Course Scheduling Using Constraint Satisfaction

The algorithm implemented generates a consistent course schedule by solving a constraint satisfaction problem. The program runs by entering the name of the dataset file that includes the domain values of the variables (rooms, instructors, available timeslots), and the name of the file that represents the soft constraints available in the preference file.

Two sets of constraints are implemented: hard and soft constraints. A schedule is not generated if it violates one of the hard constraints. The generated schedules are evaluated based on the number of soft constraints that they satisfy and the schedule with the highest evaluation is generated.

Two dataset files are available, and when the user is asked to enter the datafile name, one of the following files should be entered to run the program: smallSet.csv or largeDataSet.csv

For each dataset, there is a file of preferences that includes the soft constraints. For the smallSet.csv, the corresponding file of soft constraints is: smallSetPreference.csv - this should be the input for the soft constraints filename. Similarly, for the large data set, the file of preferences is: largeSetPreference.csv

The program will output the generated schedule and write it to an output file (output.csv). The algorithm implemented generates the schedule for the large data set after running for a few seconds.

The algorithm implements backtracking search with forward checking. For large datasets, an iterative approach and a local search with selected random restarts is implemented to maintain the satisfiability of the soft constraints.

The output is a consistent (conflict-free) schedule with most of the soft constraints satisfied. This is a screenshot of part of the generated schedule for the large dataset.

	Subject	Course	Room	Class Day(s)	Class Time	Professor	Duration
2	ACC	66000-1	North Bldg C114	F	4:00 PM	Chang Philip	200 mins
3	ACC	77700-1	North Bldg C114	MTH	5:00 PM	Zhao Yan Ying	75 mins
4	ACCP	37100-1	West Bldg W503	T	1:00 PM	Rampulla Renee	200 mins
5	ACCP	37100-2	West Bldg W503	W	3:00 PM	Rampulla Renee	200 mins
6	ACCP	49000-1	North Bldg 531	TTH	9:00 AM	Li John Qiang	100 mins
7	ACSK	6500-1	West Bldg W405	TH	11:00 AM	Martin Patricia	200 mins
8	ACSK	6500-2	West Bldg W405	W	9:00 AM	Liggins Fredericka	200 mins
9	AFPRL	20100-1	West Bldg W407	F	8:00 AM	Ramlal Derek	200 mins
10	AFPRL	29001-1	North Bldg 404	MW	3:00 PM	Lima Lazaro	75 mins
11	AFPRL	29003-1	North Bldg C108	M	12:00 PM	Ramlal Derek	150 mins
12	AFPRL	38400-1	North Bldg 404	W	5:00 PM	Browne Anthony P	200 mins
13	AFPRL	39030-1	North Bldg C108	T	1:00 PM	Ramlal Derek	200 mins
14	ANTH	70256-1	North Bldg 705	F	9:00 AM	Soler Angela	200 mins
15	ANTH	70300-1	North Bldg 730	MTH	6:00 PM	Baden Andrea	100 mins
16	ANTH	72200-1	North Bldg 705	MF	6:00 PM	Fierman Julia B	75 mins
17	ANTH	72551-1	North Bldg 717	TF	5:00 PM	Soler Angela	75 mins
18	ANTH	75400-1	North Bldg 717	T	12:00 PM	Baden Andrea	150 mins
19	ANTH	77153-1	North Bldg 705	MTH	9:00 AM	Brown Jacqueline Nassy	75 mins
20	ANTH	79101-1	North Bldg 717	MTH	9:00 AM	Gilbert Christopher Charles	75 mins