Hawkes Processes Classification Procedure for Chiroptera Monitoring

Romain E. Lacoste*[1]

[1]Laboratoire Analyse et Mathématiques Appliquées – Université Gustave Eiffel – France

Résumé

We are interested in the problem of classifying commuting and foraging behavior of bats at a site using echolocation calls data detected by acoustic sensors during a night at this site. As the temporal distribution of calls is a relevant indicator of behavior, it is natural to model the call sequences by point processes. Given the self-exciting dynamics observed in foraging behavior, we propose to model the calls sequences of bats by Hawkes processes. Specifically, we consider that the start time of each calls emitted on a site is a jump of a Hawkes process. For the classification, we use a hybrid procedure based on the plug-in method, where model parameters are estimated by empirical risk minimization through a convexification method to avoid computational issues. To assess the performance of the procedure, we compare it with random forest classifier on synthetic data. Finally, we present the numerical results obtained on the real dataset, collected as part of Vigie-Chiro project. The goal of this study is to have a better understanding of behavioral determinants of bats on a large scale and to provide answers to spatial ecology issues such as risk of wind collision.

Mots-Clés: Hawkes process, Supervised Learning, Modelling, Ecology

*Intervenant