

Tree-based learning methods for extreme value regression with applications to cyber-insurance (joint work with Maud Thomas and Sébastien Farkas, Sorbonne Université)

Olivier Lopez

Sorbonne Université

`olivier.lopez@sorbonne-universite.fr`

Regression trees are well known models introduced by Breiman (1984) which allow to perform clustering and regression at the same time. On the other hand, their instability endangers the analysis that can be performed using these tools. In this work, we consider the application of regression trees to the analysis of heavy-tailed phenomenon, introducing them as a valuable tool to perform extreme value regression. We derive theoretical results and consider the stabilization of the method using random forests and gradient boosting. We show how these techniques can be applied to the analysis and evaluation of cyber risk for insurance portfolios. The growing field of cyber-insurance is particularly challenging due to the extreme volatility of the losses, the heterogeneity of cyber claims, and the fast evolution of the risk. The tools we develop may be used to contribute to draw a line between what can be insured by private companies, and what type of claims is unbearable through a classical insurance mechanism.