NAME: Maxfield Green
DATE: 2/3/2019
Reading reflections: Reflection N. 3
STAT/CS 387

Title(s) read

- Sequential Decision Making with Relative Ranks: An Experimental Investigation of the "Secretary Problem"
- Measuring the Vague Meanings of Probability Terms

Reflection

The two assigned readings provide discussion and example of mapping vague probability terms to values and an experiment implementation of the secretary problem using heuristic decision rules. The secretary problem works to optimize a theoretical hiring process in which the goal is to hire the best applicant. The only trick is that the applicant must be hired on the spot, once an applicant is reviewed, they are either hired or fired. This poses a interesting problem in which we must reckon about the distribution of talent in the applicant pool and where interviewing applicants lie within it.

Measuring the Vague Meanings of Probability Terms discusses how imprecise terms are used to express probabilities of events whos predictions contain lots of uncertainty. In the past, such mappings have been generated by sampling many mappings from people and assessing the variability over word – number relations and the variability across the groups sampled. Typically, there is high variance among word-probability mappings as the rankings of vague probability terms are inherently vague and will mean different things to different people. The study looks at two alternate methods using membership functions that create intervals of probabilities associated with different terms. However, the study uses a pair comparison method to make measurements of probabilities embedded in different terms. Participants are shown two visual area distributions and are given a probability. They are asked to then rank the distributions according to how well they represent the probability given. This experiment had participants judge vague probability terms like "probable","impossible"and"tossup". The final experiment showed participants a probability and then instructed them to create a visual that represented that probabilities upper and lower bound. The study found that over several different experimental designs, the extreme expressions of certainty tended to generate monotonic functions whereas the more moderate probability claims created bimodal shapes.

The other study titled "Sequential Decision Making with Relative Ranks: An Experimental Investigation of the 'Secretary Problem'", suggests a computer experiment to test the how

well heuristics that people commonly use to solve the optimal stopping problem perform against the “optimal” theoretic decision rule. The study finds that a simple rule that counts the number of successive non candidates works well in place of an optimal strategy. The study interrogates subjects about the heuristics and decisions rules used in personal strategies and reports the following. Commonly, people use a simple cutoff, where the first r – 1 applicants are rejected, another heuristic used is the picking of the jth candidate. These strategies are referred to as heuristics because they make “minimal use of the decision makers cognitive system”. The simulation chooses a set of decision rules that will be followed in each step of the simulation. The rules are not optimal, but they reflect the heuristics commonly reported by subjects. The results from the simulations show that across strategies, the probability of selecting the correct candidate increases as n, the sample size increases. Because of this, the best cutoff changes depending on the number of applicants. For n = 40, the optimal policy instructs decision makers to reject the first 15 applicants while the simulations averaged to selecting the first 14. Alternatively, the candidate count rule determines that j = 4, yields the highest probability for selecting the optimal candidate. This is a 35% reduction from the results of the optimal policy. Additionally, these decisions are not very robust to changing j, a small change is j leads to a significant change in the probability of selecting the best applicant. The final heuristic simulated, the successive non candidate rule, tasks the decision maker with rejecting at least k consecutive non candidates and then hiring the next. This approach was shown to be 97% as effective as the optimal policy in the best case scenario. Additionally, this approach is fairly robust to choosing different sub-optimal values of k, making it an effective heuristic.

I think that this study is a good example of testing how effective heuristics are compared to optimal decision theoretic informed analysis. The study reports that people tend to cut-off typically too early in the candidate search. As a hiring manager, knowing this could help solve this problem in application. However I would like to see a simulation that penalizes late selection to incorporate the cost for a company of not having a talented employee in the short term. In this way, it makes sense that people tend to pick too early.