Flex Deep Learning Project

**Background**

For Flex CEC engineering, predicting server or cluster application performance while meeting datacenter OpEx and CapEx constraints is a complex part of “right sizing” a solution for a Flex customer.  Often many potential solutions must be tested or trialed to ensure that the final deliverable meets all of the customer’s needs. Using an automation framework, the Flex CEC CloudLabs performance team runs many workloads across many types of server platforms from different vendors and compiles the performance results and hardware responses in SQL and JSON-based databases.  While this data is useful to Flex with just basic analysis, analysis with deep learning algorithms could drastically improve the analysis of the effect of dozens of different hardware changes on captured performance and hardware response data points.

Basic analysis is when we wish to verify the results of a new server are aligned with expectations. We need to determine what are the expectations by hand, this entails gathering the data for the benchmark of interest in a spreadsheet and filtering by the specific variable that is changing like a processor type or memory. The change in the benchmark output due to the variable of interest is calculated and a trendline is created. Then the new test run on the target server is placed in the data set and determined if it fits the expected curve with the other data.

Performing this type of analysis by hand can require a day or two to complete per benchmark. Thus a ML model is used that can be used to do the analysis and predict result in fraction of time.

**Progress Milestone**:

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| --- | --- | --- |
| **Date** | **Task** | **Remark** |
| Week 10 | Finalize Proposal and Research | To Be decided (TBD) |
| Week 11 | Proposal Submission and Feature finalization | THD |
| Week 12 | Model definition and implementation | TBD |
| Week 13 | Testing and tuning the Model | TBD |

**Reading:** ANN, Bayesian Models, LSTM ,  TensorFlow ,Machine Learning supervised learning, Optimization function , Gradient decent , encoding , dataset manipulation using pandas and NumPy , Chipset specification and effect of individual parameter on performance.

**Experience:** Various variants of the Model was researched, lots of reading was done on the way to build neural networks and reading was done on optimization and loss function and

**Resources:** *Date of Reference : Feb 18 to May 18*

<https://github.com/thu-ml/zhusuan>

<https://github.com/davmre/elbow>

<https://www.cs.utah.edu/~piyush/teaching/bayes-review.pdf>

<https://towardsdatascience.com/lstm-by-example-using-tensorflow-feb0c1968537>

<https://blog.sigopt.com/posts/tensorflow-convnets-on-a-budget-with-bayesian-optimization>

<https://www.tensorflow.org/>

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<http://www.informit.com/articles/article.aspx?p=130978&seqNum=4>