, highlighting how crucial it is to divide up staff responsibilities for invigilation fairly while yet adhering to room specifications. The suggested method continuously produces excellent results while satisfying all requirements, including ones that the university's current software is unable to handle. [7]

This study tackles the examination scheduling challenges specific to the female section of a college's Master's program, considering cultural restrictions on room types and proctor assignments. It proposes a Genetic Algorithm (GA) approach, emphasizing mutation to maintain solution feasibility. The optimization process involves two phases: determining optimal room assignments and assigning exams to proctors, each with distinct hard constraints. Experimental results highlight the algorithm's efficiency in handling specific constraints inherent

to this examination scheduling problem. [8]

This paper presents an automated timetabling system that uses Genetic Algorithm (GA) optimisation to handle conflicts in resource usage brought on by an increase in university student enrollment. The technique was tested in the Faculty of Science of a Nigerian college. It effectively maximises resources and reduces exam scheduling conflicts. Although expanding the search space may slow down the programme, there are benefits over manual methods, such as better resource allocation and fewer course collisions. All things considered, the method makes it easier to plan and assign space for academic events in an effective manner, which helps to maximise resource management in higher education. [9]

This study focuses on creating a decision support system for scheduling exams in educational settings with the goal of maximising resource utilisation while meeting the demands of students, instructors, and management. The Quadratic Assignment Problem (QAP) model is modified, and a hyperheuristic approach is used to optimise resource allocation without requiring prior examination knowledge. This minimises conflicts. To improve scheduling quality, future work will involve putting in place a scheduling system for simulation and assessment. [10]

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In order to address imprecise allocation variables using fuzzy numbers, this work presents three mathematical models for the Examination Timetabling Problem (ETP) at NSOU, Kolkata, India. The models use the Fuzzy Integer Linear Programming (FILP) technique. The Fuzzy number ranking approach is used to obtain solutions. A fuzzy number that is derived from the Fuzzy objective function represents each conceivable solution. On Carter benchmark datasets, FILP models are compared with ILP techniques and other AI-based heuristics using experimental data from NSOU, Kolkata, India. Even though it takes longer to solve, FILP is a benchmark that shows off its capabilities for a range of combinatorial optimisation issues outside of ETP. [12]

This study addresses the difficulty of creating test schedules by hand at FOSEE, MMU, Malaysia, and suggests heuristic techniques like grouping and graph colouring to shorten exam length. The study shows how to reduce exam duration in a methodical and effective way using these techniques. Although successful, the research points to the possibility of even greater improvement through automation with certain tools and languages for scalability and consistency. [13]

This abstract describes a survey that was done to find out how Universiti Kebangsaan Malaysia's undergraduate students

felt about the scheduling of university exams. A new model for allocating exams to rooms is presented in light of the survey results. It introduces the Room Penalty Cost objective function, which aims to minimise students' movement between rooms during consecutive exams and, where needed, limit the number of rooms assigned to a single exam. Furthermore, a heuristic method is proposed to optimise the new model in order to generate high-quality answers to the examination timetabling problem. [14]

In this paper by decreasing the amount of human labour and time needed by the scheduling committee, the Examinations Invigilation Scheduling System expedites the creation of final examination invigilation schedules. It makes it possible to build a database including the preferences and limitations of lecturers, which makes it easier to create detailed schedules. It is available online and lets professors remotely access timetables, enter preferences, and give feedback. The technique, which has been effectively implemented at UiTM Sarawak for the previous five semesters, encourages a methodical approach to scheduling using automated processes. [15]

Together, these studies contribute diverse methodologies to streamline invigilation duty scheduling and exam management, ultimately enhancing operational efficiency and user satisfaction in educational settings.

III. Addressing Drawbacks of Existing Methods

In the existing system, room allocation is done manually, following a multitude of parameters. However, this manual distribution often leads to faculty members being dissatisfied. The faculty may receive the same room or they receive a room which is far from their cabins, causing various issues. Some of the projects leveraged genetic algorithms while others utilized a sequential method for space allocation. Nevertheless, there are inconsistencies in these methods, such as the inability to edit data multiple times and the lack of feedback to the faculty through emails or other means.

The drawbacks of the current system are evident. The manual allocation process is prone to errors and inefficiencies, resulting in faculty dissatisfaction and operational challenges. To address these drawbacks, it is essential to enhance the room allocation system with a more efficient and effective solution.

By implementing a more advanced and automated system for room allocation, such as utilizing algorithmic approaches and incorporating feedback mechanisms for faculty, we can significantly improve the allocation process. This upgraded system will streamline the allocation process, reduce inconsistencies, and provide a more transparent and user-friendly experience for faculty members.

IV. Problem Statement and objectives

The current manual room allocation system in our academic institution is plagued by inefficiencies and shortcomings, resulting in faculty dissatisfaction and operational challenges.

A. objectives

1) To reduce the manual involvement and the amount of time taken to prepare the invigilation schedule.
2) To ensure that no faculty member of the same branch will be assigned to invigilate the same branch examination classroom.
3) Improve data management capabilities to allow for easy modifications and updates to room allocation information.
4) Develop an automated room allocation system that optimizes space utilization while ensuring fairness and transparency in the assignment process.

V. PROPOSED WORK

The "Exam Invigilation Scheduler" was proposed to overcome the disadvantages of the manual process of allocation such as being complex, time-consuming, involving a lot of effort, and many more. By implementing this system we can eliminate manual errors, and ensure a fair and efficient assignment of invigilation duties. The following are the main characteristics and elements of the suggested system.

1) Web-based admin dashboard: Authorized users can monitor and oversee the scheduling process. The admin can only log in to the system he can modify the database of the system by adding, removing, or changing the details of the faculties and he can schedule the invigilation table according to his requirements.
2) Preparing process:- To prepare the invigilation schedule he needs to select the no.of rooms available and no.of faculties and by mentioning the date and time of the examination he can able to prepare the schedule of allocation to those faculties for the whole exam at once if any faculty is absent on the exam day then he can replace their positions with the other faculty who were present and not scheduled.
3) Allocation conditions:- In this allocation process there are some conditions taken into consideration like no faculty of the same department will be assigned to the same department exam room and if the room is large and capable of more students then the system will assign the no.of faculties to the room accordingly.
4) Mails:- After completion of the invigilation scheduling, the admin can send emails to the respected faculties which include information about the examination name, time of the examination, Room No which is to be invigilated, etc...

VI. METHODOLOGY

We use the Sudoku technique in our system to assign faculty members to rooms such that no room is used twice for the same exam. If the given conditions are not fit into the Sudoku format then the algorithm will adjust the things and in the algorithm it self there are some techniques are involved like sequential allocation and some techniques .Sudoku is played on a nine-by-nine grid that consists of rows, columns, and boxes. The goal is to fill every space in the grid with the

digits 1 through 9. By utilising this reasoning, our system assigns faculty members' rooms in an effective manner while preventing duplication. Furthermore, the algorithm adjusts by considering the surplus faculty as free for the day's examination duties, such as organising exam papers and signing sheets, if the number of faculties surpasses the number of rooms that are accessible.

For the first exam day, faculty scheduling starts with randomization using Javascript Random method. Then, to make sure there are no duplicates, the Sudoku-based method takes over to finish the remaining room assignments. When a faculty member's emergency requires them to be absent, they tell the administrator, who then selects substitutes from the pool of candidates. To guarantee that the test goes smoothly, the new faculty member is promptly informed of the details of the invigilation.
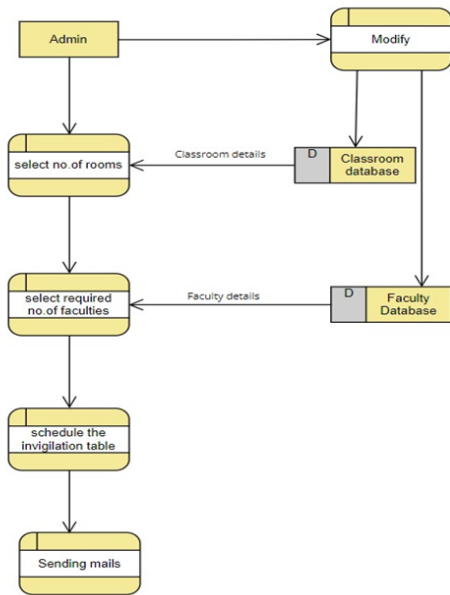
VII. RESULTS

The algorithm that is tested has the maximum no.of the invigilators who are scheduled for the invigilations that are satisfied. There are no clashes/issues and all the constraints are properly maintained. The examination committee members were happy as there was no need to spend several days rescheduling the invigilation table and he could directly inform the faculty through emails so there was no chance of miscommunication manually. and after visualizing a few system-generated invigilation tables there were no faculty allocated to the same department examination room. By maintaining the database of this system will be helpful for the admin to prepare the invigilation table by just selecting it and a few more comparisons are tabulated as follows:-

Invigilation assignment	Room1	Room2	Room3	Room4	Room5	Room6	Room7	Room8	Room9
Day1	Id1	Id5	Id2	Id4	Id8	Id9	Id3	Id7	Id6
Day2	Id7	Id3	Id9	Id2	Id5	Id6	Id8	Id4	Id1
Day3	Id4	Id6	Id8	Id3	Id7	Id1	Id2	Id9	Id5
Day4	Id3	Id8	Id7	Id1	Id2	Id4	Id6	Id5	Id9
Day5	Id5	Id9	Id1	Id7	Id6	Id3	Id4	Id2	Id8
Day6	Id2	Id4	Id6	Id8	Id9	Id5	Id7	Id1	Id3
Day7	Id9	Id1	Id4	Id6	Id3	Id7	Id5	Id8	Id2
Day8	Id6	Id2	Id5	Id9	Id4	Id8	Id1	Id3	Id7
Day9	Id8	Id7	Id3	Id5	Id1	Id2	Id9	Id6	Id4

SAMPLE INVIGILATION SCHEDULE.

Fig. 1. invigilation schedule

TABLE I
RESULTS AND FINDINGS

Parameter	Existing System	Proposed System
Faculty Satisfaction	66.5%	95%
Time required to schedule	More	Less
Repetition of same room	Yes	No
Paperwork	Yes	No
Manual involvement	Yes	No
Duty distribution	uneven	Even & fair
Manual errors	Yes	No

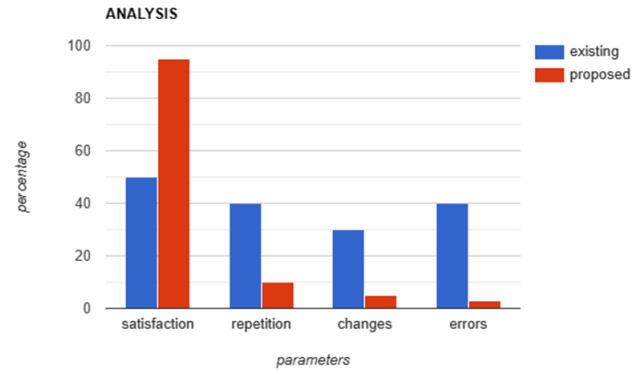
Fig. 2. DATA FLOW DIAGRAM (DFD)
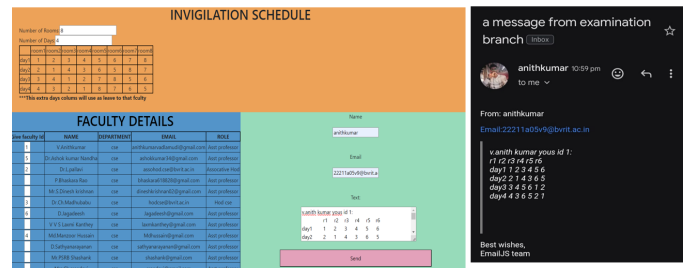

Fig. 3. BAR GRAPH REPRESENTATION

Fig. 4. implementation

VIII. CONCLUSION

The current manual allocation process, which is susceptible to errors and inefficiencies, has resulted in dissatisfaction among faculty members. By introducing Exam Invigilation Scheduler(EIS) an automated room allocation system that eliminates manual tasks, reduces the time needed to arrange invigilation schedules, prevents room repetition and same subject faculty not assigned as invigilator to the same subject exam ,many more. Overall, by addressing the drawbacks of the existing room allocation system and implementing a optimized solution, which enhance the efficiency, effectiveness and reduce inconsistencies, and enhances the satisfaction of faculty.

IX. FUTURE WORK

For futuristical workings on the Exam Invigilation Scheduler, effectoriates might be directified to enhancious real-time monitoring and reporting functionalitivities, enablement administrators to track exam progross and analyze invigilation datas very much effectively. Integration with other academical systems like student informations systems and course managing platforms could streamline sharing of data and ensure consistencies across all academical processes. Additionally, automatizing conflict resolutions, implementing customazable invigilation rules, and developmenting a mobile application version would further optimize allocations and accessibleness, providifying a seamless and efficient experience for administrators and faculty members. Furthermore, incorporating a feedback mechanism for faculty members to provide input on their invigilation experiences and continuously improving the user interfaces would ensure the system's ongoing usability and effectiveness. These developments would contribute to the system's scalability, securitization, and overall performanceness, making it a comprehensive and indispensableness tool for exam invigilation in educational institutions.

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