"*Frontiers in Science*" Seminar

Dr. Piotr Graczyk

LAREMA, Université d'Angers, France

Title : Penalized estimation for Big Data in Regression Problems and its Geometry

Date & Time : April 9, 15:00～16:30

Venue : Sci. Bldg., E408 (Sugimoto C.)

Abstract: It is known that LASSO discovers the sign of the vector b in the regression equation Y = Xb + ε. In the study of Big Data one needs to identify more informative patterns of the vector b. We define the pattern of any regression estimator with polyhedral penalty. Surprising links between the pattern of a penalized estimator and the geometry of the convex polytope B^* will be explained. In particular, we study in detail estimation with a sorted ℓ^1 penalty, called SLOPE. The SLOPE pattern of a vector b provides: the sign of its components, clusters (components equal in absolute value) and clusters ranking.

School of Science / Graduate School of Science

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Lecture Series "*Frontiers in Science*"

Dr. Piotr Graczyk

LAREMA, Université d'Angers, France

Title : Modern Statistical Estimation with a Penalty and its Geometry

Date & Time : April 13, 13:15～14:45
April 16, 13:15～14:45
April 20, 13:15～14:45

Venue : Sci. Bldg., E408 (Sugimoto C.)

We consider the regression problem Y = Xb+ε where X is the matrix with data on p variables observed n times, $Y \in \mathrm{R}^n$ the response vector and ε an error. The coefficient vector $b \in \mathrm{R}^p$ is unknown and must be estimated. In classical statistics we have $n \geq p$ and we use an Ordinary Least Squares estimator OLS. In modern statistics we need to consider the case $n < p$ of Big Data. The OLS is then penalized. Surprising links between the pattern discovered by an estimator with a polyhedral penalty *pen* and the geometry of the pen^*-dual ball B^*will be explained.

Plan of the lectures: 1. OLS Estimator. 2. LASSO Estimator and its properties.
3. Estimators with a polyhedral penalty and their properties.

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