Non-convex inverse problems

ECTS : 4

Volume horaire : 18

Description du contenu de l'enseignement :

An inverse problem is a problem where the goal is to recover an unknown object (typically a vector with real coordinates, or a matrix), given a few ``measurements'' of this object, and possibly some information on its structure. In this course, we will discuss examples of such problems, motivated by applications as diverse as medical imaging, optics and machine learning. We will especially focus on the questions: which algorithms can we use to numerically solve these problems? When and how can we prove that the solutions returned by the algorithms are correct? These questions are relatively well understood for convex inverse problems, but the course will be on non-convex inverse problems, whose study is much more recent, and a very active research topic.

The course will be at the interface between real analysis, statistics and optimization. It will include theoretical and programming exercises.

Compétence à acquérir :

Understand what is a non-convex inverse problems; get some familiarity with the most classical algorithms to solve them.

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