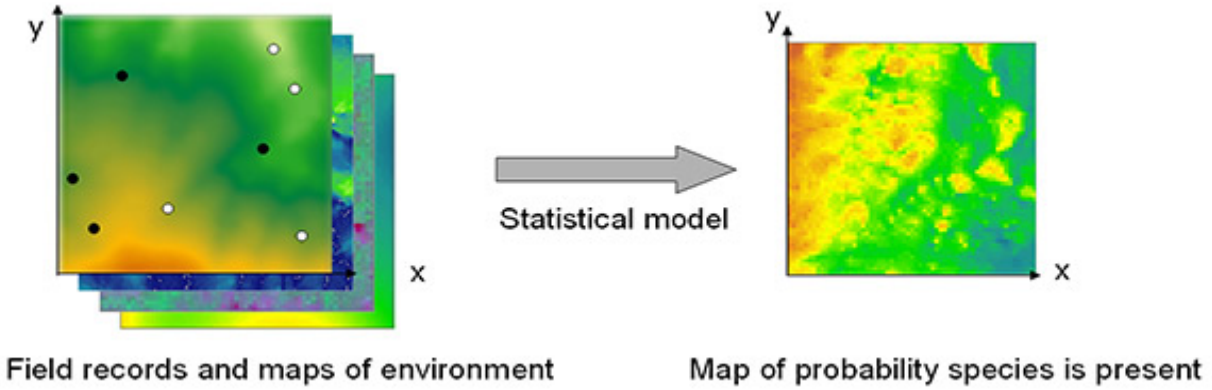
Quantitative Biology Colloquium – Fall 2013

Point process species distribution models

Tuesdays 5-6 pm in Mathematics 402

The Quantitative Biology Colloquium will consist of two 6 to 8 week-long minicourses. The first, beginning on September 10th will be **Species distribution modeling**. SDM (also known as ecological or environmental niche modeling, or climatic envelope modeling) involves the statistical prediction of a species' geographic distribution, by modeling the environmental conditions at locations where the species is known to occur (*i.e.*, georeferenced presence data and GIS layers of climate). SDMs have been used in a myriad of applications in ecology, conservation, and evolution in the last decade, increasingly at an informatics scale. Perhaps their greatest impact has been as a tool for forecasting the response of biodiversity to climate change. Several recent papers have shown that the method of choice for presence-only SDMing, the machine learning algorithm Maxent (cited over 1000 times since it was introduced in 2006), implements a discretized approximation to a more general class of inhomogeneous Poisson point process models (Warton and Shepard 2010, Chakraborty et al. 2011, Fithian & Hastie 2012, Renner & Wharton 2012, Merow et al. 2013).



The minicourse will be devoted to Poisson point process modeling of species' distributions. The first three weeks will focus on gaining the background to understand these models, including a lecture on Bayesian statistics, a lecture on point process models, inhomogeneous point process models, and hidden process models, and a lecture about the biological applications of SMDs. Following that will be a guest lecture by Avishek Chakraborty, a student-led discussion of Chakraborty et al. 2011, and a wrap-up of 1-2 weeks building a point process model using real data for western North American trees. We hope this will offer an opportunity for a wide range of students, post-docs, and faculty using species distribution models to build connections across research units. A recent blog on the topic generated vivid discussion

(http://methodsblog.wordpress.com/2013/02/20/some-big-news-about-maxent/).

The minicourse is open to all. However, students interested in academic credit should enroll in Mathematics 596A and attend the organizational session on August 27th at 5pm in Mathematics 402 or contact the course coordinator. Course credit for EEB students is available through Dr. Brian Enquist. Credit for students in other research units can also be arranged.

Contacts: Margaret Evans <margaret.ekevans@gmail.com> minicourse organizer,
Joe Watkins <jwatkins@math.arizona.edu> course coordinator
Course webpage: http://math.arizona.edu/~jwatkins/biomathf13.htm