Abstract Submitted
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Reconstruction of electron temperature and density profiles from Thomson scattering system using neural networks[1] VETRI VELAN, Rutgers University- Department of Physics & Astronomy, AHMED DIALLO, BENOIT LEBLANC, Princeton Plasma Physics Laboratory — Neural networking analysis is implemented on NSTX Thomson scattering measurements in order to provide fast, real-time control of temperature and density profiles. Raw voltages from an array of 30 radially-variant polychrometers [1] are transformed into T_e and N_e measurements by using a multi-layer perceptron approach. The neural net, designed with the Torch7 package, is trained on Thomson Scattering data taken between 2008 and 2011, and tested on different data taken during the same period. The net can be modified by changing the number of hidden layers, the optimization procedure used, the size of each epoch, or the batch size (in the case of batch optimization methods); different permutations of these are tested to optimize accuracy and computation time. If the analysis succeeds, the next step is to use it on 2012 data, which contains an array of 42 polychrometers, to predict temperatures and densities and compare them to actual calculations. Furthermore, the analysis's success will motivate inclusion of the neural net into the NSTX-Upgrade, so that electron temperatures and densities can be extracted in real time.

[1] B. LeBlanc et. al. Rev Sci Instrum. 2012 **83**(10):10D527.

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