

Kerstin Frenckner, tel 08–790 9754, e-mail:. kfrenck@csc.kth.se2 Copyright CSC, KTH

OPPOSITION FOR MASTER'S PROJECT

The duties of an opponent are to:

- Critically review the report in question
- Pay particular attention to the problem approach, the methodology chosen and to the interpretation/evaluation of results
- Make annotations on the report of clerical errors, other minor errors, incomprehensible or ambiguous text
- Complete this Opponent Record (use a computer or black ink)
- In advance at the time stipulated give this record to the persons stipulated in the instructions for your exjobb subject.
- Orally present your general opinion of and comments on the work during about 5 minutes after the author's presentation of the work
- Put questions to the author of the report following his/her presentation: you may put forward the questions set down in the Opponent Record, or some of these questions, but it is also reasonable to expect the presentation to generate new questions.
- Give the Opponent Record and the annotated report to the author at the conclusion of the seminar

You may contact the person responsible for the degree project, e.g. to test programs.

The Opponent Record can be completed either using a computer or manually. If writing by hand, use red or black ink and write distinctly. The Record copies must be legible but not necessarily aesthetically pleasing.

Master's projects vary considerably. Consequently, at times not all of the questions will be relevant to the project you are opposing. It can be appropriate to rephrase the questions to fit the project. You may also introduce one or two additional questions.

Attempt to answer the questions in the Opponent Record in relative detail. Answers such as **Yes** and **Good** are insufficient.

February 12, 2009

OPPONENT RECORD

Thesis compiled by Henrik Vikstén, Viktor Mattsson Title of thesis: Performance and Scalability of Sudoku Solvers Opponent: Andreas Brytting

Was it easy to understand the underlying purpose of the project? Comments.

Yes, the purpose and problem statement sections in the introduction explains it very well. Compare different algorithms to see which is faster and how their performances change with different sized input.

Do you consider that the report title justly reflects the contents of the report?

Perhaps reword it slightly. "Sudoku Solvers" makes it sound a little like full applications written by someone else is being tested. "Sudoku Solving Algorithms" sounds better.

How did the author describe the project background? Was there an introduction and general survey of this area?

The rules of Sudoku are explained along with the algorithms being implemented. Dancing links was difficult to understand, perhaps because of it's complexity and not because of the report.

To what degree did the author justify his/her choice of method of tackling the problem?

Choosing nanoTime() over currentTimeMillis() is well motivated. It is pointed out that dancing links will have an advantage due to how they measure, but it is never discussed how much it will impact the results.

Did the author discuss the extent to which the prerequisites for the application of such a method are fulfilled?

A potential issue was with successive calls of nanoTime(), and did not apply in this case. And again, it is not discussed if dancing links' advantage was significant.

Is the method adequately described?

Yes, both how the algorithms will run the same puzzles and how they will measure their performance.

Has the author set out his/her results clearly and concisely?

Good tables and diagrams with text explaining. Diagrams in appendixes were a bit small and difficult to read.

Do you consider the author's conclusions to be credible?

The Dancing Links algorithm was very well suited for Sudoku solving and it was not surprising to see it perform much better. Brute force outperforming simulated annealing was a little surprising, but as the report states it could very well be because of how they were implemented.

What is your opinion of the bibliography? What types of literature are included? Do you feel they are relevant?

Mostly webpages are used and they are all relevant. Java Doc, creators of the algorithms used, etc. References should start with [1] then [2] and so on!

Which sections of the report were difficult to understand?

Explanation of the Dancing Links algorithm. An example using a sudoku board showing how the data structure changes when a number is written in a cell might have helped.

Other comments on the report and its structure.

Well structured report. The abstract is phrased strangely and reads like a list.

What are the stronger features of the work/report?

Method very well explained with both computer specifications and detailed description of how performance was measured.

The Sudoku sizes used were thoroughly tested with over 100 boards x 3 algorithms per size, with good analysis and discussion.

What are the weaker features of the work/report?

Only three sizes of input were tested. One of the algorithms were unable to complete one of the sizes and thus only had two in it's results, making it difficult to determine it's scaling.

What is your estimation of the news value of the work?

Probably only of interest to Sudoku fans and programmers considering making a Sudoku solver of their own. To the general public it is probably not very news worthy.

Summarize the work in a few lines.

A comparison of three different Sudoku solving algorithms. The complex dancing links algorithm out performed the others. Brute force, the most naive approach performed slightly better than simulated annealing, possibly because of how they were implemented. Exact scaling was hard to determine due to only having three data points, but it is possible to tell that the order of which scales better is the same as the performance.

Questions to author:

1.

Did you try measuring the time dancing links spent on pre calculating the sparse matrix? Would it have impacted the results?

2.

Could you have tested other sizes, say 6x6, 12x12? (It would not have had perfectly square sub-boxes, but the rules are still the same)

3.

4.

5.

6.