Guillermo Ortiz-Jiménez

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About me

I am a **PhD student at EPFL** working under the supervision of Prof. Pascal Frossard. My current research focuses on **understanding deep learning** by studying the complex interactions between datasets, architectures and optimization. My work provides a **novel framework** to design better and more reliable neural networks leveraging prior knowledge about the world.

Education

2018 - (2023) **PhD. Electrical Engineering**
Ecole Polytechnique Fédérale de Lausanne (*Switzerland*)

2016 - 2018 **MSc. Electrical Engineering** (*Best graduate*)
Delft University of Technology (*Netherlands*)

2011 - 2015 **BSc. Telecommunications Engineering** (*Best graduate*)
Universidad Politécnica de Madrid (*Spain*)

Research experience

Doctoral assistant at EPFL

Sep 2018 - ongoing *Lausanne, Switzerland*

I have recently discovered that each neural network posseses a unique signature, its neural anisotropy directions (NADs), that encodes its preference to select certain features over others on the training data. My current research focuses on understanding the properties of these NADs and on exploiting them to improve the performance and reliability of deep learning.

Master thesis at TU Delft

Nov 2018 - Aug 2018 *Delft, Netherlands*

Introduced a novel algorithm based on submodular optimization to sample tensor data and reconstruct it with near-optimal guarantees. Applications to point cloud compression and recommender systems.

Research Intern at Philips Healthcare Research

Jul 2017 - Oct 2017 *Hamburg, Germany*

Developed self-supervised deep learning algorithms for representation learning and medical image reconstruction of fetal ultrasounds and CT scans.

Research Assistant at Universidad Politécnica de Madrid

Jul 2015 - Jul 2016 *Madrid, Spain*

Pioneered the use of 3D rendering techniques from computer graphics to simulate radar scattering from the human skin at the THz band.

Awards

- **2018 National Award for Excellence in Academic Performance** by Government of Spain
- **2018 Best graduate** by TU Delft (~1000 students)
- **2016 "La Caixa" Postgraduate Fellowship** by La Caixa Foundation (~45,000$)
- **2015 Best graduate** by Universidad Politecnica de Madrid (~800 students)
- **Other competitive grants** (~18,000$)

Publications

- GOJ et al. Neural Anisotropy Directions. *Under review, NeurIPS 2020*
- GOJ et al. Hold me tight! Influence of discriminative features on deep network boundaries. *Under review, NeurIPS 2020*
- GOJ et al. Redundant features can hurt robustness to distribution shift. *Uncertainty & Robustness in Deep Learning Workshop at ICML 2020*
- C.Vignac, GOJ et al. On the choice of graph neural network architectures. *IEEE ICASSP '20*
- GOJ et al. Forward-backward splitting for optimal transport based problems. *IEEE ICASSP '20*
- GOJ et al. CDOT: Continuous domain adaptation using optimal transport. *Optimal Transport Workshop at NeurIPS 2019*
- GOJ et al. Sparse sampling for inverse problems with tensors. *IEEE Transactions on Signal Processing 2019*
- GOJ et al. Sampling and reconstruction of signals on product graphs. *IEEE GlobalSIP '18*
- GOJ et al. Simulation Framework for a 3-D High-Resolution Imaging Radar at 300 GHz with a Scattering Model Based on Rendering Techniques. *IEEE Transactions on THz Science and Technology 2018*

Teaching experience

- Machine learning (MSc. course, Fall 2020)
- A network tour of data science (MSc. course, Fall 2019)
- Computational optimal transport (PhD. course, Spring 2019)

Student supervision

- Johannes Ruether (MSc. Thesis, Spring 2020): *Adversarial ML for interpretability.*
- Julien Heitmann (Semester project, Fall 2019): *Weight dynamics of deep neural networks.*
- Manuel Faysse (Semester project, Fall 2019): *Time-varyigng graph neural networks.*

Software skills

- PyTorch, Tensorflow.
- Python, C, Java, Matlab, Javascript.

Languages

Spanish: ●●●●●
German: ●●●○○
Dutch: ●○○○○
English: ●●●●◐
French: ●●●○○