Hidden Markov Modelling (HMM)

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Packages

- `moveHMM` - https://cran.r-project.org/web/packages/moveHMM/vignettes/moveHMM-guide.pdf - For fitting hidden Markov models to animal movement data
- `momentuHMM` - https://cran.r-project.org/web/packages/momentuHMM/vignettes/momentuHMM.pdf - Essentially an updated version of moveHMM with more flexibility

Tutorials and resources

####`moveHMM` **package documentation and tutorials** - https://cran.r-project.org/web/packages/moveHMM/vignettes/moveHMM-guide.pdf - Michelot, T., Langrock, R., & Patterson, T. A. (2016). **moveHMM: an R package for the statistical modelling of animal movement data using hidden Markov models**. Methods in Ecology and Evolution, 7(11), 1308–1315. https://doi.org/10.1111/2041-210X.12578

`momentuHMM` package documentation and tutorials

- https://cran.r-project.org/web/packages/momentuHMM/vignettes/momentuHMM.pdf
- McClintock, B. T., & Michelot, T. (2018). **momentuHMM: R package for generalized hidden Markov models of animal movement**. Methods in Ecology and Evolution, 9(6), 1518–1530. https://doi.org/10.1111/2041-210X.12995

HMM tutorial

- https://mjones029.github.io/Tutorials/HMM_tutorial.html

Behavioral Analysis in R - *includes both HMMs and Behavioural Change Point Analysis (BCPA)*

- https://www.danaseidel.com/MovEco-R-Workshop/Materials/Day6/Behavioral_Analysis/

Useful papers

(Langrock et al. 2012) - Langrock, R., King, R., Matthiopoulos, J., Thomas, L., Fortin, D., & Morales, J. M. (2012). **Flexible and practical modeling of animal telemetry data: hidden Markov models and extensions**. Ecology, 93(11), 2336–2342. https://doi.org/10.1890/11-2241.1

(Pohle et al. 2017) - Pohle, J., Langrock, R., van Beest, F. M., & Schmidt, N. M. (2017). **Selecting the Number of States in Hidden Markov Models: Pragmatic Solutions Illustrated Using Animal Movement**. Journal of Agricultural, Biological, and Environmental Statistics, 22(3), 270–293. https://doi.org/10.1007/s13253-017-0283-8

References

Langrock, Roland, Ruth King, Jason Matthiopoulos, Len Thomas, Daniel Fortin, and Juan M Morales. 2012. "Flexible and practical modeling of animal telemetry data: hidden Markov models and extensions." *Ecology* 93 (November): 2336–42. https://doi.org/10.1890/11-2241.1.

Pohle, Jennifer, Roland Langrock, Floris M van Beest, and Niels Martin Schmidt. 2017. "Selecting the Number of States in Hidden Markov Models: Pragmatic Solutions Illustrated Using Animal Movement." *Journal of Agricultural, Biological, and Environmental Statistics* 22 (September): 270–93. https://doi.org/10.1007/s13253-017-0283-8.