

ICTS Seminar

Title : Atlas and Global Topological Models- Opportunities and Challenges in Real-world Data Analysis

Speaker : Sajini Anand P S, ICTS-TIFR, Bangalore

Date : Tuesday, November 28, 2017

Time : 3:30 PM

Venue : Nambu Discussion Room (Left), ICTS Campus, Bangalore

Abstract : Chaos theory and topology in the past few decades have given many useful insights to understand data generated by nonlinear systems. In 1980, Packard et al. observed that the state-space of a nonlinear system could be reconstructed from a time-series created by it and this opened up a possibility of associating geometrical and topological structures with observed data. Standard topological modeling methods broadly fall into two categories: (i) Atlas based methods that approximate dynamics in overlapping local charts of the state-space, and (ii) Global methods that find equations valid for the entire state-space. Since Atlas model needs neighborhoods that are well populated, it works well when data is plenty and densely sampled (e.g., biomedical measurements). In some cases, global models are a good choice when the time series is sparse but can be smoothed without affecting the qualitative data profile (e.g., crop data in seasons, plague data for few years). I will discuss (i) prediction capabilities of a new Atlas model for analyzing a time-series with recurring patterns, and (ii) opportunities of global models in retro-modeling and its challenges in atmospheric data analysis.