1163-62-50 **Lizhe Sun**, **Mingyuan Wang**, **Yangzi Guo** and **Adrian Barbu*** (abarbu@stat.fsu.edu). *A Novel Framework for Online Supervised Learning with Feature Selection.*

Current online learning methods suffer from lower convergence rates and limited capability to recover the support of the true features compared to their offline counterparts. In this work, we present a novel online learning framework based on running averages and introduce online versions of some popular existing offline methods such as Elastic Net, Minimax Concave Penalty and Feature Selection with Annealing. The framework can handle an arbitrarily large number of observations as long as the data dimension is not too large, e.g. p<50,000. We prove the equivalence between our online methods and their offline counterparts and give theoretical true feature recovery and convergence guarantees for some of them. In contrast to the existing online methods, the proposed methods can extract models of any sparsity level at any time. Numerical experiments indicate that our new methods enjoy high accuracy of true feature recovery and a fast convergence rate, compared with standard online and offline algorithms. We also show how the running averages framework can be used for model adaptation in the presence of model drift. Finally, we present applications to large datasets where again the proposed framework shows competitive results compared to popular online and offline algorithms. (Received July 29, 2020)