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SenSIP Seminar Series

Analysis and Design of Robust Max Consensus for Wireless Sensor Networks

Presenter: Gowtham Muniraju

PhD Student in ECEE

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Abstract

Max consensus is a fundamental algorithm and the fastest way to reach consensus in a distributed network. In this talk, I will address the pitfalls of the conventional max consensus algorithms in the presence of additive noise and time-varying graphs. Next, I present a practical approach for reliable estimation of maximum of the initial state values of nodes in a distributed network, in the presence of additive noise.

We show the existence of a constant growth rate due to additive noise and then derive upper and lower bounds for the growth rate. It is argued that the growth rate is constant, and the upper bound is a function of spectral radius of the graph. By deriving a lower bound, we prove that the growth rate is always a positive non-zero real value. We also derive upper and lower bounds on the growth rate for random time varying graphs. An empirical upper bound is obtained by scaling the original bound, which is shown to be tighter and generalizable to different networks and noise settings. Finally, I we present a fast max-based consensus algorithm, which is robust to additive noise and showed that the variance of the growth rate estimator used in this algorithm decreases with number of iterations, using concentration inequalities. We also show that the variance of our estimator scales linearly with the diameter of the network.

Biography:

Gowtham Muniraju is a PhD student at Arizona State University, co-advised by Dr. Andreas Spanias and Dr. Cihan Tepedelenlioglu. He completed B.E. degree in electronics and communications engineering from Visvesvaraya Technological University, India, in 2016. His research interests include distributed computation in wireless sensor networks, distributed optimization, computer vision and deep learning. In summer 2018, he interned at Lawrence Livermore National Laboratory, where he worked on developing optimal sampling techniques for improved hyper parameter optimization. In summer 2019, he interned at NXP semi-conductors, where he developed a calibration approach for MEMS sensors using deep learning. In recent years, his research involves statistical parameter estimation and clustering algorithms in distributed wireless sensor networks.

Refreshments will be served

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