University of St Andrews | FOUNDED 1413

Master's Dissertation

Reflective Essay

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I hereby certify that this essay, which is 1014 words in length, has been composed by me, that it is the record of work carried out by me and that it has not been submitted in any previous application for a degree. This project was conducted by me at the University of St Andrews from June 2023 to August 2023 towards fulfilment of the requirements of the University of St Andrews for the degree of M.Sc. Statistical Ecology under the supervision of Dr David Borchers.

August 22, 2023

Upon arriving at St. Andrews, an idea began to take shape. Throughout my honours thesis, which focused on Bayesian dynamic occupancy models, I discovered that despite their considerable power and flexibility, these models remained underutilised in ecological literature. Several factors contribute to this, including these models' computational demands and time-intensive nature. However, even reaching the stage where these challenges become apparent necessitates a solid understanding of the methodology and its application. For individuals not well-versed in statistics or coding, these models can appear quite daunting, and unfortunately, there's a scarcity of easily accessible online resources addressing them. While there is a commendable textbook dedicated to these models, it remains out of reach for those without university affiliations or the financial means to acquire it.

This observation extended beyond dynamic occupancy models, revealing a broader pattern concerning novel statistical ecology methods. Typically, information about these techniques is disseminated through scholarly publications, experts in the field, or university courses. Take, for example, the spatial capture-recapture methodology; its instructional resources are not plentiful online, mostly requiring a textbook purchase, needing to decipher a statistical paper, or enrolment in a university programme. This scarcity of free resources might be due to funding limitations or experts' time constraints, compounded by the fact that statistical ecology is a relatively small field without significant commercial or private profit motives. The inertia in statistical ecology is likely influenced by the lack of easily accessible educational resources.

Motivated by these insights, I opted for a portfolio dissertation with the intent of narrowing the gap between theoretical understanding and practical implementation in the field of statistical ecology. My goal was to create something with a broader impact, moving beyond the traditional demonstration of proficiency in a specific statistical method. While the gratification of composing a conventional thesis is undeniable, I aspired to produce something accessible and comprehensible for practitioners in the field. Thus, I decided to build a tutorial introducing an innovative statistical ecology method to a wider audience: acoustic spatial capture-recapture.

The education landscape is swiftly evolving, spurred by technological advancements and unforeseen transformative events. Particularly for subjects intertwined with coding, the learning trajectory is shifting towards online platforms, gradually overshadowing traditional in-person approaches. Three aspects of online learning motivated my decision to develop a web application.

Firstly, learners can see and interact with the output of running code. Traditional slide-based lectures provide a theoretical understanding of concepts, but cannot provide stu-

dents with the immediate feedback loop created by running code and visualising its output. I built the tutorial in R with the help of the *learnr* package, which allows the learner to run and inspect code from within the tutorial. Another benefit is that the learner does not have to download and install the R language and an appropriate IDE on their own system.

Secondly, effective learning requires practice, often involving multiple attempts to attain the desired outcome. The tutorial includes opportunities for learners to write code through exercises and incorporates quizzes to test the user's understanding and reinforce their knowledge. This hands-on approach enhances the learning experience and ensures active engagement with the material.

Lastly, every learner possesses a unique background and learning pace. Some may grasp foundational concepts swiftly, while others require more time to internalise the material. The tutorial is designed without any time constraints and allows the learner to move through the material at their own speed with the help of interactive built-in web applications.

Over the past few months, I have gained confidence in my abilities while also gaining new skills. Teaching something I've only recently learned was challenging. I needed to understand the topic well enough to effectively explain it to others without an extensive statistical background. I was able to draw upon the experience and knowledge I gained throughout my academic career and prove to myself that I understand these concepts and can explain them to others. This experience has taught me to trust in myself and emphasised the importance of planning ahead while remaining open to change and adaptation in the face of unexpected challenges. Interspersed throughout the tutorial are interactive web applications built with the R package, Shiny. Before the dissertation, I had little experience building web applications, and now I can confidently integrate them into my work. I also gained experience in other programming languages like HTML and CSS.

I've also had to confront my weaknesses. When I come across something that seems easy and straightforward, but I don't grasp it right away, I often hesitate to ask for help, fearing that I've somehow fallen short. Sometimes, it's possible to dodge and avoid the issue, but here I needed to be thorough. To ensure I covered all the bases, I had to overcome my fear of failure and the discomfort of appearing inadequate and simply reach out for assistance. In the end, I discovered that many people have felt the same. It turns out that even the individuals I hold in high esteem face similar struggles.

In conclusion, my journey through the creation of the online tutorial and the insights gained along the way have reinforced the importance of accessibility in education, the potential of online learning, and the value of acknowledging and addressing one's vulner-

abilities. This experience has broadened my skills and enriched my understanding of the intricate relationship between learning, teaching, and personal growth.