759 Final Project Proposal

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Problem statement: Implement parallel processing either on the host or GPU on a Matlab code which uses Neural Network Ensembler (NNE) to reduce code run time.

Motivation/Rationale: Current Matlab code takes 10-15 min to run and process the data on a desktop PC. This application is used frequently to come up with response surfaces. It is developed by my colleague and wants to reduce total time taken to run this model which will eventually reduce development time.

How you plan to go about it:

Current Code: It is Neural Network Ensembler (NNE) application takes empirical data and fits neural network (NN) response models to it. But since NN models can tend to over-fit the data, care must be taken to prevent this. A very effective way to do this is to generate a family or ensemble of models that all use the same inputs to predict the same output. Each individual model in the ensemble is different from all of the rest due to the fact that they are each randomly seeded. The output is then calculated as the average of the outputs of each of the ensemble members. In order to select the ensemble members, the NNE application generates hundreds of NN models and compares their performance. The best 10 or so performers are then selected as the ensemble. Generating the NN models is done in a while-loop in Matlab. For large data sets of 2000 or so records (total 8-10 input channels), generating all the models can take 15 minutes total. Each NN model takes 1-2 min.

While loops are big part of NN models which in itself have number of other tasks like develop a network, validation of data sets, develop performance and display model building process to the user. Plan is to use OpenMP for parallel processing multiple tasks and instrument the code such that it uses memory transaction efficiently as it uses lots of data to develop the NN models

How you will demonstrate what you accomplished: Goal is to reduce total run time by at least 25 – 50% on the same desktop machine compared to its current state.

Team members: Vinay Raikar

Deliverables: Powerpoint/Pdf report to show parts of code where parallel processing and data transfer reduction was implemented.

Participate in Rescale sponsored Final Project competition: No