

Testing topological conjugacy of time series

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We consider a problem of testing topological conjugacy of two trajectories coming from dynamical systems (X, f) and (Y, g) and deliver a number of tests to check if the corresponding trajectories of f and g are topologically conjugate. The values of the tests are close to zero for systems conjugate and large for systems that are not. For our main developed method, ConjTest, the convergence of the test values, in case when sample size goes to infinity, is established. Various numerical examples indicate scalability and robustness of the presented methods. In addition, we include a proof-of-concept study using ConjTest tool to search for an approximation of the homeomorphism conjugating given systems and discuss applications of ConjTest in analysis of medical time series.

- [1] P. Dłotko, M. Lipiński, J. Signerska-Rynkowska. Testing topological conjugacy of time series. *SIAM J. Appl. Dyn. Syst.* (**accepted**) (2024). <https://doi.org/10.1063/5.0158923>