March 15,2020

EE493 Real-Time Applications of Digital Signal Processing

Project

This project is about the implementation of Kalman Filter in order to predict the movement of the mouse. Kalman Filter theory is built over the Wiener Filter. One of the main differences between these two filters is the former one has a model which includes the dynamics of the moving object. Hence Kalman Filter is the main tool for estimating the trajectory of moving objects.

Kalman filter should be implemented in C and called from LabVIEW as a shared library function "kalman.so" that should be placed in the appropriate directory of myRIO. Therefore your mouse trajectory predictor will run in myRIO and the predicted mouse position will be displayed in the computer user interface. The input to your program will be the current mouse position and the output will be the predicted mouse position.

The user interface should show the previous mouse trajectory, and the predicted mouse (x,y) coordinate. The current and the predicted mouse coordinates should be shown as blue and red circles respectively in sufficient size. You should also plot the direction vector from the current to the predicted coordinate. The predicted coordinate and the real coordinate should be shown in the user interface as the predicted and the real trajectories. You should also plot the least-squares error between the predicted and the real coordinate points in the user interface.

The project report print-out together with the codes should be zipped and sent to etuncer@metu.edu.tr before the demo session which will be announced later. The project report should include the theoretical background which should be in accordance with the implemented code. It should also include all the results, plots, etc. The report should also be brought to the demo session.

A Kalman Filter implementation in MATLAB is presented as an example. You can take this code as a reference to implement your code in C. Note that a shared library file can be generated using a framework such as Eclipse. You need to install this software and compile your code and call it from LabVIEW with the appropriate parameters. The following links can be used to better understand the process.

Note that a genuine effort is expected from you so that you should have all the knowledge about your implemented code which will be tested in the demo session.

http://www.ni.com/tutorial/14625/en/

http://www.ni.com/tutorial/14690/en/

https://knowledge.ni.com/KnowledgeArticleDetails?id=kA00Z0000019SViSAM&l=en-TR