Abstract

Machine learning has emerged as a growing area of interest in species distribution modeling. Maxent is one machine learning tool that has gained wide use in such modeling. Maxent has shown good to superior performance compared to other SDM methods in studies using presence-only species data when the tool is used properly. Often, however, due diligence with the selection of input data and model parameters is neglected, resulting in models of questionable quality. A range of factors need to be considered when setting up Maxent modeling. This study explored two of these. The performance impact of covariate scaling and the results of model tuning on Maxent species distribution models were examined, evaluating two questions related to these factors. Do higher resolution covariates yield a better performing Maxent model of potential habitat extent? Does a tuned Maxent model yield a better performing model of potential habitat than a model using the default Maxent settings? Two approaches to Maxent modeling, default parameters and tuned parameters, were used at two different covariate resolutions, yielding four evaluation models. Presence data for bristlecone pines (*Pinus longaeva*) provided the species example for the evaluation. Covariates were selected that are relevant to the species. These were scaled to match the two study resolutions. Model tuning was performed using the ENMeval R package. Quantitative and qualitative evaluations of the resulting models demonstrated improvements in the model performance in the tuned models. Results from the resolution aspects of the study were less conclusive. Issues with the quality of certain aspects of the climate and elevation data raised questions about the certainty of results at either resolution.