CS 470 Spring 2011
Project Proposal

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Due May 2nd, 2011

In the study of animal movements, there are many algorithms for calculating potential paths. One method for calculating the probability of an animal in an area is using the Brownian Bridge Motion Model (BBMM) [1]. The BBMM can create a probability map of an area to then predict where animals will tend to migrate. Since animals can move in slightly different ways, it can be beneficial to analyze each individual seperately.

The problem with the BBMM is that it only makes a probability map off of past animal movements. Since this doesn't tell us much about preference to habitat, the Synoptic Model [2] can also be used The Synoptic Model starts with a null model, and optimizes environment covariates for the following models over a maximum likelihood algorithm.

One can combine BBMM and SM. Selecting sets of locations to run the Synoptic Model on can be left to BBMM. The results are being finalized in a research project, Northwest Cascade Mountain Goat Research Project, at the University of Idaho College of Natural Resources. NCMGRP has found that mountain goats overwhelming prefer slope in terrain, and talus rock. They care little about much else. The mountain goat appears to be a very paranoid animal, and are sensitive to predetors. So sensitive, that they stay in areas that are hard for predators to navigate.

My proposal is to simulate a slope and talus environmet, for virtual goats to navigate. I will then simulate natural and human hunters, and place their movement limitations as well into the environment. I will take the resulting predictions from the study, and apply them to either StarLogo or V6 simulations, and then model real locations. I will then run simulations to answer environmental questions, like reintroduction of goats or predators in certain areas. I will also simulate environmental changes, and predict what goat populations would do. The questions will be real questions of reintroduction, and the results will calculate where future populations will move, and if they will survive.

1 Bibliography

References

[1] Horne, Garton, et al. "Analyzing Animal Movements using Brownian Bridges". *Ecology* 88(9) 2007: 2354-2363. Print

[2] Horne, Garton, Rachlow. "A synoptic model of animal space use: Simultaneous estimation of home range, habitat selection, and interintra-species relationships" *Ecological Modelling* 214, 2008: 338-348. Print.