Homework 1 MLSP

Problem 2: optimization and non-negative decomposition

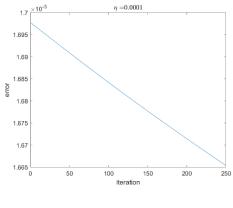
i. Computing a Derivative

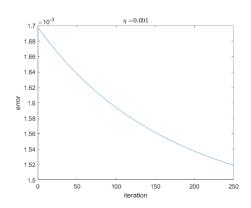
$$E = \frac{1}{DT} |M - NW|^2 = \frac{1}{DT} (M^T - W^T N^T) (M - NW)$$
$$= \frac{1}{DT} (M^T M - W^T N^T M - M^T NW + W^T N^T NW)$$

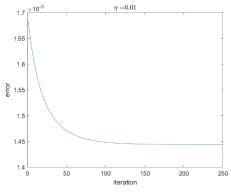
The derivative of W is

$$\frac{dE}{dW} = \frac{2}{DT}N^T(NW - M)$$

ii. A Non-Negative Projection







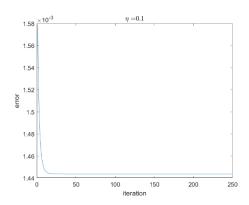


Figure 1 The Error Plot with Different η

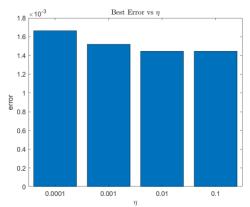


Figure 2 Best Error with Different η

1