

**schEDU: WEB-BASED PUBLIC SENIOR HIGH SCHOOL SCHEDULING
SYSTEM USING ANT COLONY OPTIMIZATION**

A Thesis

Presented to the Faculty of the

Computer Studies Department

College of Science

Technological University of the Philippines

Ayala Boulevard, Manila

In Partial Fulfilment of the

Requirements for the Degree

Bachelor of Science in Computer Science

By

SOPHIA J. DALUMPINES

CHRISTINE G. DELOS REYES

LEA O. FLOR

SELWYN AUDREY C. PEREZ

RENT L. SARMIENTO

June 2024

INTRODUCTION

The main objective of this study is to develop a web-based scheduling system for Public Senior High Schools. The system uses the Ant Colony Optimization algorithm to generate schedules. The frontend is configured with React, and Flask is used for the system's programming. The backend is set up using Python as the primary programming language. The project is intended to enhance the scheduling process of senior high schools, offering efficiency for both faculty and students. It is designed to produce an optimized schedule for a single academic year within the senior high school academic year. The system must meet the robust and safe performance criteria based on network applications. It must handle scheduling requirements such as diversification, frequent schedule adjustments, massive amounts of data, etc. The system can only cater for a single-shift schedule and can only generate schedules for one semester at a time. It includes the teacher's preferred time, preferred subject areas, and the time allotted for each class. Allows the user to modify or delete the data input.

METHOD

The system takes the following inputs to construct an optimized schedule: room availability, teachers' subjects, and required subjects. Constraints, such as topic requirements, classroom sizes, and teacher availability, are entered by the user into the scheduling system. The system analyses the data and creates a school schedule based on these inputs. The scheduling system is available for download and available for use by the public. The development of schEDU follows the Agile Software Development model, focusing on continuous improvement. The system generates an optimized schedule using Ant Colony. Ants leave pheromone trails as they explore paths, and these trails will be the guide for other ants to follow. The optimal schedule is produced once the procedure is repeated. The system undergoes beta testing with real users to gather real users' feedback. It is designed to be error-free and debugged before deployment. It can be used to manage teachers, students, and classrooms. It has been developed by the University of Delaware.

RESULTS

schEDU focuses on the following modules: Subject Module, Teacher Module, Section Module, Summary Module, and View Modules. These modules enable the user to integrate the required data to utilize the web application's scheduling process. The user can download a pdf version of the generated schedules, both available in the sections and teachers' tabs. The add, update, and delete features are also available in this module. The following are the system capabilities and Limitations of schEDU. The system was evaluated by 30 respondents, composed of Senior High School personnel and IT Professionals. The user can only select up to nine subjects for each teacher. The generated schedules are presented in a tabular format. The system is currently limited by fixed time slots and break times. The researchers were able to develop schEDU using Python, JavaScript, Flask, React, and Git. The tables below present the steps undertaken to test each module, along with the corresponding results. The test results show that the steps achieved the system's functionality goal for each module.

DISCUSSION

The system can create efficient schedule based on the inputs: subjects, rooms, teachers, and sections. The system was evaluated using the ISO/IEC 25010 evaluation tool. The respondents rated the system's functional suitability as highly acceptable after meeting all specified objectives and delivering accurate, expected results. The researchers recommend the following for future enhancements: . A web-based scheduling system for public senior high schools;. A system that can be used to create non-conflicting schedules for all sections and teachers.