

Handling Uncertainty in Networked Systems: An Online Algorithm Design Approach

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Abstract: In the presence of uncertainty, as a pervasive feature of engineering systems, it is notoriously difficult to design systems that work with partial or without future information. By assuming complete uncertainty, i.e., no exact or stochastic modeling, this talk presents two online algorithmic design approaches to tackle uncertainty in networked systems.

First, we focus on the online storage management for integration of uncertain renewable sources in electricity market. The uncertainties in renewables and market price emphasize the need for online solution design. We present our recent online algorithms that achieve optimal competitive ratio.

We then focus on an online combinatorial node assignment problem in cloud video conferencing architecture. The uncertainty is due to the online arrival of conferencing sessions and the dynamics in networks conditions. We present a Markov approximation based online algorithm along with a prototype system that works provably efficient without knowing the future information.

Bio: Mohammad Hajiesmaili is a Postdoctoral Fellow with the Department of Electrical and Computer Engineering, the Johns Hopkins University. Previously, he was a Postdoctoral Fellow, with the Department of Information Engineering, the Chinese University of Hong Kong. His research centers on optimization and algorithm design in computer, energy, and cyber-physical systems.