

# ACO ANNUAL DISTINGUISHED LECTURE

## ACO Center (Algorithms, Combinatorics and Optimization)



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### “Geometric Aggregation of the Social Welfare in Resource Allocation”

Friday, April 8, 2022 @ 11 a.m.  
Donald Bren Hall, Room 6011

#### ABSTRACT

We present efficient algorithms for resource allocation to optimize the geometrically aggregated social-welfare objective function. Unlike the usual (weighted) arithmetic average objective, the (weighted) geometric average provides some ideal features such as strong concavity, social-fairness, and decentralization property, as demonstrated in the classic Fisher market equilibrium. In this talk, we show

- 1) Complexity of computing an optimal solution for the weighted geometric average objective is in the same class of linear programming that uses the arithmetic welfare average.
- 2) It can be computed in a distributed fashion by using the primal-dual and/or ADMM methods while preserving individual utility privacy.
- 3) It can be implemented in the online setting with a sublinear regret, such that exhibited in online linear programming.

The major takeaway from this talk: it is desirable and doable for optimization/decision models that uses geometrically aggregated social welfare objectives.

#### BIO

Yinyu Ye is currently the K.T. Li Chair Professor of Engineering at Department of Management Science and Engineering and Institute of Computational and Mathematical Engineering, Stanford University. He received the B.S. degree in System Engineering from the Huazhong University of Science and Technology, China, and the M.S. and Ph.D. degrees in Engineering-Economic Systems and Operations Research from Stanford University. His current research interests include Continuous and Discrete Optimization, Data Science and Application, Algorithm Design and Analysis, Computational Game/Market Equilibrium, Metric Distance Geometry, Dynamic Resource Allocation, and Stochastic and Robust Decision Making, etc. He is an INFORMS (The Institute for Operations Research and The Management Science) Fellow since 2012, and has received several academic awards including: the 2009 John von Neumann Theory Prize for fundamental sustained contributions to theory in Operations Research and the Management Sciences, the 2015 SPS Signal Processing Magazine Best Paper Award, the winner of the 2014 SIAM Optimization Prize awarded (every three years), the inaugural 2012 ISMP Tseng Lectureship Prize for outstanding contribution to continuous optimization (every three years), the inaugural 2006 Farkas Prize on Optimization, the 2009 IBM Faculty Award, etc.. He has supervised numerous doctoral students at Stanford who received various prizes such as INFORMS Nicholson Prize, Student Paper Competition, the INFORMS Computing Society Prize, the INFORMS Optimization Prize for Young Researchers.

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