



ID de Contribution: 402

Type: **Contribution orale**

Projection methods as dimensionality reduction tool and application in neuroscience

lundi 3 juillet 2023 16:45 (30 minutes)

Dimensionality reduction techniques, such as PCA, t-SNE, and UMAP, are commonly used in various scientific fields to analyze high-dimensional data. These methods project the data onto a lower-dimensional embedding space, making it easier to visualize and analyze. In this conference presentation, I will discuss two different aspects of dimensionality reduction. First, I will present an application of non-linear projection methods in the field of neuroscience, specifically focusing on the spatial representation in the hippocampus of mice. I will highlight how these techniques can reveal the spatial coding modalities and mechanisms at play. Second, I will present analytic results for non-linear projection of paradigmatic data, which can serve as benchmarks for studying real-world data. These benchmark results can provide a reference point for evaluating the performance and effectiveness of different dimensionality reduction techniques in practical applications.

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Classification de Session: Mini-colloques: MC03 Information et biologie

Classification de thématique: MC3 Information et biologie