

Selecting embedding delays: An overview of embedding techniques and a new method using persistent homology

Journal Article

Dr Debora Correa

Authors: Eugene Tan, Shannon Alga, Débora Corrêa, Michael Small, Thomas Stemler and David Walker¹

2023-03-01

Publication

Chaos 33, 032101 (2023)

33, 032101 (2023)

2023 Author(s). Published under an exclusive license by AIP Publishing.

Quality Indicators

Peer Reviewed

Q1 Journal as rated in SJR

Acknowledging the centre and awarded status as a "Featured" article. It's currently on the Journal's front page: <https://aip.scitation.org/journal/chaos>

Direct: <https://aip.scitation.org/doi/10.1063/5.0137223>

Michael.

Relevance to the Centre

This paper has three main objectives. # First, to provide a simple overview of the challenges of selecting good embedding parameters. # Second, to collate and compare the various popular methods across the dynamics-topology spectrum that have been proposed to tackle the problem of embedding parameter selection. We will focus on the particular case of optimizing time delay embedding. # Finally, to present a different approach based on the growing field of persistent homology—the significance score—that attempts to incorporate both dynamical and topological arguments into selection of embedding parameters.

DOI: 10.1063/5.0137223