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Modeling High-Resolution Animal Telemetry Data: Hidden Markov Models and Extensions

Clustering time-series data into discrete groups can improve prediction as well as providing insight into the nature of underlying, unobservable states of the system. However, temporal heterogeneity and autocorrelation (persistence) in group occupancy can obscure such signals. We use latent-state and hidden Markov models (HMMs), two standard clustering techniques, to model high-resolution hourly movement data from Florida panthers. Allowing for temporal heterogeneity in transition probabilities, a straightforward but rarely explored model extension, resolves previous HMM modeling issues and clarifies the behavioural patterns of panthers.