You are invited to the 59th edition of the PRAGUE COMPUTER SCIENCE SEMINAR

STEFAN EDELKAMP

Sorting and Searching for Algorithmic Intelligence

The lecture will be followed by a discussion

April 18, 2024
4:15pm

Auditorium S5, MFF UK
Malostranské nám. 25,
Praha 1

ABSTRACT

In the early days of computer science Donald E. Knuth and Kurt Mehlhorn both dedicated one book of their monographs to the topic of sorting and searching. During my research, I found some major algorithmic improvements to these fundamental problems documented in my new book on “Algorithmic Intelligence”.

QuickXsort is a highly efficient in-place sequential sorting scheme that mixes Hoare’s Quicksort algorithm with *X*, where *X* can be chosen from a wider range of other known sorting algorithms, like Heapsort, Insertionsort and Mergesort. Its major advantage is that QuickXsort can be in-place even if *X* is not. By doing so the mean number of comparisons can be reduced down to *n*log(n) – 1.4112*n + o(n)* for a remaining gap of only *0.0315*n* comparisons to the lower bound. On the practical side, BlockQuicksort beats standard library implementations and has been included in **`libcxx`**. I will also introduce a variant of a binary heap that operates in-place, executes minimum and insert in worst-case constant time, and **`extract-min`** in *O(log(n))* worst-case time, while involving at most *log(n) + O(1)* element comparisons. These efficiencies surpass lower bounds known for standard binary heaps, thereby resolving a long-standing theoretical debate.

ABOUT THE PRAGUE COMPUTER SCIENCE SEMINAR

The seminar takes place once a month on Thursdays at 4:15pm (mostly excluding June to September, and December) alternately in the buildings of Faculty of Electrical Engineering, Czech Technical University in Prague, Karlovo nám. 13, Praha 2 and Faculty of Mathematics and Physics, Charles University, Malostranské nám. 25, Praha 1. Its program typically consists of a one-hour lecture followed by a discussion. The lecture is based on an (internationally) exceptional or remarkable achievement of the lecturer, presented in a way which is comprehensible and interesting to a broad computer science community. The lectures are in English.

Dr. Stefan Edelkamp is a professor at Charles University and Czech Technical University in Prague. Previously he was the leader of the planning group at King‘s College London and also worked at the Institute for Artificial Intelligence, Faculty of Computer Science and Mathematics of the University of Bremen, and at the University of Applied Science in Darmstadt. For a short period of time, he held the position of an Interim Professor at the University of Koblenz and Landau and Paris Dauphine University. He earned his Ph.D. from Freiburg University and led a junior research group at the Technical University of Dortmund. His main scientific interest is algorithmic intelligence, including heuristic search, action planning, game playing, machine learning, motion planning, multiagent simulation, model checking, distributed computing, algorithm engineering, and computational biology.

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