

2018 Research Interest/Project Ideas

Tiark Rompf

tiarkrompf.github.io

Compiler Techniques for Differentiable Programming

Neural networks and deep learning crucially depend on frameworks such as TensorFlow and PyTorch that model computation graphs and are able to compute gradients automatically (backpropagation). But the traditional layer organization of neural networks is increasingly inflexible and gives way to architectures with less rigid structure (e.g. Inception, ResNet in vision, TreeLSTM, StackRNN in NLP). In preliminary work, we are exploring metaprogramming approaches to such more general forms of "differentiable programming" (<https://openreview.net/pdf?id=SJxJtYkPG>), and in this project, we plan to build an optimizing tensor algebra compiler around these techniques that will yield both higher performance and greater expressiveness than currently popular systems.