מכון ויצמן למדע

THE WEIZMANN INSTITUTE OF SCIENCE

FACULTY OF MATHEMATICS AND COMPUTER SCIENCE

Machine Learning and Statistics Seminar

on Tuesday, Dec 22, 2020
at 15:00

https://weizmann.zoom.us/j/93648867660?pwd=dVpDeHAyRk5IbGFOTWVvS3pTZnF3UT09

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On the injectivity and (in)stability of invariant encoding

Abstract:

Quotient spaces are a natural mathematical tool to describe a variety of algorithmic problems in computer vision and related fields, where different objects are to be compared while their natural symmetries are to be ignored. The computational complications arising from these symmetries can be alleviated by mapping the given object to features invariant to the objectâ□□s symmetries. But can this be done without losing information? In this talk we will discuss this question for two different problems:

(a) Neural networks for point clouds: The natural symmetries of 3D point clouds are permutations and rigid motions. We will describe our recent work which provides a general framework for constructing such invariant networks to be lossless, in the sense that they can approximate any continuous invariant function. As a result, invariant networks such as Tensor Field Networks are shown to have universal approximation power.

(b) Phase retrieval: Phase retrieval is the problem of retrieving a signal, up to global phase, from linear measurements whose phase is lost. The phase ambiguity here can be considered as the symmetries of the problem, and the phaseless linear measurements as the invariants. We will discuss results on the injectivity and stability of phase retrieval, and particularly our results connecting phase retrieval stability to measures of graph connectivity.

To conclude, we will point out some insights which can be obtained from viewing these two different problems in the same framework.

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