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Applying Bipartite Network Approach To Scarce Data: Modeling Habitat Suitability Of A Marine Mammal Species

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Abstract

Current study intends to formulate a habitat suitability model of a newly surveyed marine mammal species where the research scenario is characterized by real-world data that is scarce with no detail demographic value available. It is extremely challenging to solve it using either traditional statistical approaches where huge amount of data are required or deterministic approaches that commonly employ partial differential equations (PDE) model which are based strongly on well-established physical laws and entail detail species-specific demographic values. Conversely, the graph-theoretic based bipartite network modeling (BNM) approach is not bound by the above limitations and is thus employed in this study. The result produced is a bipartite habitat suitability network model consisting thirteen location nodes and thirteen species nodes, each with their respective parameters of which some are quantified through a machine learning algorithm, and thirty-eight weighted edges that are quantified through multiplication rule. Habitat suitability index, generated through implementation of an adapted web-based search algorithm, is produced and utilized for the ranking of these location nodes. The ranking result obtained is in good agreement with the past literature. The results produced also provide pertinent input to the related practitioners for the conservation of the species and preservation of the habitat and environment ecology.

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