

Postdoc position

Hamilton-Jacobi equations on graphs

Applications are invited for 1 postdoctoral positions in the department of Mathematics, INSA Rouen Normandy. The position is available for 12 months, assuming the successful candidates take up post on or before September 1st 2018.

Host institution and place of work

The successful candidate will be co-supervised Prof. Nicolas Forcadel (LMI, INSA Rouen Normandie, nicolas.forcadel@insa-rouen.fr) and Prof. Jalal Fadili (GREYC, ENSICAEN, Jalal.Fadili@ensicaen.fr). He will become a member of the LMI laboratory at INSA Normandy, Rouen, with frequent visits to the GREYC laboratory, in Caen. The work will be carried out in a stimulating and international environment involving collaboration and interaction with important experts in the field.

Scientific program

Context and motivations In a large number of scientific domains and for various applications, massive quantities of data are generated or recorded on a daily basis from a variety of sources, including internet, images, 3D meshes or 3D point clouds, social networks, biological network, etc. These datasets with irregular and complex structures are directly generated or can be modelled as a graph or as scalar or vector-valued functions defined on a graph. Consequently, there is a huge demand and a growing interest for the analysis, processing, storage and manipulation of these data. This has stimulated intensive research activity to develop new methods for processing and analysing data defined on graphs and for the extension to graphs of the classical methods and concepts used in signal and image processing.

Goals Currently, for the analysis of such data on graphs, discrete non-local models have proven extremely successful. We can cite for example p-Laplacian type equations or the infinite Laplacian equations on graphs, mean curvature motion or variational models using perimeter concepts on graphs such as the non-local regularization by total variation or the Mumford-Shah model. These models have been used successfully to solve in a unified way inverse problems for local and non-local image processing, image processing on 3D point clouds as well as for the analysis of big data on graphs.

In the framework of the regional project MONOMAD, the goal of this postdoc will be the study of (non-local) Hamilton-Jacobi (HJ) equations on graphs. More precisely, the aim is to study consistency guarantees of these models on graphs as the number of vertices grows. For this the project aims at investigating continuum limits of these discrete HJ equations on graphs as the number of vertices goes to infinity, and establishing convergence rates via error estimates between solutions of the discrete problem and their continuum counterpart.

Required background and skills

The ideal candidate will be an enthusiastic and creative individual with a Ph.D. in Mathematics (in e.g., PDE's, variational and non-smooth analysis, numerical analysis of PDE's), Computer Science, Data Science, or a related field, and a strong track record as evidenced by high quality publications, etc.. The candidate should also show good programming skills, and good communication skills in English, both written and oral.

All applicants must send a CV (including publication list) and a research statement to:

nicolas.forcadel@insa-rouen.fr or Jalal.Fadili@ensicaen.fr.