Estimating Species Abundance from Presence–Absence Maps by Kernel Estimation

張雅梅 教授
Prof. Ya-Mei Chang

淡江大學統計系

Department of Statistics, Tamkang University

Abstract

　We present a novel method for estimating species abundance using presence–absence maps. Our approach takes the spatial context into consideration, distinguishing it from conventional methods. The proposed method is built upon a well-known kernel estimation for point pattern intensity, with the addition of a new parameter representing the mean abundance in each occupied cell. The parameter estimate is obtained through maximum likelihood estimation. The expected abundance corresponds to the integral of the intensity over the study area, which can be estimated by taking the Riemann sum of the intensity. The implementation of our method is straightforward, using existing packages in the R software. We compared various bandwidth selection methods within our approach and assessed the estimation performance against some approaches based on the random placement model or negative binomial model through the simulation study and an empirical forestry data in Barro Colorado Island (BCI), Panama. The results of the simulation and the application demonstrate that our method, with a carefully chosen bandwidth, outperforms the alternatives for highly aggregated data and improves the issue of underestimation.

Keywords：Spatial aggregation; Bandwidth parameter; Negative binomial

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地　點：本校數學館 527 教室（嘉義縣民雄鄉大學路 168 號）

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