

April 6, 2022 Education Working Group Call

Attendees: Anna Sjodin, Antoinette Abeyta, Sakshi Saini, Jason McLachlan, Alyssa Willson, Jody Peters

Agenda/Notes:

1. Announcement - May 23-25 EFI is hosting a Virtual Conference. We are looking for people to present 10 minute talks or posters and/or 30 or 60 minute workshops about a specific task, skill, walk through a forecasting workflow, etc. Details and registration at: <https://ecoforecast.org/efi-2022-conference/>
2. Updates
 - a. Olivia's Population Ecology Class
 - i. We will check in with Olivia next time she is available
 - b. Anna - Forecasting, Prediction, Projection Manuscript
 - i. Looking at forecasting terms and how forecast is different from prediction/projection.
 - ii. Anna has email to Gretchen to check in about next step
 - iii. Main need is working on a conceptual figure
 - c. Alyssa - Ecoforecasting Educational Resources and Gaps Manuscript
 - i. Assessed online materials for learning forecasting, stats modeling, ecology, mechanistic models, data assimilation, etc. Looked for courses on ecoforecasting
 - ii. Have a full draft - think all data and analyses are final. Will send out to collaborators after some final revisions
 - d. Jason - Sloan-funded education activities
 - i. Jason and grad student, Helena Kleiner, visited collaborator Georgia Smies at Salish Kootenai College. Georgia and Helena worked on R code for Georgia's class. Thinking about ways to introduce stats, data viz, etc that are grounded in the challenges Indigenous communities face. In particular, thinking about water quality and preparing reports for the EPA
 - ii. 2 proposal opportunities for the beginning of May (NSF and Alfred P. Sloan Foundation) - Jason is going to check in with the group to keep working together
 - e. Antoinette - course material
 - i. Evaluating educational materials that Alyssa compiled and that are available for data science - assessing the materials to see what are the technical requirements (e.g., high speed internet, program software, etc)
 - ii. The material is widespread - can EFI make the material more centrally available?
 - SERC (serc.carleton.edu) - can go and search for topics you want to teach. It is in a centralized location, in a uniform format so you know what to expect.

- SERC is NSF funded to be able to compile the materials and standardize the format
 - SERC lacks what software is required which would be helpful
 - Moving forward - think about where to put our EFI education materials. Currently have 4 resources on QUBES (and linked from EFI Educational webpage). But is QUBES the best place to put it or do we want to put it on QUBES and SERC? In some ways this is an advertising need - how do we get it out to the most people?
- iii. Went through Georgia's course material but think something that is more isolated and stand alone would be better at this time so that students don't get behind throughout a semester
- Jason had a similar experience when using the Macrosystems EDDIE modules - wanted to use them slightly differently than they were originally created for. So it is good thing to think about how to make things modular and stand alone and opportunities for making it easy for people to make modifications to make the materials fit their needs
- iv. Antoinette has seen a lot of modules, but can't find what the assumptions are or the background information needed. Need a document with an explanation - background, why people are interested in this topic, etc

3. Forecasting Ethics material

- a. Here is an overview of what was developed: start with a think-pair-share to discuss the [Ecological Forecasting Ethics: Lessons from Covid-19](#) post in Dynamic Ecology. This would then be followed by 3 topics presented in the post, 1) uncertainty, 2) unintended consequences and conflict of interest, and 3) sins of omission vs commission. The material provides a hypothetical ecological example with questions and real-world examples/news stories. There are also a couple of examples of further readings and suggestions for the next steps forward.
- b. Idea from Mike on Slack: One other thing we always talk about in my class when we cover forecast ethics (and which might build well off the "sins" example in the slide deck) is the question of which forecasts should be public goods and which are appropriate for private investment. If all forecasts have to be public goods, there will be a lot less forecasting and possibly less innovation than if the private sector invests, but on the flip side there may be forecasts where there's a moral obligation to disclose the prediction to everyone.
- c. Update from Abby: I actually put a bit of work into this last semester and drafted the start of a formal resource that we could publish.
- d. The core group that worked on this project (Abby, Sydne, Ryan, Quinn) were potentially interested in trying to publish it at Teaching Issues in Ecology and Evolution. Sydne had suggested this journal, but Abby is open to others. Think

about putting it up on QUBES to get DOI, but make sure that uploading to QUBES won't affect submission to a journal.

- i. Looking for people to help write one of the examples. If there are 1-2 people who are motivated this can be helpful. Abby can't work on this for the next 2 weeks
 - ii. If anyone is teaching an interested in trying this out, or reviewing it from a pedagogical perspective
 - iii. Short workshop during EFI meeting to walk through as a group as an activity or collaboratively write one of the case studies. Is there anyone in the education group willing to lead this?
 - Talk about discussion questions for each case study
 - iv. Sydne is happy to provide some rubrics for assessment of student learning to this document once the examples are nailed down
 - v. Jason willing to include in his course next fall
- e. Is there a model that was connected to the example?
- f. Put in context about decisions people are making about the model have ethical challenges that people need to consider
- g. Could talk to Georgia about the drinking water example and check in with Abby to see. Would be a nice one to emphasize that the communities affected by environmental decisions - how are they involved with the decisions that are made.
4. Jody connected with Brett Melbourne to get his syllabi for the Educational Resources webpage and thought it would be good to loop the group in with what he has been working on and is planning to work on next year during his sabbatical. Brett has been following the working group activities, but hasn't been able to join because of his schedule. He is on sabbatical next year, and maybe able to join then.
- a. Data Science for Biological Research
 - b. Machine Learning for Ecology
 - c. Ecological Forecasting seminar
 - d. I did the forecasting seminar in 2020 and it was project based so there's not a lot of lecture-type material but there is some. My two data science classes above are more broad than forecasting but prediction is integral to both and the machine learning class is 100% prediction (PS EBIO5460 is our general "Special Topics" course number). All of the course materials (mostly in a brief markdown textbook format with R code) and many of the video lectures from "Data Science for Biological Research" are posted. All of the course materials from ML4Ecology are posted (including code) but videos are private (zoom lectures have students in the session so can't be posted).
 - e. I have a third class (Quantitative Ecology and Evolution) that pre-dates GitHub and the online trend so I don't have a public-facing version unfortunately. I taught

it from 2008-2017 and it focuses on the natural process culture, i.e. dynamic ecological models and prediction and forecasting but I haven't taught it since 2017. I switched to teaching more generic data science because that's what grad students need the most and very few ended up using the more sophisticated prediction/forecast approach that I was teaching (one of the assignments was to forecast the dynamics of a human disease outbreak on a fictitious island and provide advice to the govt; I guess that's much more relevant now!). Syllabus/topics for this class are attached.

- f. I'm developing two things based on these three courses (hopefully done by end of my sabbatical next year). The first is a two-semester graduate-level sequence that includes the three perspectives of the natural process, generative models, and algorithmic cultures, see e.g. here for this overview on the three cultures
 - g. The second is a textbook, "Data Science for Ecology: Practical Algorithms to Understand and Predict Nature". This will be a free and open educational resource and it will include a chapter on forecasting and I intend to incorporate the wonderful things you have all been doing in the education group (which unfortunately I just haven't had time to participate in; hopefully sabbatical will provide more of an opportunity). I think graduate students need this interdisciplinary perspective that includes computer science, statistics, math, ecology, and epistemology.
 - i. Is this for undergrad or grad level? If at the grad level, could think about this as an opportunity for the group to get people up to the grad level
5. Open Book Project to keep in mind and mash up of notes from previous calls
- a. There is potential to use the educational materials developed for the Sloan grant or with Olivia's class to start providing content for this that other EFI members could contribute to.
 - i. This is a book you would read before you read Mike's Forecasting book
 - ii. If we start to develop modular materials they could be included in such a book
 - iii. Can start to develop a list of the components that would be useful to include in a book and think about how to make it applicable to a wide range of students from many different backgrounds
 - iv. Think about developing slides/materials that provide context
 - v. Running list of who has expressed interest at one time or another
 - Jason McLachlan, Shannon LaDeau, Elva Escobar
 - vi. Has anyone seen the [Open Forecasting Textbook](#) (does exist as a [paperback](#) as well)
 - In the Preface this is for a 3rd year undergrad intro master's course
 - Interesting template. Success in part due to free online and R packages are nicely user friendly

- This is a bookdown format where R code is integrated and is a living document
 - Wouldn't get the credit of something like an AGU Monograph, but would be more broadly available.
 - Could do something that are RMarkdowns that could be combined as a book
 - Loop John Zobitz into this. He is also writing a book for his courses. Mike has used some of his chapters in his 300 level course.
 - Do this in the context of NEON data and walking through all the steps of forecasting. Could get long, but would be a nice resource.
 - A self-contained book to walk through. Could reference other books.
- vii. This sounds like a strong potential for a proposal for NSF Education Directorates, especially if we could bring in an education evaluator who evaluates the open source, collaborative textbook.
- If we structured it well it could have a strong educational research component