

Seminari Informal de Matemàtiques de Barcelona

Speaker: Aina Ferrà Marcús.

University: Universitat de Barcelona.

Date: Wednesday, June 1st, 2022.

Schedule: 12:00, *virtual coffee break*; 12:20, talk.

Place: UB (FMI aula B1) and Zoom.

Language: English.

Title: Reconstruction of univariate functions from persistence diagrams

Abstract: Persistent homology computes topological features of a space at different spatial resolutions. More precisely, the persistent homology transform (PHT) is a function on the sphere S^{d-1} that associates to each unit vector v the persistence diagram of sublevel sets of a finite geometric simplicial complex in the direction v . We study the inverse problem for $d = 2$ in the case of single-variable functions f , namely, reconstructing the graph of f by using persistence diagrams of sublevel sets from height functions in different directions. We provide algorithms when f is piece-wise linear, where three directions suffice, and for the smooth case, where five directions are needed. The study is motivated by the use of Topological Data Analysis together with Machine learning, specially for explainability and privacy purposes, of which we give an example.

About us: *SIMBa* is a youth mathematics seminar organized by graduate students in the Barcelona area. It is aimed towards graduate and last course undergraduate students. Our goals are divulging the knowledge from different branches of mathematics for those interested and promote networking between the attendants.

This seminar is backed by the Faculty of Mathematics and Computer Science at Universitat de Barcelona, Faculty of Mathematics and Statistics at Universitat Politècnica de Catalunya, the Department of Mathematics from Univesitat Autònoma de Barcelona, CRM, IMUB and BGSMath.

Fore more information, visit at www.ub.edu/simba/en/.

If you have any doubt or comment do not hesitate to contact us by sending an email to seminari.simba@gmail.com.