Is my SDM good enough? Insights from a Lucanoidea citizen science dataset in a Point Process Modeling framework

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Abstract

Citizen science programs, and particularly atlas schemes, are very important sources of data for species distribution models and conservation. Nevertheless, this data is prone to bias, particularly when it comes to "not-so popular" or hard to detect/identify species such as insects and it represents the challenge of presence-only datasets (lack of absence data). Moreover, how do we know if the model predictions are trustworthy?
In recent years, Point Process Models (PPM) have shown their strength as a unifying frame to fit presence-only species distributions models (SDM) with many advantages in model implementation and interpretation. Based on the French citizen science program - "Stag Beetle Quest", we illustrate different methods to assess "model reliability" within the PPM perspective fitted with a lasso penalty and bias corrections. To do this, we randomly subsampled different sets of locations from the whole dataset and compared fitted intensities and model coefficients. All of the developed measures are congruent and can be used to identify at what number of point locations the model stabilizes, which will be dependent on the dataset.

Thereby, our work presents new tools to explore questions around model stability based on the number of locations in the context of PPMs with a lasso penalty and confirms once more the use of PPM framework as flexible and unifying framework to model presence-only species distribution models.
key-words: Lucanus cervus, citizen science, atlas, diagnostic tools

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