High Performance Machine Learning
Lab 3

Paweł Rościszewski
Department of Computer Architecture
Faculty of Electronics, Telecommunications and Informatics
Gdańsk University of Technology

Introduction

In this lab we will investigate further the training program developed in previous labs.
Note 1: A properly working PerformanceMeasurementHook from Lab2 will be crucial for Task 3. Please share the implementation with those students, who don't have it.
Note 2: If someone introduced custom modifications to the code and wants to keep them, they can continue with their version.

1 Task 1: Use TensorBoard for analysis (5 points)

TensorBoard is a useful tool included in the TensorFlow library, that allows visualization of certain aspects of machine learning workloads. Running TensorBoard requires providing path to the saved logs directory:

```
> tensorboard --host 172.20.83.2XX --logdir <log_directory>
...
TensorBoard 2.1.1 at http://172.20.83.2XX:6006/ (Press CTRL+C to quit)
```

The TensorBoard user interface can be accessed by a browser using the given URL. One of its features allows browsing charts of consecutive values of certain variables in the computational graph in the "SCALARS" tab. Notice that the "IMAGES" tab allows for visual inspection of current model inputs and outputs, while the "GRAPHS" tab visualizes the computational graph created by the training program.

To pass the task: provide a link to a working TensorBoard fed by your training program. Discuss the information available in the tool.

2 Task 2: Session run profiling (5 points)

Profiling is very useful for performance analysis of programs and their individual components. Using TensorFlow we can generate profiles of consecutive training steps using the ProfilerHook (see documentation for details[1]). The timeline.json files generated by the ProfilerHook can be loaded by Chrome browser in the tracing mode, accessible by "chrome://tracing" URL.

Note: For operations placed on GPU, the Cuda Profiling Tools Interface (CUPTI) is used. It is an extra library provided by the CUDA toolkit, accessible in /usr/local/cuda/extras/CUPTI/lib64/ which has to be added to LD_LIBRARY_PATH.

To pass the task: show screenshots of the profile visualization and discuss the profile.

[1] https://www.tensorflow.org/api_docs/python/tf/estimator/ProfilerHook