Certifying Algorithms

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Overview

A certifying algorithm is an algorithm that produces, with each output, a certificate or witness (easy-to-verify proof) that the particular output has not been compromised by a bug. A user of a certifying algorithm inputs xx, receives the output yy and the certificate ww, and then checks, either manually or by use of a program, that ww proves that yy is a correct output for input xx. In this way, he/she can be sure of the correctness of the output without having to trust the algorithm.

We put forward the thesis that certifying algorithms are much superior to non-certifying algorithms, and that for complex algorithmic tasks, only certifying algorithms are satisfactory. Acceptance of this thesis would lead to a change of how algorithms are taught and how algorithms are researched. The widespread use of certifying algorithms would greatly enhance the reliability of algorithmic software.

The course is based on the LEDA book [Mehlhorn, Naeher99] and on a survey on certifying algorithms [McConnell, Mehlhorn, Naeher, Schweitzer11]. It will also use recent articles on certifying algorithms.

The course aims to teach participants how
1. certifying algorithms are better than those which do not produce any certificate of correctness
2. to convert/modify existing well-known algorithms to make them certifying.
3. to use duality and randomization for building certifying algorithms.

Module	Certifying Algorithms: March 11-16, 2018 **Number of participants for the course will be limited to fifty.**
You Should Attend If…	▪ you are a senior undergraduate or a graduate student who has done a course on Algorithms and is interested in learning more about them. ▪ you teach undergraduate and graduate courses on Algorithms ▪ you are an Industry professional/researcher whose works involves developing/coding advanced algorithms.
Fees	The participation fee for taking the course is as follows: **Participants from Industry/ Research Organizations: Rs 15000** **Faculty members at Academic Institutions: Rs 10000** **PhD Students and Postdocs: Rs 5000** **Masters and Undergraduate students: Rs 1000** The above fee includes all instructional materials, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty

Kurt Mehlhorn is a director at the Max-Planck Institute for Informatik, Saarbruecken, Germany. He has made fundamental contributions to Data structures, computational geometry, computer algebra, parallel computing, VLSI design, computational complexity, combinatorial optimization, and graph algorithms. Prof Mehlhorn has been an important figure in the development of algorithm engineering and is one of the developers of LEDA,

Naveen Garg is a Professor at the CSE department at IIT Delhi. His research interests include Algorithms and Combinatorial Optimization.

Course Co-ordinator

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