

The Seminars on “Information Technology Outlook” – PhD Program in Computer Science and Mathematics



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Machine learning with limited supervision: from bioinformatics to animal welfare

Traditionally, data-driven Machine Learning (ML) models are split into two large families, depending on whether the data being analyzed have labels or not: supervised and unsupervised. Both fields have been extensively studied in the last few decades, yielding dozens of classification, regression, dimensionality reduction and clustering algorithms, among others, and solving a multitude of real-life problems. However, in practice, many problems don't fall within either definition: there is some information about the labels, but not sufficient to consider the problem as fully supervised. We call these problems “weakly supervised”. In this talk, I will present several use cases in research where such problems arise and how we have dealt with them. First, I will introduce the problem of cell type identification in label-free Imaging Flow Cytometry. Then, I will show how transfer learning can be applied on antimicrobial resistance detection (AMR) using mass spectrometry data. Finally, I will introduce a current project on activity recognition for animal welfare using wireless devices.

Daniel Peralta received his Ph.D. in Computer Science in 2016, from the University of Granada (Spain). Then, he spent 5 years as a post-doctoral researcher at the Flanders Institute of Biotechnology (VIB) in Ghent (Belgium), carrying out research on high-content imaging data, label-free imaging flow cytometry, and antibiotic resistance detection from mass spectrometry data. He is currently a Postdoctoral Researcher at IDLab, in the Department of Information Technology of Ghent University - imec, where his research focuses on data mining techniques for animal welfare using wearable devices. His research interests involve machine learning, time series analysis, biological imaging data analysis, biometrics, large-scale datasets and parallel and distributed computing. He was awarded the Foundation BBVA Award for Young Computer Science Researchers in 2018, and has published to the date over 20 journal papers.