



MATH-IMS Joint Applied Mathematics Colloquium Series The Chinese University of Hong Kong

This MATH-IMS Joint Colloquium Series is organized by Center for Mathematical Artificial Intelligence (CMAI), under Department of Mathematics and Institute of Mathematical Sciences (IMS) at The Chinese University of Hong Kong. The colloquium series focuses on mathematics and applications of artificial intelligence, big data and related topics.

Date: April 16, 2021 (Friday)

Time: 16:00-17:00 (Hong Kong Time)

Zoom Link: <https://cuhk.zoom.us/j/92775210812>

Can a neural network learn planar topology?

*Speaker: Professor Jean-Michel Morel,
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Abstract: In this talk we address the simplest instance of the figure-ground problem, raised in 1921 by the cognitive psychologist Edgar Rubin. The problem is to understand how human perception segments an image into foreground figures and their background. The simplest instance of the figure-ground problem is the closure problem. For psychologists, the interior of a Jordan curve is perceived as a figure, and its exterior as its background. For mathematicians, this is just the Jordan curve theorem. It is easily solved numerically: There is an elementary algorithm tagging the interior points of any rasterized Jordan curve in a digital image. This problem is therefore a good playground to evaluate how far we stand in artificial intelligence. We shall evaluate the performance of neural networks on this problem and attempt to explain it based on recent mathematical observations on the learning power of neural networks.

Bio: Jean-Michel Morel received the PhD degree in applied mathematics from University Pierre et Marie Curie, Paris, France in 1980. He has been Professor of Mathematics at the Ecole Normale Supérieure Paris-Saclay since 1997. His research is focused on the mathematical analysis of image processing and on detection theory in image series. He is a co-founder in 2011 of Image Processing on Line (www.ipol.im), the first journal publishing reproducible algorithms, software and online executable articles. He is a laureate of the 2013 Grand Prix INRIA – Académie des Sciences, 2015 CNRS innovation medal, and 2015 IEEE Longuet-Higgins prize and is 2017 Doctor honoris causa of Universidad de la Republica, Montevideo.