

Scheduling exam timetable using Graph colouring

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1. Abstract :

Graph coloring comes out to be an efficient technique for Exam Time Table scheduling at universities. Planning an exam timetable is generally challenging for universities where students of different branches have the same courses. Graph colouring concept makes this task easy. This paper is based on graph colouring based algorithms , where the branches and courses in each branch are input.

2. Introduction :

For conducting the exams every institute need to have a well scheduled exam time table.It's difficult and very time consuming to make the time table manually because of the presence of a large number of offered courses and scheduled exam time table should not include any of the conflicts like no two or three exams for the identical student should be scheduled at the same period of time.

So we need to have an automatic generation of a time table with maximum efficiency.Time table can be generated through graph coloring approach taking in to account some specific hard and soft constraints .Graph coloring is a way of assigning different colors to different vertices, so that no two adjacent vertices will have same colors, it includes many applications like map coloring, vertex coloring, sudoku, scheduling exam time table, scheduling sport time table etc.

3. Work Done :

3.1 Input :

- Student details
- Branch of student
- Current year of study

- Courses taken by the student

3.2 Constraint :

- Number of years in all the courses should be the same

3.3 Method :

Step 1:

Courses and number of years are listed in an array. A loop is set to run through all the rows, where the new courses are appended into a dictionary variable.

A table containing years and courses in each year is created.

Since, every student in a year may not opt for the same courses, all the courses taken by the students in that year are considered.

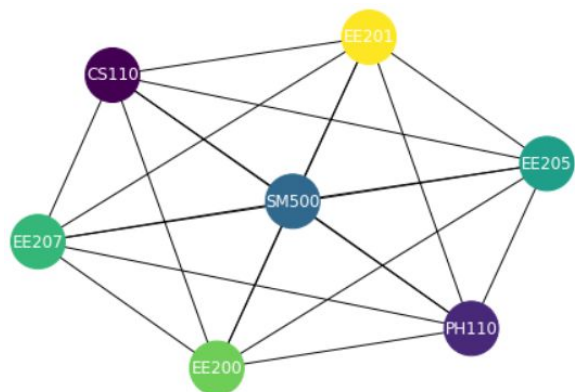
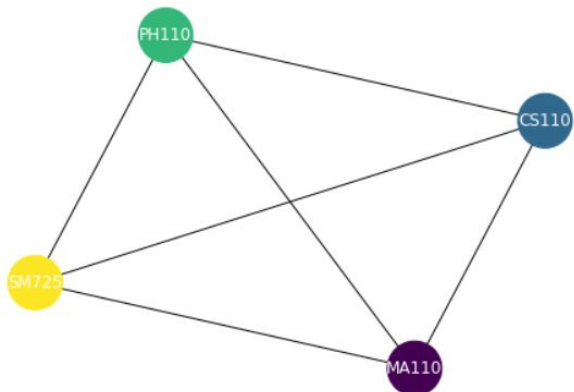
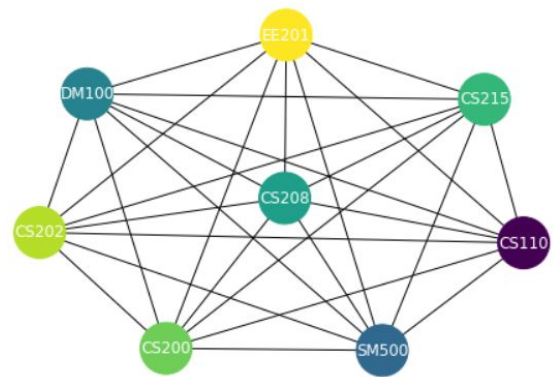
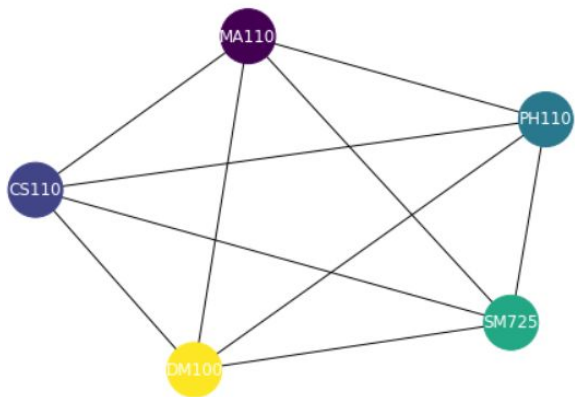
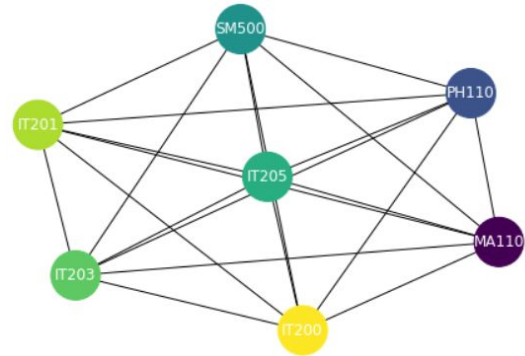
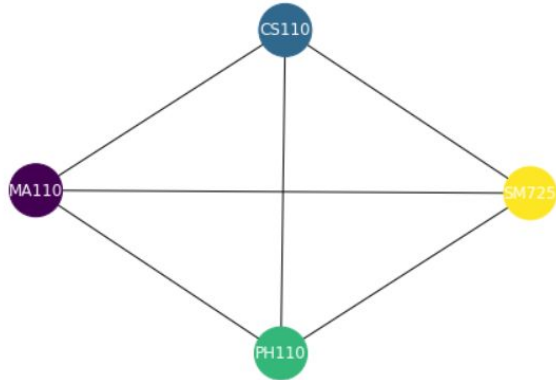
	MA110	CS110	PH110	SM725	SM500	IT205	IT203	IT201	IT200	DM100	CS208	CS215	CS200	CS202	EE201	EE205	EE207	EE200
0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	0	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0
2	1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0
3	0	1	0	0	1	0	0	0	0	1	1	1	1	1	1	0	0	0
4	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	1	1	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1

Step 2 :

From the table created in step 1, for each year a complete graph is plotted where the courses present in that year are given unique colours. An edge is drawn between every two course nodes to make it a complete graph.

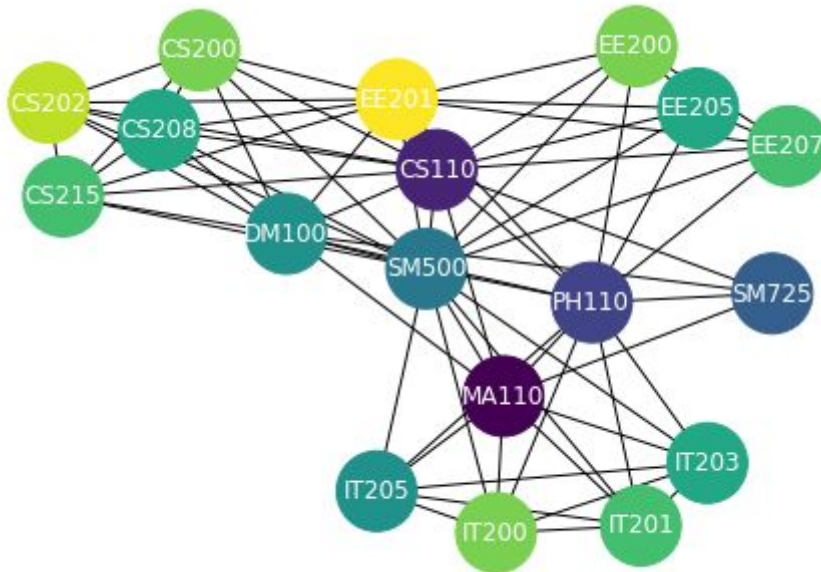
Sample Graphs :

Complete graph for Courses in a year :



Step 3 :

All the graphs obtained in step 2 are combined to form a single graph . The number of different colours in this graph will give the total number of days for which the exam will be conducted.



The course nodes having the same colour are in the same slot . Accordingly all the courses are listed in their respective slots(i.e days). And finally, the timetable is created.

4. Results :

Following is the snapshot of the final Time table:

	Branch	Year	Day1	Day2	Day3	Day4	Day5	Day6	Day7	Day8	Day9	Day10	Day11
0	IT	1	MA110	CS110	PH110	SM725							
1	IT	2	MA110		PH110		SM500	IT205	IT203	IT201	IT200		
2	CS	1	MA110	CS110	PH110	SM725		DM100					
3	CS	2		CS110			SM500	DM100	CS208	CS215	CS200	CS202	EE201
4	EEE	1	MA110	CS110	PH110	SM725							
5	EEE	2		CS110	PH110		SM500		EE205	EE207	EE200		EE201

5. Conclusion :

The Time table scheduling problems are directly related to the number of constraints involved. Higher number of constraints might raise more numbers of complexities. There is no fixed algorithm to solve this class of problem.

In this project, we generated the exam time schedule automatically with the help of graph coloring approach by taking the list of students of different branches and different years and list of courses in each branch as input. Also, the scheduled exam time table takes some constraints into account.

In future, we are planning to extend our project to also give time slots and allotted room numbers as outputs.