CS 292F.300 Final project proposal

Sean Jaffe

TOTAL POINTS

1 / 1

QUESTION 1

1 Proposal submitted 1 / 1

✓ **- 0 pts** **Correct**

This sounds great. What will you use for test data?

Laplacian Project Proposal

Sean Jaffe

May 2021

1 Introduction

Many types of interconnected dynamical systems exhibit what are known as Laplacian dynamics. For a system over a network G with node and edge sets (V, E) and with $|V| = n$, the dynamics at each node such systems are represented by

$$\dot{x_i} = ax_i + bu_i \tag{1}$$

$$u_i = \sum_{(i,j)\in E} w_{ij}(x_i - x_j) \tag{2}$$

The full state equation is given by

$$\dot{x} = IA - LBx \tag{3}$$

Where $A, B \in \mathbb{R}^{nxn}$ are diagonal matrices and $L \in \mathbb{R}^{nxn}$ is the Laplacian of the interconnected system.

Examples of Laplacian dynamical systems are flocking patterns in animals, RC circuits, mechanical spring networks, and other time-averaging systems.

Properties of the equilibrium state dynamics of such systems based on reachability properties are well known. I plan to explore the affect of continuous properties of the graph, in particular, the isoparametric ratio and conductance, on convergence and rate and robustness (convergence properties under noise).

Source

F. Bullo, J. Cortez, F. Dorfler and S. Martinez, *Lecuter on Network Systems*, ed. 1, CreateSpace, 2018. ISBN 978-198642563

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