

Invitation

You are cordially invited to the public defense to obtain the academic degree of

DOCTOR OF BUSINESS ECONOMICS

by Tom Demeulemeester

Fairness through randomization: an operations research perspective

Supervisors:

Prof. dr. Roel Leus (KU Leuven)

Prof. dr. Dries Goossens (Ghent University)

Wednesday, 22 May 2024 at 17h00

In room 01.05 - Promotiezaal, Universiteitshal (112-01), 3000 Leuven

Please confirm your attendance no later than 1 May by email to

Tom.demeulemeester@kuleuven.be

EXAMINATION BOARD

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Abstract

Incorporating a certain level of randomization is a prerequisite to design fair design processes in many applications. In this dissertation, we illustrate that intuitive methods to incorporate randomization, such as randomly ordering the agents, can often be improved upon from various perspectives. We study three distinct, yet related problem settings, and apply techniques from the field of operations research to find and compute alternative solutions with desirable properties. First, we propose a new egalitarian solution concept for the random assignment problem, which studies how to assign indivisible goods to agents who have preferences over these goods, without making use of monetary transfers. Second, for an extension of the random assignment problem, we study how to decompose probabilistic solutions as a lottery over deterministic outcomes while optimizing a worst-case measure of choice. Third, we propose methods to fairly control the selection probabilities of the (possibly many) optimal solutions of an integer linear program. For each of the three evaluated problem settings, we evaluate both the axiomatic and the computational properties of our proposed solutions. Our proposed methods can be applied to a wide range of practical problems, such as the assignment of apartments in housing cooperatives, the assignment of students to schools or universities, or kidney exchange programs.

Curriculum vitae

Tom Demeulemeester (°1996, Leuven) holds the degrees of Bachelor of Business Engineering (2017, KU Leuven), and Master of Business Engineering (2019, KU Leuven). He started a joint PhD in Business Economics under the supervision of Prof. dr. Roel Leus (KU Leuven) and Prof. dr. Dries Goossens (Ghent University) in 2019 and obtained a FWO scholarship in 2020. His research lies on the intersection between operations research, theoretical micro-economics, and theoretical computer science. During his PhD, Tom has co-authored papers that have been accepted in the European Journal of Operational Research, the AAAI conference on Artificial Intelligence, and the International Symposium on Mathematical Foundations of Computer Science.