College Learning and Management System

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Abstract - *In today's technological era, most of the colleges use the age old traditional and outdated method for the administration and day to day work of the institution. The day-to-day management for every student is still done manually for each individual, and there can be hundreds of them, which is time-consuming. The proposed application is a web application which will be used to reduce the time and efforts of our college teachers and staff. The admin can easily monitor the leave status of all the members of the institution including the teaching and non-teaching staff. Other facilities provided in this app is a platform for scheduling events and alumni meetings, making announcements for the students from the teachers which will allow the sender to send a message to multiple people all at the same time and providing a thorough time table for each class that will be conducted in the college.*

Key Words: Angular, Typescript, NodeJS, Node Mailer, Web browser, Real time Database.

1. INTRODUCTION

In most of the colleges today we use the age-old traditional method for the basic work of the institution. The management for the daily task is still done manually which is time-consuming.

Keeping records and creating the time table for every class, leave management and keeping track of their status is a harrowing process.

The proposed application makes it easier for all the users to adopt it. This is enforced with authentication making it fairly secure. The admin can easily generate time table for every class in the institution monitor the leave status of all the members of the institution including the teaching and non-teaching staff. An additional feature provided in this application is the easy way for the college to get in touch with the alumni. So, this app takes care of the overall needs of an institution, thus making it easy and faster for the teachers in their day to day tasks.

1.1 Objective

The proposed application is a web application based, which is enforced with authentication making it fairly secure. The application makes it easier for the staff members to apply for a leave and thus making it easy to maintain and keep a hold of the leave applications. Other modules provided in this app is a platform for keeping in touch with the alumni and

providing a thorough time table for each class present in the college. So, this app takes care of the overall needs of an institution, thus making it easy and faster for the teachers in their day to day tasks.

2. LITERATURE REVIEW

This section of the literature survey reveals some facts and insights based on thoughtful analysis of many individual authors works as follows:

Anirudha Nanda [1], provides a general solution for the timetabling problem. The heuristic proposed previous approaches the difficulties from the point of view of a student. This solution, works from the lecture's point of view meaning the lecturer is given availability for a given time slot. While all the strong constraints (e.g. the availability of teachers, etc.) are resolved rigorously, the scheduling solution presented during this paper may be a flexible one, with a primary aim to unravel the problems of clashes of lectures and subjects, pertaining to teachers.

A. Elkhyari [2], the proposed algorithm here provides solving the timetabling problem while giving import to teachers' availability. This algorithm makes use of a heuristic approach to give a solution to difficulties faced during generating a timetable. It initially makes a temporary time table using random subject sequence. If the teacher has been given more than the allowed maximum lectures the subjects is moved into a data structure called Clash. To avoid cycling to improve the search, this variable selection criterion can be random.

Srikant Patnaik [3], The college management system provided in this system only makes use of basic HTML, CSS and JavaScript and only has modules for registration, allotments for hostels and information about mess.

Y.-S. Ong [4], the meta-heuristics are classified based on the number of solutions that are used at the same time into local search-based methods and population-based methods (i.e. harmony search algorithm, ant colony optimization).

E Rushitha Reddy [5], The project is totally built at administrative end and thus only the administrator is guaranteed the whole access to maintain the database and can be done only using an android mobile device.

Dipti Shrinivasan [6], Find a feasible tutorial timetable during a large university department may be a challenging problem faced repeatedly in educational establishments. This paper represents an evolutionary algorithm (EA) based approach to solving a robust constrained university timetabling problem. The move toward a problem-specific chromosome representation. Heuristics and also context-based reasoning have been used for received feasible timetables in a reasonable computing time. An intelligent flexible mutation

scheme has been employed for fast-moving up the convergence. The comprehensive course timetabling system presented in this paper has been approved, tested and discussed using real world data from a large university.

R, Qu [7], In a recent comprehensive survey to examine timetabling, Qu et al. "There are many research directions generated by taking into consideration of the hybridization of meta-heuristic methods specifically between population-based methods and other approaches."

3. SOFTWARE REQUIREMENTS

3.1 Angular

Angular may be a TypeScript-based open-source web application framework led by the Angular Team at Google and by a community of people and corporations. Angular may be a complete rewrite from an equivalent team that built AngularJS. Examples of some supported functions are given below:

- Angular does not have a concept of "scope" or controllers, it makes use of a hierarchy of components and uses it as its primary architectural characteristic.
- Angular has a different expression syntax, focusing on property binding and event binding.
- Modularity – core functionality has moved to modules.

3.1 NodeJS

Node.js is an open source server environment. Node.js can generate dynamic page content. Node.js can create, open, read, write, delete, and shut files on the server. Node.js can collect form data. Node.js files contain tasks which will be executed on certain events.

3.2 Node Mailer

Node mailer may be a module for Node.js applications to permit easy as cake email sending. The project got started back in 2010 when there was no sane choice to send email messages, today it's the answer most Node.js users address by default. It has heavy focus on security and avoids any RCE vulnerabilities. Different transport methods in addition to the built-in SMTP support trying to access a port on the server.

3.3 Cloud Firestore

Cloud Firestore may be a flexible, scalable database for mobile, web, and server development from Firebase and Google Cloud Platform. Like Firebase Realtime Database, it keeps your data in sync across client apps so you'll build responsive apps that work no matter network latency or Internet connectivity. Cloud Firestore also offers seamless

integration with other Firebase and Google Cloud Platform product.

4. MODULES
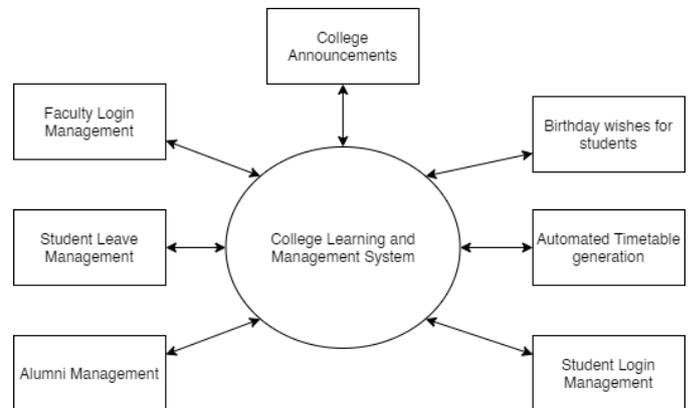
Fig -1: Modules of application

i.   *Faculty Login Management* - The login of faculty to access different modules of the application is maintained here.

ii.   *Student Login Management* - The students can login to the module. The students are only given access to read and not make any changes.

iii. *Automated Timetable Generation* - These modules make use of genetic algorithm to generate a timetable for a particular class. Different field inputs are required to be entered to generate a timetable according to the requirements of a class.

iv.   *Alumni Management* - The alumni of the institution are required to be in touch with the institution, so this module takes care of it. The announcements which needs to be given out to the alumni can be easily done here.

v.   *College Announcements* - The announcements from the college to the students and the alumni related to any college functions or alumni meeting are included in this module. The announcements also include wishing the students and the alumni for their birthdays and any religious functions throughout the year.

vi.   *Leave Management* - The leaves for the students and faculty can be easily managed in this module. The leaves can be applied in this module and can be allowed for the leave only after the leave is approved.

5. ALGORITHMS USED

5.1 Genetic Algorithm

A genetic algorithm may be a search heuristic that's inspired by Charles Darwin's theory of natural evolution. This algorithm reflects the method of survival where the fittest individuals are selected for copy so as to supply offspring of subsequent generation.

The process of survival starts with the choice of fittest individuals from a population. They produce offspring which inherit the characteristics of the oldsters and can be added to subsequent generation. If parents have better fitness, their offspring are going to be better than parents and have a far better chance at surviving. This process keeps on iterating and at the top, a generation with the fittest individuals are going to be found. Five phases are considered during a genetic algorithm.

i. *Initial population:* The process begins with a group of people which is named a Population. Each individual may be a solution to the matter you would like to unravel. An individual is characterized by a group of parameters (variables) referred to as Genes. Genes are joined into a string to make a Chromosome.

ii. *Fitness function:* The process begins with a group of people which is named a Population. Each individual may be a solution to the matter you would like to unravel. An individual is characterized by a group of parameters (variables) referred to as Genes. Genes are joined into a string to make a Chromosome.

iii. *Selection:* The idea of selection phase is to pick the fittest individuals and allow them to pass their genes to subsequent generation.

iv. *Crossover:* For each pair of oldsters to be mated, a crossover point is chosen randomly from within the genes.

v. *Mutation:* In certain new offspring formed, a number of their genes are often subjected to a mutation with a coffee random probability.
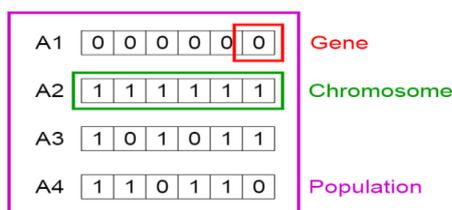
Fig -2: Population Chromosome and Genes
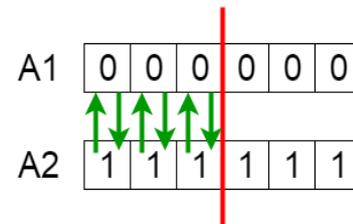
Fig -3: Exchanging genes among parents
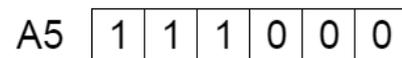
Fig -4: Mutation before and after

The algorithm stops if the population does not produce offspring which are different from the prior generation. Then it is said that the genetic algorithm has provided a set of solutions.

5.2 Text Analysis

Text analysis, sometimes referred as text mining, is the automated process of understanding and sorting unstructured text, making it easier to manage. Text analysis helps businesses deal with information overload. This method helps companies extract information directly from texts. These texts may include tweets, emails, surveys or reviews. The main reason to collect information through texts is to extract specific information such as keywords, names or some specific information. Sorting through data is a repetitive and a time-consuming task. Text analysis identifies important information within a text.

Text analysis methods:

i. Word frequency: The frequently occurring words or concepts in a given data or text. This can be useful for a number of use cases, for example, to analyze the words or expressions customers use most frequently in support conversations. If the customer reviews have the word "product" occurring frequently then that would mean that there is a problem with the product that is being delivered to the customers.

ii. Collocation: The words that co-occur are identified in this method. For example, in hotel booking website the words 'air' and 'conditioning' always co-occur instead of occurring individually. Bigrams (two adjacent words) e.g. 'air conditioning' or trigrams (three adjacent words) e.g. 'out of office'

are the most common types of collocation we need to look out for. Improving granularity of insights and improving hidden semantic structures are done because of collocation.

iii.   Concordance: It helps identify the context and instances of words or a set of words. It can also be used to decode the ambiguity of the human language to a certain extent. By looking at how words are used in different contexts, as well as being able to analyze more complex phrases. Concordance can give us a quick idea to how the users are using certain words.

Advanced Methods:

i.   Text Classification: It is the process of assigning predefined tags or categories to unstructured text. It's considered one of the most useful Natural Language Processing (NLP) techniques because it's so versatile and can organize, structure and categorize pretty much anything to deliver meaningful data and solve problems.

ii.   Sentiment Analysis: Emotions are essential to effective communication between humans, so if we want machines to handle texts in the same way, we need teach them how to detect emotions and classify text as positive, negative or neutral. That's where sentiment analysis comes into play. It's the automated process of understanding an opinion about a given subject from written or spoken language.

6. GRAPHICAL REPRESENTATION
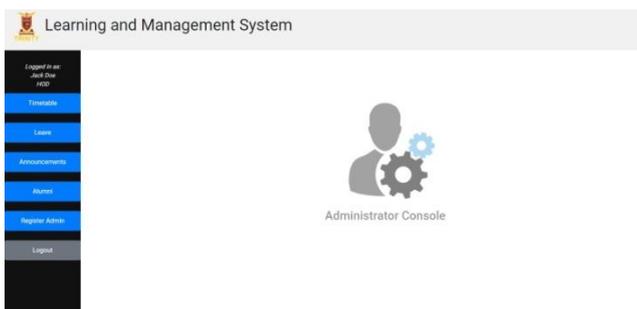
Fig -5: Admin Console
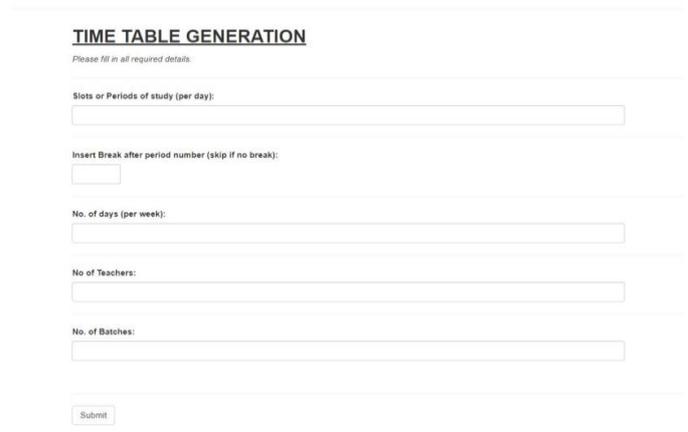
Fig -6: Time Table Generator
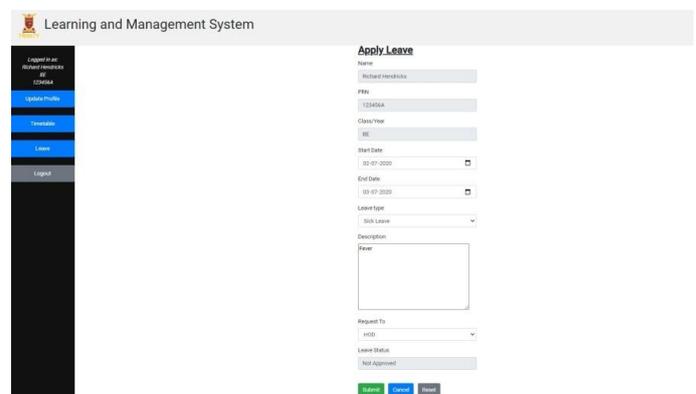
Fig -7: Student Leave Application
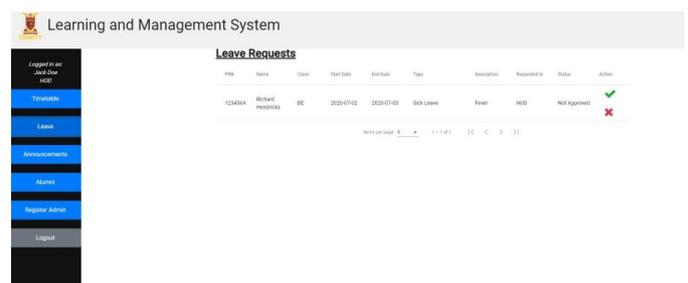
Fig -8: Leave Requests to Admin
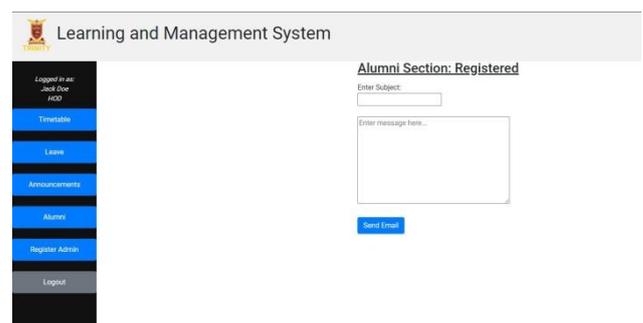
Fig -9: Alumni Section

7. CONCLUSION

This web-based application assists in modifying the existing system to a website-based application. This is a paperless work. It can be controlled and monitored remotely thus reducing the manpower required. It provides accurate information always. All information can be saved and can be accessed at any time without any hassle. The data which is stored in the project helps in taking intelligent decisions by the management. So, it is better to have a Web-Based Management system. All the staff members can get the desired information without delay. This system is essential in the colleges and universities.

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