"1st BGSMath Data Science Workshop"

Barcelona, 22nd February 2017, Institut d'Estudis Catalans

PROGRAM

The program includes presentations by BGSMath research groups from UAB, UB, UPC and UPF, a keynote lecture, presentations by companies and research centers followed by a roundtable on Data Science Innovation

9.00 Welcome

Marc Noy
Director, BGSMath

Marina Villegas
Directora, Agencia Estatal de Investigación

Francesc Subirada
Director General de Recerca

9.30 Jordi Vitrià (Universitat de Barcelona). "DataScience@UB: Going from theory to practice"

10.00 Piotr Zwiernik (Universitat Pompeu Fabra). "Sparsity in Gaussian totally positive distributions"

10.30 Coffee break

11.15 Ricard Gavaldà, Argimiro Arratia (Universitat Politècnica de Catalunya). "Research and applications at the LARCA (UPC) research group"

11.45 Joan del Castillo (Universitat Autònoma de Barcelona). "Advanced statistical modeling"

12.15 Keynote Lecture

Joan Bruna, Courant Institute, New York University

"Mathematics of Deep Learning: questions, conjectures, and some answers"

13.00 Lunch / Poster Session

14.30 Daniel Villatoro (Vodafone - Academia). "How to do evil with Data"

15.00 Cédric Notredame (Centre de Regulació Genòmica). "Harnessing numerical instability in high throughput sequence analysis pipelines using Nextflow"

15.30 Coffee break

16.00 David Torrents (Centro Nacional de Supercomputación / ICREA). "Biological data, more complex than big"

16.30 Roundtable Data Science innovation

José Antonio Rodriguez Serrano (BBVA), Pau Agulló (Kernel Analytics), Marc Torrent (Eurecat), Angel Faus (vLex)

17.15 Concluding remarks

Joan Bruna, Courant Institute, New York University
Mathematics of Deep Learning: questions, conjectures, and some answers

Abstract:

In the age of ever increasing data and computational resources, the mathematical question of how to extract meaningful information from generic high-dimensional data remains a cursed one. However, deep learning architectures appear to be breaking this curse of dimensionality across many tasks in computer vision and speech recognition, using convolutional neural networks (cnn) that are trained by stochastic gradient descent.

This remarkable empirical success raises a number of puzzling questions spanning several statistical and mathematical fields. Why are deep convolutional architectures succeeding where other computer vision models didn't? Why is stochastic gradient descent so efficient for training such architectures despite the non-convexity? How can the successful inductive biases of cnn's be generalized to other signal domains?

In this talk, we shall connect these questions through a story of geometry, invariance and large deviations. Along the way, we will present a few conjectures and some answers, as well as open research directions at the interface of deep learning and mathematics.

Poster Session — Posters A-Z