

Electrical Engineering and Computer Science Seminar

The sparse manifold transform

Dr. Bruno Olshausen

Friday, January 31, 2020

12:00 PM – 1:20 PM in COB 114

Faculty Host: Prof. Miguel Carreira-Perpinan

Abstract

We present a signal representation framework called the sparse manifold transform that combines key ideas from sparse coding, manifold learning, and slow feature analysis. It turns non-linear transformations in the primary sensory signal space into linear interpolations in a representational embedding space while maintaining approximate invertibility. The sparse manifold transform is an unsupervised and generative framework that explicitly and simultaneously models the sparse discreteness and low-dimensional manifold structure found in natural scenes. When stacked, it also models hierarchical composition. We provide a theoretical description of the transform and demonstrate properties of the learned representation on both synthetic data and natural videos.

With Yubei Chen and Dylan Paiton

<https://redwood.berkeley.edu/people/bruno-olshausen>

**For additional information, please contact Prof. Miguel Carreira-Perpinan <mcarreira-perpinan@ucmerced.edu
acerpa@ucmerced.edu>**

Bruno Olshausen
UC Berkeley

Biography

Bruno Olshausen is Professor of Neuroscience and Optometry at the University of California, Berkeley. He also serves as Director of the Redwood Center for Theoretical Neuroscience, an interdisciplinary research group focusing on mathematical and computational models of brain function. He received B.S. and M.S. degrees in Electrical Engineering from Stanford University, and a Ph.D. in Computation and Neural Systems from the California Institute of Technology. Prior to Berkeley he was a member of the Departments of Psychology and Neurobiology, Physiology & Behavior at UC Davis. Olshausen's current research aims to understand the information processing strategies employed by the brain for doing tasks such as object recognition and scene analysis. This work seeks not only to advance our understanding of the brain, but also to discover new algorithms for scene analysis based on how brains function.

