Second Commitee Meeting Report — Septemer 22, 2021

MD Catchen

Summary

This is the annual report for my committee meeting, year two, Sept 22 2021. What is in this document? A brief recap of the status/outline of each chapter, timeline for the next year of work, and a prospectus on the next steps re (3rd meeting/future courses/ta-ing) etc.

Introduction

Developing a predictive theory of ecology is an imperative, both to root our understanding of ecosystem function in predictive capacity (Dietze 2017), but also because of the applied need to make robust, actionable forecasts of how ecosystem composition and functioning will change in the future (**Dietze2017?**).

Effective prediction has long evaded ecological systems as they are variable, high-dimensional, and the intrinsic dynamics are often unknown (**SymbolicRegression?**), and some (**Pennekamp?**).

Inference and forecasting in ecology. Simulation based inference has proven effective in the modeling of complex systems (numerical weather prediction; (**Num?**)). Core theme of my dissertation is understanding how simulation tools and methods can aid predictive ecology.

The purpose of this document is to: briefly outline of each dissertation chapter, with in-progress work for what's done, goal-figures for what isn't.

One-sentence per chapter here.

Then to present a timetable of work for the next year. A discussion of other side projects. A discussion of courses and TAing for the next year.

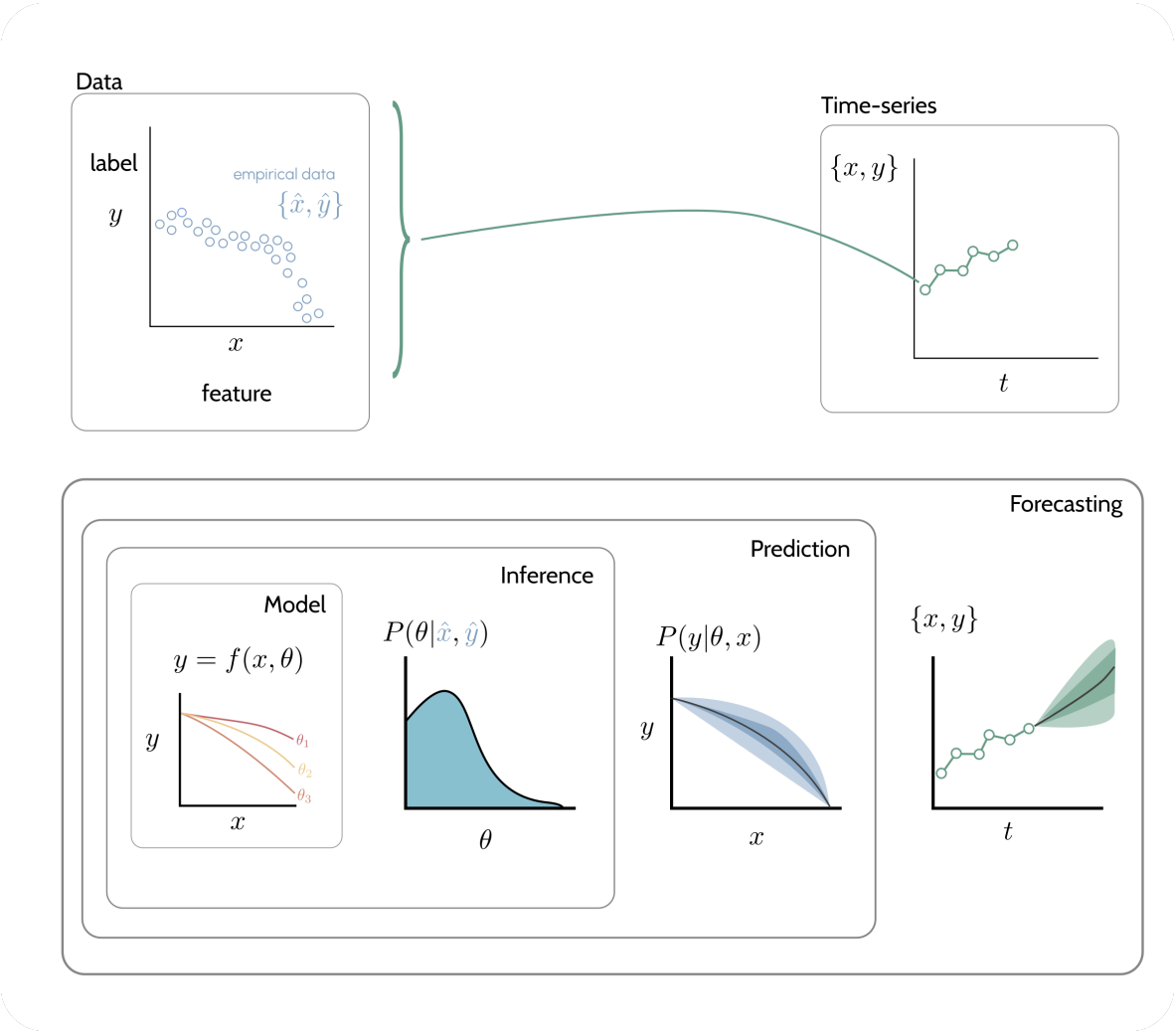

Figure 1: todo

Dissertation status

Disseration Introduction

What's the deal with community ecology and global change. Wild stuff.

Chapter one (*The missing link: differentiating true from false negatives when sampling species interactions*)

This opening chapters serves as a vignette of how simulation can have pragmatic use in ecology.

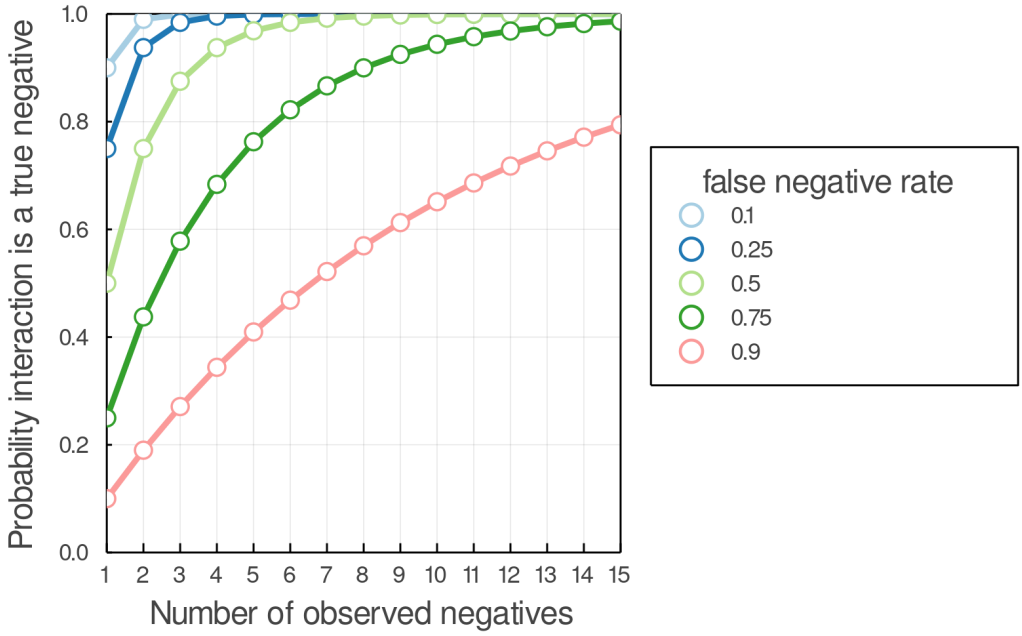

Figure 2: todo

Include some of the better figs.

Chapter two (*Generative learning for predictive ecology*)

We need to predict interactions between species.

Data on species interactions is limited. Many conceptual models have been proposed to explain food-web structure

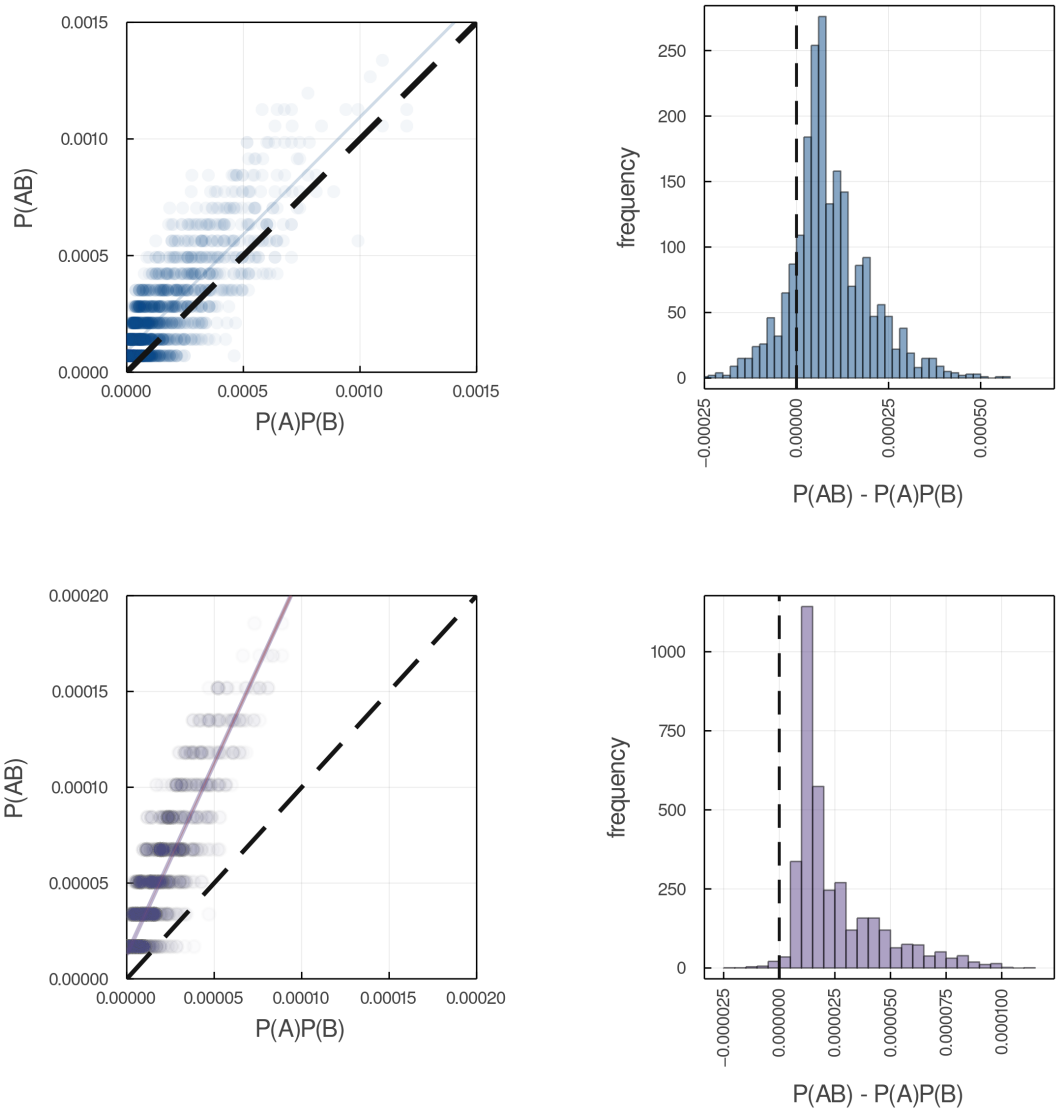

Figure 3: todo

which fit data reasonably well.

Predictive models could feasibly be trained on simulated data to predict interactions in empirical systems.

In this chapter we (hopefully) show training a model on entirely simulated data can enable effective prediction of interactions.

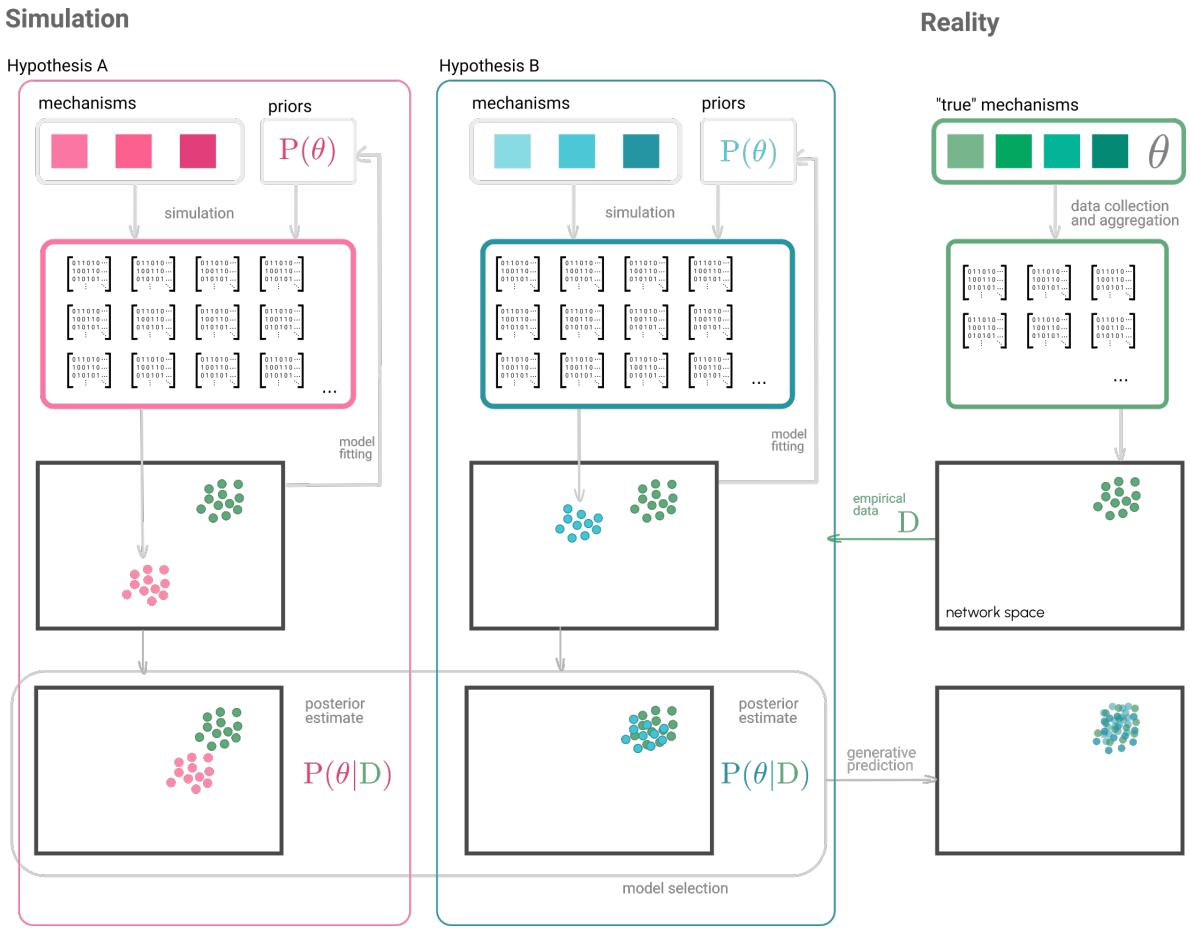

Figure 4: todo

Chapter three (*Optimizing corridor placement*)

Corridors to increase landscape connectivity. In an ideal world we could build corridors between each pair of locations, but the realities of funding mean we have a limited amount of Earth's surface for which we can change the surface cover. So where is the best place to put a corridor given a constraint on how much area you can change?

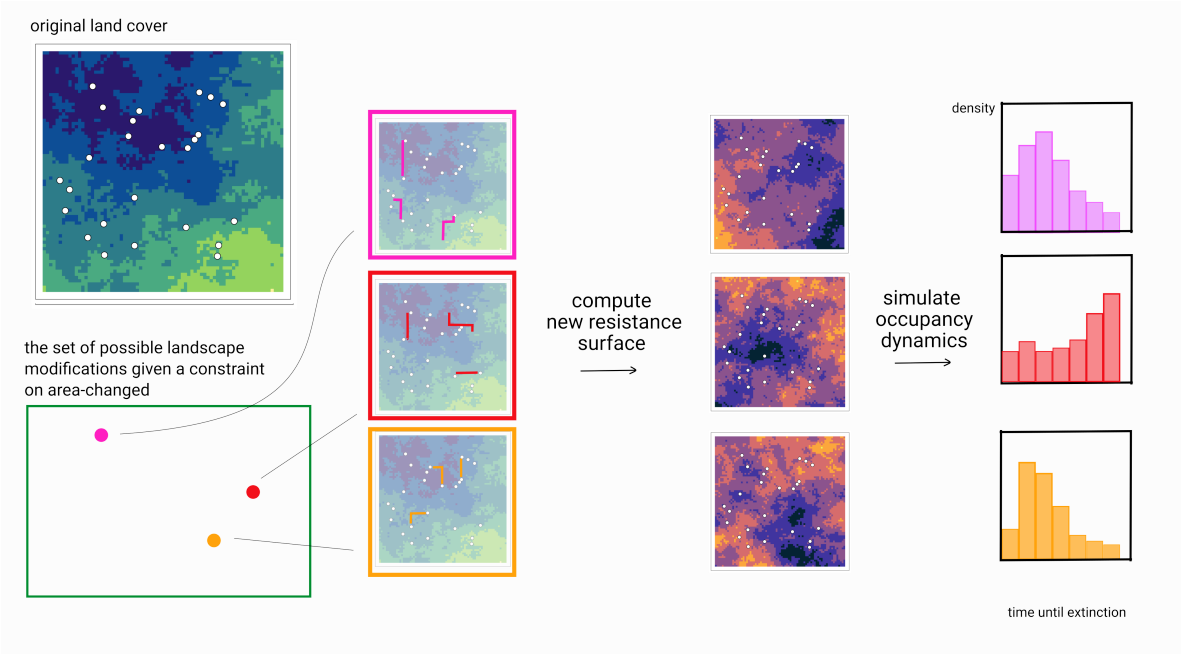

Figure 5: todo

Chapter four ("software chapter…. maybe")

Disseration Conclusion

Half summary, half future directions for this work

Time table

Here's

Month	Courses	TAing	Drafts	Submission
September 2021				
October 2021				
November 2021				
December 2021				CH1 Submitted
January 2022		Spring 2021 TA		QUALS
February 2022				
March 2022				
April 2022				

Month	Courses	TAing	Drafts	Submission
May 2022				CH2 Draft 1
June 2022	BIOS2 summer school (3cr)			
July 2022				
August 2022				CH2 Draft 2
September 2022				
October 2022				CH3 Draft 1
November 2022				
December 2022				CH2 Preprint
January 2023				CH2 Submitted
February 2023				
March 2023				CH3 Draft 2
April 2023				
May 2023				Dissertation Submitted

Additional notes on Phd Stuff

TAing: 2 terms required Bios2: GEO BON contract - 6 credits: BIOS2 summer (3 cr),

Conclusion

Dietze, Michael C. 2017. “Prediction in Ecology: A First-Principles Framework.” *Ecological Applications* 27 (7): 2048–60. https://doi.org/10.1002/eap.1589.