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INSTITUTT: Natural History Museum
FAGOMRÅDE: Eco-Informatics
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AVHANDLINGENS TITTEL: *Distribution Modelling by Maximum Entropy: from blackbox to flexible toolbox.*

Artsutbredelsesmodellering er en samlebetegnelse på statistiske metoder som brukes til å modellere arters utbredelse ved hjelp av forekomstdata og kart over relevante miljøvariabler. Slike modeller er et viktig hjelpemiddel i bevaringsbiologi og i grunnleggende biologisk forskning. Mazzonis avhandling gir viktige bidrag, både til en bedre praktisk utnyttelse og til den teoretiske forståelsen av MaxEnt, en av de mest populære utbredelsesmodelleringsmetodene.

Despite our vast mapping knowledge, we still don't know where most plants and animals are found and why. Better understanding of their distribution, is critical in conserving and maintaining biodiversity, especially in view of ongoing environmental changes. Using spatial information of where some of these species have been observed and relating this to existing maps and satellite images of their surroundings, ecologists and conservation managers, can build *models* to map their current and future distribution. Bringing together ecological, mapping, computer, and statistical methods, the field of Species Distribution Modelling plays a central role in improving this understanding. Maximum Entropy Modelling (MaxEnt) is currently one of the most popular method, however the uncritical use of the default of the user-friendly computer software maxent.jar, and its black box approach, have recently been questioned.

Mazzoni's thesis explores the mismatch between the ease of performing MaxEnt modelling and the considerable theoretical and practical challenges involved in optimising these models. The cross-disciplinary nature of Mazzoni's contributions, have the potential to change the way MaxEnt modelling is performed, to the benefit of science and nature management.

She uses ecological and computer science (eco-informatics) concepts to propose a novel "Modular Integrated Approach" to simplify and integrate flexibility in the modelling process. This includes adding functional and descriptive narratives when defining inputs and outputs, ensuring researchers think about the concepts and assumptions of the discipline. This approach is implemented as a practical Toolbox (MIAT) with increasing levels of detailed functions, extensive comments automating and guiding the process further. MIAT reorganises the modelling process, including data preparation, model selection and model evaluation, into a practical workflow. This opens for more efficient process, in terms of model performance and traceability of modelling results.

Using this more flexible approach and toolbox, Mazzoni has been able to effectively analyse thousands of distribution models. The body of her work shows quite evidently that there are no "generally optimal" (default) ways to perform MaxEnt modelling. Instead, she shows that a more flexible integrated matching of modelling purpose, properties of the modelled species and the available data is needed when choosing modelling options and settings. Additionally, Mazzoni and her co-authors show that simpler traceable models often provide more useful information than more complex models.