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CS 470: GridFilter Hw

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1. Complete the [Kalman MATLAB tutorial](https://facwiki.cs.byu.edu/cs470fall2011/index.php/Kalman_MATLAB_tutorial), and summarize what you've learned in one or two paragraphs.

I learned that as the number of observations increase, even if nosy, the mean gets slightly closer to the actual value more and more consistently. I also learned that as one increases the variance of the nosy sensor the data points become more and more speared out around the true value, and the rings(indication of variance) increase in size.

I also learned that we use H to mask out variables in our state that are not observable. I also learned that matrices just scale and rotate vectors. Also, that the Egan values of a matrix will tell one how a vector is modified by a given matrix. They are telling of how a vector will be scaled and if it is rotated 180 degrees.

1. Repeat the steps done in C7 (concept 7) of the tutorial, but set sig0=10.5 and sest = s + 1.5 \* randn(2,1). Explain the differences from the tutorial results.

The first observation distribution is a lot larger than the origin tutorial. It also appears that it takes the algorithm a few steps before the observation distribution and the actual state get close again. In the tutorial it appeared that most of the time the actual state was with in the observation distribution.

1. Repeat the steps done in the previous problem, but set sig0=1.5 and sest=s+10.5\*randn(2,1). Explain the differences from the tutorial results.

It just kicks our first observation and guess of the original state a lot farther away from the actual state but doesn’t seem affect the observation from there on out.

1. Repeat the steps done in C11 (concept 11) of the tutorial, but set Sx=5\*[0.1 0 0 0 0 0; 0 0.1 0 0 0 0; 0 0 4 0 0 0; 0 0 0 0.1 0 0; 0 0 0 0 0.1 0; 0 0 0 0 0 4] and Sz=1\*[1 0 ; 0 1]. Explain the differences from the tutorial results.

Causes the states to vary a lot more from state to state. It also causes our predictions to be farther from the true state.

1. Repeat the steps done in the previous problem, but set Sx=1\*[0.1 0 0 0 0 0; 0 0.1 0 0 0 0; 0 0 4 0 0 0; 0 0 0 0.1 0 0; 0 0 0 0 0.1 0; 0 0 0 0 0 4] and Sz=5\*[1 0 ; 0 1]. Explain the differences from the tutorial results.

Causes the observations to vary a lot more around the true state. Made the Kalman state and the predicted state much more accurate compared to the observation of the state.