

Abstract Title:

Extracting similar movement patterns in animal trajectories using sequence analysis methods

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Abstract:

Digital tracking technologies have considerably increased the amount and quality of movement trajectories, improving our abilities to study any type of moving objects. A study field that has been largely reshaped in that context is animal ecology. Complex concepts such as habitat use are becoming increasingly clear due to availability of fine-scaled spatial and temporal data. However, current approaches do not explicitly account for a key aspect of habitat use, namely the sequential and temporal variation in the use of different habitats. To overcome this limitation, we present a tree-based approach that makes use of sequence analysis methods, derived from molecular biology, to identify ecologically relevant and similar sequential patterns in habitat use by animals. We applied this approach to ecological data consisting of simulated and real trajectories from a roe deer population (*Capreolus capreolus*), expressed as time-ordered sequences of habitat use. Results show that our approach effectively captures different spatio-temporal patterns of sequential habitat use, and provide evidence for several behavioral processes, such as migration and daily alternating habitat use. Interestingly, similar habitat proportions in a certain time interval could correspond to very different spatio-temporal strategies of habitat use. For example, similar habitat proportions could correspond to an alternating or a random sequential habitat use. Moreover, by modifying habitat classification rules, more detailed patterns, such as day/night use of human settlements, can be discovered. In a future study, we will extend and apply the method to two ungulate species of multiple populations in different climatic/environmental settings in Europe.

Keywords:

[exploratory analysis](#),[autocorrelation](#),[distance](#),[habitat use](#),[Hamming](#),[roe deer](#),[pattern discovery](#),[spatio-temporal sequences](#),[trees](#)