Highlights

Climate predictor selection and variable reduction methods influence MaxEnt model performance and predictions of climatic suitability

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- Highlight 1
- Highlight 2
- Highlight 3

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Abstract

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Keywords: keyword1, keyword2

1. Introduction

Ecological models are important tools to aid the development and implementation of environmental policies and management programmes (Addison et al., 2013; Schuwirth et al., 2019; Sutton and Martin, 2022). These models are used for conservation planning (Guisan et al., 2013), predicting the establishment and spread of invasive species (Martin et al., 2020), implementing biological control programmes (Sutton, 2019; Mukherjee et al., 2021), and forecasting species responses to environmental change (Bocedi et al., 2014), amongst other applications. Species distribution models (SDM's) are an example of ecological models that have become increasingly popular in recent years (Elith and Leathwick, 2009). SDM's typically take the form of correlative or mechanistic models that correlate species presence/absences (or pseudo-absences) to environmental covariates to identify suitable climatic conditions for the study taxon (Elith et al., 2011). The Maximum Entropy species distribution model (hereafter 'MaxEnt') is amongst the most popular methods for climate modelling studies and has been shown to perform well compared to alternative modelling algorithms (Wisz et al., 2008; Phillips et al., 2017). It uses maximum entropy to distinguish between environmental conditions where the focal taxon is present from environmental conditions at sites without confirmed presence records for the taxon (Elith et al., 2011).

In recent years, a number of studies have investigated and demonstrated that computational choices made during the model building process can have a significant influence on resulting model outputs and inferences drawn (Warren and Seifert, 2011; Webber et al., 2011; Shcheglovitova and Anderson, 2013; Boria et al., 2017; Sutton and Martin, 2022). Despite its importance in the model building process, covariate selection methods have received considerably little attention to date (but see Austin and Van Niel, 2011; Fourcade et al., 2018; Adde et al., 2023), whereby covariate selection refers to "identify[ing] the best subset of covariates out of a panel of many candidates, both from an ecological and statistical perspective (see Adde et al., 2023, and references therein).

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