Translational AI Center (TrAC) Seminar - Fall 2021

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November 18 at 12:00 noon

https://iastate.zoom.us/s/9378976918

Straggler Mitigation in Large Scale Distributed Matrix Computation

High-dimensional matrix computations are a key component of various algorithms within machine learning and scientific computing. Such computations are often deployed on large scale distributed computing clusters. The widespread usage of these clusters presents several advantages over traditional computing paradigms. However, they also present new challenges, e.g., such clusters are well known to suffer from the problem of "stragglers" (slow or failed nodes in the system) which can end up dominating the overall job execution time.

In this talk we shall overview recent information-theoretic ideas in mitigating the effect of stragglers in distributed matrix computation. At a top-level these ideas allow the recovery of the desired result as long as any k-out-of-n worker nodes (where $k < n$) complete their assigned tasks. The talk will highlight several open issues within this broad area and our recent work on these topics. These include, dealing with partial worker node computations (slow vs. failed nodes), sparse input matrices and ensuring numerical stability of the recovered result.

Short Bio

Aditya Ramamoorthy is a Professor of Electrical and Computer Engineering and (by courtesy) of Mathematics at Iowa State University. He received his B. Tech. degree in Electrical Engineering from the Indian Institute of Technology, Delhi and the M.S. and Ph.D. degrees from the University of California, Los Angeles (UCLA). His research interests are in the areas of classical/quantum information theory and coding techniques with applications to distributed computation, content distribution networks and machine learning.

Dr. Ramamoorthy served as an editor for the IEEE Transactions on Information Theory from 2016 — 2019 and the IEEE Transactions on Communications from 2011 — 2015. He is the recipient of the 2020 Mid-Career Achievement in Research Award, the 2019 Boast-Nilsson Educational Impact Award and the 2012 Early Career Engineering Faculty Research Award from Iowa State University, the 2012 NSF CAREER award, and the Harpole-Pentair professorship in 2009 and 2010.