

A letter of motivation to the Robot Learning research group

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My background

I have been a Linux Kernel contributor for 20 years, porting Linux Kernel on several new CPUs and implementing IOMMU drivers in the upstream kernel. Those work are all about System Software architecture in traditional Computer Science (i.e. Operating System), using C language, Assembler and JTAG. Recently I got interested in a new concept of Machine Learning compiler (ML compiler) when I worked at Ericsson research. Here’s our paper, [A TinyMLaaS Ecosystem for Machine Learning in IoT: Overview and Research Challenges](#)

Historically ML development was about building up a new algorithm model in Python. The outcome of them are running on powerful Cloud GPUs. ML models have been getting bigger and bigger while ML use cases are expanding to Edge computing where computing resources are smaller. There’s apparently needs to run ML inference efficiently on various hardware environments, including the very end of Edge computing. ML hardware accelerator needs its ML compiler to generate optimized executable binary for them. This trend is changing the traditional legacy Computer Science concept (e.g. Compiler) into a new era. For

example, more needs for domain specific compilers. There are 2 aspects of ML compilation. Compiling ML models to convert a computational graph at training into the optimized efficient format. [MLIR](#) and [Apache TVM](#) Using ML methods to optimize compile operation itself (e.g. Reinforcement Learning to find the best outcome). [Apache TVM](#) is doing [this](#). Those 2 are supplemental.

Right now I'm not employed but I'm under Helsinki university incubation program, NEXUS, considering own business based on [TinyML](#) technology.

My research interests

I'd like to research ML compiler area, applying ML algorithms (e.g. RL) to ML compilers, esp. ML accelerators. This could be naturally extend to generating ML HW accelerators too.

Benefit for the Robot Learning research group

Right now I have no idea about the Robot Learning research group I'd like to learn what kind of synergy could be.

Reference

- [Alexander Ilin](#)

Appendix

Courses

I have recently taken the following courses at Aalto university.

- CS-C3240 - Machine Learning D, Lecture
- CS-E407513 - Special Course in Machine Learning, Data Science and Artificial Intelligence D
- CS-E4890 - Deep Learning D, Lecture
- CS-EJ3211 - Machine Learning with Python D
- CS-EJ3311 - Deep Learning with Python D, Lectures
- ELEC-E8125 - Reinforcement learning D, Lecture