Subhash Gubba
Sig Sys Final Project Proposal

Exploration of Adaptive Filters

I will be working alone for the Sig Sys final project. My topic is the implementation and purpose of adaptive filters. I am interested in researching this topic because it is where machine learning and signal processing begin to overlap, which are two areas of my liking. For the presentation, I will be introducing the topic and giving some brief background on its use in signal processing (talk about noise removal, prediction, etc.) and why it can be advantageous compared to other techniques.

In addition to explanation and research in the topic, I would like to provide an implementation of the LMS (Least Mean Squares) quick walk through on the math and design behind it. I will show a demo of it in python using a generated signal with noise. After this I will touch on other types of adaptive filters and their relations back to filters we've seen in this class (like the Kalman filter).

As another deliverable, I'd like to make a blogpost talking about this topic. It would cover most of what I talk about in the presentation, and include certain figures and graphs I generate. I would also like to discuss its application to the image domain as well and explain some of the similarities and differences there.

In summary, I'll be giving a presentation on the implementation and usefulness of adaptive filters for LTI systems. I will begin by giving background on the topic and some formal definitions, then explain how it relates to machine learning and its applications in noise removal and linear prediction for signal processing. Transitioning into a demo, I will explain what the LMS algorithm is and how it works, then show how it is implemented and used in python. Following this, I will highlight some other adaptive filters and how they may relate to some filters we've seen in this class. To conclude my project, I will have a blogpost that covers those topics I presented and some insight into adaptive image filtering.