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CS 470: Sequential Bayes

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**Key Points**

1. Nosy Sensor
2. Est. as samples come in.
3. Running average good.
4. But we know something about the answer before we have the estimate so we should use this estimation…that is why we use Bayes, it let us use this additional information.
5. So we need the likelihood and the prior…that’s about all I know.

The goal of this tutorial is to understand how to accurately find a goal with a noisy sensor. One of the curtail points is that the sensor is noisy. If the sensor was accurate there would be no need to place an algorithm between the sensor’s readings and the navigation system. However, since the sensor is noisy we need a way of interpreting its readings in order to find the true goal.

One good way to interpret the sensor’s readings is to simply keep a running average of all sensor readings. As one accumulates more and more readings the running average becomes more and more accurate with respect to the actual goal.

While this running average will do the trick there is however a better alternative. Because one knows something about the sensor, how often it’s right or how much it’s off, or one knows something about the answer, one can use this information to bias the estimate. In other words, we can use our additional information about the sensor or the answer in order to improve our estimate. Bayesian reasoning allows us to use this additional information.

The trick then to using Bayesian reasoning is coming up with both the prior and the likelihood terms in order to compute the posterior probability. The best I understand it is that the likelihood is computed by plugging in numbers to a normal density function, given our knowledge about our sensor. The final thing we need is our prior; I’m not sure how we derive this.

**Whaaat? -- http://www.youtube.com/watch?v=qORouZ-qOgg**

1. sest derivation
2. normal density function
   1. what is this
   2. how this translates into iterative bayes
3. What is the whole Pr(i+1) = Po(i)
4. With none stationary goals how do we use our knowledge of how the state changes to alter the estimate for the Prior in the next step?

I’m struggling to understand how we obtain the prior and likelihoods for any desired posterior probability. I’m struggling to understand how we make this iterative. I’m also struggling with how we alter to problem to take into account a moving target.