

Outline Thesis Proposal

January 19, 2016

1. Introduction

- 1.1. Neuroscience background
- 1.2. Description of the data

2. Literature

- 2.1. State space model
- 2.2. Decoding using Kalman Filter
- 2.3. Evidence from Sonia & Valerie's paper that the KF can be improved performing some sort of model selection on the observation equations

3. Preliminary Work

- 3.1. Weighed Generalized Least Square (WGLS):
computing a weighed MLE, where the weights are obtained by minimizing the MSE in velocity
- 3.2. Weights computed using an adapted version of the boosting approach
- 3.3. Weights computing using leave one out observation equation approach
- 3.4. Velocity prediction based on Penalized MSE (Forward Approach)

4. Research Plan

- 4.1. Find the numerical solution for the weight matrix, W , in WGLS and extend at the Kalman Filter solution
- 4.2. Propose new approaches for either generating weights and combining weights
- 4.3. Compare the new approaches with Kalman Filter