

Math 140 Starting on the sheep-herding problem

Our next major project is to model a sheepdog herding a group of 40-50 sheep. This problem involves two major subproblems:

- 1) What does the dog do to herd the sheep?
- 2) How do the sheep react to the dog?

We must model the dog and sheep rules jointly, as it is the *interaction* between dog and sheep that is important here. That is, we can't try to answer one question without addressing the other at the same time.

We can generate ideas by examining the real data we have and by searching the web for what is known on this problem. Your task is to start generating and testing ideas for how the sheepdog and the sheep interact.

For example, the websites <http://grandin.com/B.Williams.html>
<http://grandin.com/behaviour/principles/acting.predator.stress.handling.html>
contain some suggestions from an animal handling expert.

There are also attempts to program a robot sheepdog:
<http://www.cs.ox.ac.uk/stephen.cameron/sheepdog/>

For the sheep behavior question, examine hypotheses like the selfish herd theory among others. Wikipedia has a decent overview to get you started, but be sure to look into articles by experts to delve more deeply:

http://en.wikipedia.org/wiki/Selfish_herd_theory
http://en.wikipedia.org/wiki/Herd_behavior

For class on Monday: compile a list of ideas for both dog and sheep behaviors and be prepared to explain them in class. Be specific when outlining your ideas, e.g., as a list of rules or pseudocode, even if you aren't sure how to code them in NetLogo (we can work that out later).