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> JEUDI 02 DÉCEMBRE 2021, 13h45 \ 14h30

Enriching movement ecology of marine top predators with Generative Adversarial Networks

Marine top predators are often considered as sentinels of the environmental variability and bio-indicators for ecosystem structure and dynamics, given that anomalous change in their behaviour might warn us of potential marine ecosystem shifts. In this context, it is however crucial to understand the multi-scale processes governing their movement and to be able to predict their response to environmental variability. Existing approach to animal movement modeling (eg. state-space models) consist yet mainly in 1st order Markovian models calibrated at the local scale which can lead to overly simplistic description of trajectories. Recently, technological advances in the miniaturization and autonomy of electronic devices such as GPS have enabled ecologists to document relatively large amount of animal trajectories. Parallelly, 'state-of-the-art' tool from artificial intelligence such as Generative Adversarial Networks (GAN) have proven useful to simulate complex stochastic processes such as animal trajectories. In this study, we introduce GAN for the simulation of seabirds foraging trajectories. We also investigate the use of conditional GAN to predict seabirds' response to oceanographic features, and their ability to reproduce social interactions by simulating simultaneous trajectories which interact with each other. GAN provide indeed an ultra-flexible and robust framework where traditional methods such as state-space models struggle at predicting animal movement accounting for environmental heterogeneity or social interactions and can suffer from computational time when maximizing likelihood.

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Séminaire accessible sur ZOOM :
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