Research

Colloquium

Manifold Reconstruction with Deep Residual Networks and Modeling Complex

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時　間：114 年 11 月 19 日(三) 13：30

地　點：應用數學系多媒體教室(理 408 室)

摘　要：

In this talk, we briefly introduce our two recent works in manifold learning.

In the first part, we consider the manifold approximation algorithm of a dataset X in $\mathbb{R}^n$ by a low dimensional submanifold M proposed in [1]. Our work is to rephrase this manifold reconstruction algorithm as a learning process of some residual neural networks. This connection bridges the theory of Differential Geometry and Deep Learning.

In the second part, we will explore hyperbolic metric learning in e-commerce,focusing on modeling complex user behavior. By transforming users' clickstream datainto a graph and converting it to a spanning tree, we embed this structure into the Poincaré disk model. This hyperbolic embedding captures hierarchical and sequential patterns with low distortion, allowing us to represent user interactions efficiently in a lower-dimensional space. This approach leverages hyperbolic geometry to improve action prediction and provide insights into behavior patterns, offering valuable applications for recommendation systems and user engagement analysis.

[1] Fefferman, C., Ivanov, S., Kurylev, Y., Lassas, M., & Narayanan, H. (2019). Reconstruction and Interpolation of Manifolds. I: The Geometric Whitney Problem. Foundations of Computational Mathematics, 1-99.