

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND TECHNOLOGY

COURSE: COMPUTER ARTIFICIAL SESSIONAL COURSE CODE: CSE 404

TASK:4 [Constraint Programming: Sudoku puzzle solving]

Problem Statement: Solve sudoku puzzles by Constraint Programming (CP) techniques.

Marks Distribution:

Submission	CP model	One problem [from book_1]	Two problems [from book_2]	Two problems [from book_3]	Report	UI(Bonus)	Total
10	20	10	20	20	20	20	100 + 20

Submission:

1. Put all necessary file in a single Folder. Name it: cse404<SecA/B>_task4_<your roll no>
2. Put the folder in a zip file. Name it the same as that of folder.
3. Email the zip file in this email: submission.cse.mist@gmail.com .
4. The subject of the email must be same as the name of your folder.
5. Deadline: 20 May, 2018 11:59PM.

Detailed instruction for writing Constraint Programs:

You have to solve any one problem from the sudoku_book_1 and any two problems from each of the book_2 and book_3. each book has a total of eight problems. You have to solve a total of five sudoku.

To help you, a sample CP code is given which solves a sudoku problem.

The formulation provided is a direct formulation of the problem where 27 alldiff global constraints are used [9 row + 9 column + 9 box].

Detailed instruction for writing the Report:

You have to provide tables showing the problem characteristics. You should run the sample sudoku CP

code also and include it in the report tables.

	Book no, problem no	No of total clues	No of clues in row_1	No of clues in row_2	No of clues in row_3	No of clues in row_4	No of clues in row_5	No of clues in row_6	No of clues in row_7	No of clues in row_8
Sample_problem	Sample_book, prob 1									
Problem_1	Book_1, prob									
Problem_2	Book_2, prob									
Problem_3	Book_2, prob									
Problem_4	Book_3, prob									
Problem_5	Book_3, prob									

The table above shows the hints distribution for the rows. You should provide two more tables showing the hints distribution for the columns and the boxes.

Finally, you have to provide tables showing some solution statistics. They can be gathered from the output. A sample output screen is shown in sample_output_screen.doc

	Book no, problem no	No of variables	No of constraints	No of nodes	No of backtrack	No of fail	Resolution time
Sample_problem	Sample_book, prob 1						
Problem_1	Book_1, prob						
Problem_2	Book_2, prob						
Problem_3	Book_2, prob						

Problem_4	Book_3, prob						
Problem_5	Book_3, prob						

Instruction for using CP solver:

Writing choco solver code using an online IDE available in the following URL is suggested:
<https://chocoide.herokuapp.com/>

The advantage is you will not need to install choco solver in your own machine. It also has some example CP codes available from the drop-down list which you may study.

If you are comfortable with Java, learning choco solver is easier by studying the tutorial and the user help documentation (choco-solver.pdf for choco 4.0.5 and choco-tuto.pdf). I have also included user_guide-3.3.1.pdf (chapter -18 has a detailed description of Constraints over integer variables).

<http://www.choco-solver.org/> has user-guides, tutorials, and Javadoc sections which contain detailed descriptions.

A user manual for Gecode (MPG.pdf for Gecode 6.0.0) is provided, assuming many students are comfortable with C++. It is quite detailed and has many examples. For example, chapter-13 to chapter-21 contain case studies. Some of these case studies are for puzzle solving.

Finally, learning to write CP using a constraint language is a good thing but it is going to take some time. As you are going to do only one assignment using CP, I suggest using the choco solver online IDE and studying the sample CP code for sudoku solving.