EP3260: Machine Learning Over Networks
Computer Assignment 5
Instructors: Hossein S. Ghadikolaei, José Mairton B. da Silva Jr.
Due Date: April 22, 2020

Computer Assignment 5 - ADMM

Split the "MNIST" dataset to 10 random disjoint subsets, each for one worker, and consider SVM classifier in the form of $\min_{\mathbf{w}} \frac{1}{N} \sum_{i\in[N]} f_i(\mathbf{w})$ with $N = 10$.

a) Run decentralized GD (from Lecture 6) with 10 workers. Characterize the convergence against the total number of signaling exchanges among all nodes, denoted by T.

b) Consider a two-star topology with communication graph (1,2,3,4)-5-6-(7,8,9,10) and run decentralized subgradient method (from Lecture 6) and ADMM over the network (from Lecture 7). Characterize the convergence against T. Tune hyper-parameters to improve the convergence rate.

c) Propose an approach to reduce T with a marginal impact on the convergence. Do not limit your imaginations and feel free to propose any solution. While being nonsense in some applications, your solution may actually make sense in some other applications. Discuss pros and cons of your solution and possibly provide numerical evidence that it reduces T.