

ABSTRACT

The Government of India attempted introduction and sustenance of a small population of Southeast African Cheetah in 2022, after extinction of the native species and ever since then, the term ‘Habitat Suitability’ emerged as a major point of contention. Habitat suitability is defined as the capability of an area to support and sustain viable growth of species population in ecological time scale. Habitat suitability identification is a method for predicting habitat’s suitability based on bio-ecological suitability characteristics which vary from species to species depending upon their niche. These models leverage remote sensing and spatial analysis to analyse and model the ecological niche characteristics for a species based on its current occurrence, and then find areas which offer the same ecological characteristics. However, the traditional Habitat Suitability Models, based on multi-variate statistical analysis, require expert knowledge for model configuration and are very time consuming making them non-scalable and hard to be understood by normal people. This is where machine learning prevails. Machine learning offers time and process efficient, evidence-based models that are capable of ‘learning’ from the provided species occurrence records (evidence) with little supervision. In this study, a geo-intelligent habitat suitability identification model leveraging Random Forest algorithm is designed and deployed in the form of a web application. The model learns suitability of the target species based on the occurrence data and bio-ecological factors through satellite images, and then predicts habitat suitability for that species in the desired area. The model is applicable to all types of species. The model is developed using python as a programming language and is deployed as a custom-built web application using Esri’s ArcGIS technologies. The web-tools used in this web application are configured keeping in mind user-friendliness, even for a non-GIS user. Additionally, access to authentic data of species occurrence and environmental characteristics data is also provided through this application, making it an all-in-one technology. Finally, the web application is used to predict habitat suitability of Bengal tigers (*Panthera tigris tigris*) in India and provide a detailed analysis of the suitability for tigers in India’s protected areas. This scalable deployment can be custom tailored for specific species and made truly useful for guided conservation efforts.