UNIVERSITI TEKNOLOGI MARA

SPACE ALLOCATION FOR EXAMINATION SCHEDULING USING GENETIC ALGORITHM

ALYA KAUTHAR BINTI AZMAN

Bachelor of Computer Science (Hons.)

College of Computing, Informatics and Mathematics

ABSTRACT

Space allocation management for examinations at UiTM Cawangan Terengganu Kampus Kuala Terengganu (UiTMCTKKT) presents a complicated task that demands analyzing multiple limitations alongside various elements to ensure proper resource utilization and conflict reduction. This study applies Genetic Algorithms (GA) to optimize space distribution for test scheduling, addressing the challenge of managing multiple test sessions across distinct locations. The research adopts a Genetic Algorithm-based approach, where examination scheduling details such as date, time, course code, program code, student group, student numbers, and available spaces are encoded as chromosomes. The system generates and evaluates potential schedules using fitness functions, selection, crossover, and mutation operators to iteratively improve scheduling efficiency. Data for the study was collected from university records, and algorithm performance was tested against predefined scheduling criteria.

The proposed system successfully optimized examination space allocation by significantly reducing scheduling conflicts and improving resource utilization. Compared to manual scheduling methods, the automated system reduced scheduling time and errors while achieving better space management efficiency. The results demonstrated that the Genetic Algorithm approach effectively balances examination load and minimizes room underutilization. To further enhance the scheduling system, future work should focus on integrating additional optimization techniques such as Particle Swarm Optimization or Simulated Annealing to refine scheduling accuracy. Implementing real-time data updates through cloud-based platforms could further improve system scalability. Additionally, a user-friendly interface for administrative staff would enhance interaction and usability. Expanding the dataset for training and evaluation would strengthen the model's robustness, ensuring better adaptability to dynamic scheduling constraints.

ACKNOWLEDGEMENT

I am grateful to God who granted me the privilege to start my Bachelor degree studies and enable me to successfully finish this extended demanding path. Dr. Norulhidayah Binti Isa receives my heartfelt gratitude along with my thanks.

Thanks extend to my teaching staff for continuously guiding me through the development of my project. All my gratitude extends to my colleagues and friends who provided support throughout my project.

I dedicate this research to my father and mother because they envisioned and worked hard to provide me with an education. The victory belongs to both of you.

TABLE OF CONTENTS

SUPE	Ш			
STUI	IV			
AUTI	V			
ABST	VI			
ACK	VII			
TABI	VII			
LIST	IX			
LIST	X			
CHAPTER 1 INTRODUCTION				
1.1	Resear	rch Background	1	
1.2	Proble	em Statement	3	
1.3	Projec	t Objectives	4	
1.4	Projec	t Scope	4	
1.5	Projec	4		
1.6	Overv	6		
1.7	Conclu	6		
CHA	7			
2.1	Introd	uction	7	
2.2	Sched	7		
	2.2.1	Overview of Scheduling Systems	7	
	2.2.2	Components of Scheduling System	9	
	2.2.3	Common Challenges in Scheduling Systems	10	
2.3	Optimization		12	
	2.3.1	Introduction to Optimization	12	
	2.3.2	Types of Optimization Problems	14	
	2.3.3	Optimization Algorithms	15	
	2.3.4	Role of Optimization in Scheduling	17	

2.4	Genetic Algorithms		
	2.4.1	What is Genetic Algorithm	18
	2.4.2	Steps of Genetic Algorithm	19
	2.4.3	Advantages of Genetic Algorithm	22
2.5	Relate	ed Works	
	2.5.1	Implementation of Genetic Algorithm in Various Problems	24
	2.5.2	Similar Application	28
2.6	Implic	cation of Literature Review	32
СНА	PTER 3	B RESEARCH METHODOLOGY	33
3.1	Introd	uction	33
	3.1.1	Details of Research Framework	34
3.2	Prelim	iinary Phase	36
	3.2.1	Literature Study	36
	3.2.2	Data Collection	36
3.3	Design and Development		
	3.3.1	Data understanding	38
	3.3.2	Algorithm design	40
	3.3.3	User Interface Design	48
	3.3.4	Develop Space Allocation for Examination Schedule Model	49
3.4	Evaluation Phase		
	3.4.1	Calculate Fitness	50
	3.4.2	Performance Evaluation	50
3.5	Gantt	Chart	51
3.6	Concl	usion	52
СНА	PTER 4	RESULT AND DISCUSSION	53
4.1	Syster	n Logical Design	53
4.2	Program Code		
	4.2.1	Genetic Algorithm Function	54
	4.2.2	Initialize Population	55
	4.2.3	Calculate Fitness	56
	4.2.4	Selection	57