Abstract No : TDA1

TOPOLOGICAL INSIGHTS INTO MECHANISMS OF SPATIAL COGNITION

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Topological data analyses are rapidly becoming indispensable in neuroscience as key tools for attributing functional shapes to large volumes of electrophysiological data and thus gaining insights into the information carried by the spikes, brain waves and other forms of neuronal activity. However, these methods frequently aim to provide a phenomenological description of the data structure, rather than to produce insights into how this data is processed by the brain. Here, we discuss a case in which several convergent topological data analyses lead to a functional model of the hippocampusa brain part that plays a key role in learning and memory. In particular, the model allows to clarify the mechanisms of spatial learning at different levels of spatiotemporal granularity by integrating the spiking information at different timescales, and to quantify the contributions of various physiological phenomenabrain waves, synaptic strengths, etc., in a single framework.

Abstract No : TDA2

SOME NEW METHODS TO BUILD GROUP EQUIVARIANT NON-EXPANSIVE OPERATORS IN TDA

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The role of group equivariant non-expansive operators (GENEOs) is proving more and more important in topological data analysis. These operators act between sets of bounded and continuous filtering functions and allow to use persistent homology when an invariance group of homeomorphisms has been chosen. In this talk we will present some new methods to build operators of this type. Moreover, we will also describe some results concerning GENEOs associated with significant examples of invariance groups.

Abstract No: IFS1

ON SMALL DEFORMATIONS OF POLYGONAL DENDRITES

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We find the conditions under which the attractor K(S') of a deformation $S'$of a contractible polygonal system S is a dendrite.

Abstract No: IFS2

ON CERTAIN GENERALIZATIONS OF ITERATED FUNCTION SYSTEMS CONSISTING OF CONVEX CONTRACTIONS

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Iterated function system (IFS) is a mathematical tool to obtain fractal objects using a collection of contractions on a complete metric space. In recent years there have been many generalizations to the theory of IFSs. This paper generalizes Istratescu's theorem for convex contractions, along with the concept of self-similar topological systems and local IFSs. We introduce the concept of φ - convex contraction as a generalization of convex contraction as well as φ -contraction. Also, different types of convex IFSs such as convex countable IFSs, generalized convex countable IFSs, convex '- hyperbolic IFSs and convex contractive local IFSs are discussed in detail and some related results are obtained.

Abstract No: IFS3

On self-similar sets with unique one point intersection, not satisfying WSP

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Using General Position Theorem, we construct a family of self-similar discontinua in [0; 1], not satisfying WSP and having exactly one point in critical set.

Abstract No: IFS4

Finite products of irregular iterated function systems and their separation properties

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Self-similarity is a mathematical key enabling us to observe the self repetitive patterns in nature. Iterated function systems (IFSs) give a method to develop and study different properties of self similar sets mathematically. In this paper, the separation properties of irregular homogenous IFSs in product metric spaces are discussed. Necessary and sufficient conditions for a product irregular homogenous IFS to be totally disconnected, just touching and overlapping are obtained. Also, Type 1 irregular homogenous IFSs in product metric spaces are discussed and their separation properties are studied towards the end.