Shuai Li

✍ Guangzhou, Guangzhou Province, P.R. China
☎ +86 17520435806
✉ lishuai918@gmail.com
ϟ shawnLeeZX.github.io

Education

2015 – 2017 **Master of Philosophy, Electronic Engineering**
Chinese University of Hong Kong (CUHK)

2010 – 2014 **B.E. Computer Science (CS), Special Class for Gifted Young (SCGY) Program**
University of Science and Technology of China (USTC)

Employment

2017.8 – present **Researcher Associate @ South China University of Technology (SCUT)**

2014.8 – 2015.8 **Research Assistant @ Chinese University of Hong Kong (CUHK)**

2014.1 – 2014.5 **Research Intern @ Microsoft Research Asia (MSRA)**

Research Experience

June 2012 – present

Theory of Neural Networks In the past six years, I worked out a theory of Deep Neural Networks (**manuscript available at** https://arxiv.org/abs/1811.12783), The theory gives S-System, **a measure-theoretical definition of NNs**; endows a stochastic manifold structure on the intermediate feature space of NNs through information geometry; proposes a learning framework that unifies both supervised learning and unsupervised learning in the same objective function; and proves **under practical conditions**, for **large size nonlinear deep NNs** with a class of losses, including the hinge loss, **all local minima are global minima** with zero loss errors. It also completes the analogy between NNs and Renormalization Group.

Jan 2018 – Apr 2018

Orthogonal Neural Networks I am also involved with designing algorithms to improve neural networks (NNs). The new algorithm constrains the weight matrices of NNs to be orthogonal. It is theoretically inspired by **a novel generalization error bound** that goes beyond Lipschitz constant based bounds through a new covering scheme. It characterizes the error induced by erroneous expansion of intra-class variations, and erroneous contraction of inter-class difference. The analysis relies on the proof that NNs are local δ-isometry by breaking the instance space down by their hyperplane arrangement, and bounds the singular values according to Cauchy interlacing law. For more info, refer to http://shawnleezx.github.io/research_catalog.

Programming Experience

Nov 2015 – Nov 2017

Akid (Python)

Neural Network library

* `akid` is a python neural network package that uses dataism abstraction on backends (Tensorflow, or PyTorch are supported) for research in NNs. It supports Acyclic Directed Computational Graph, Multi-GPU Computing, Visualization (computation graph, weight filters, feature maps, and training dynamics statistics), Meta-Syntax to generate network structure and more.
* LeNet, AlexNet, Maxout Net, VGGNet, Residual Network are reproduced.
* For detail, refer to **http://arxiv.org/abs/1701.00609** (report) and **http://akid.readthedocs.io** (doc)

Oct 2018 – present

Akid (Lisp, C++, CUDA)

Neural Network library

* The `akid` (Lisp, C++, CUDA) is an upgrade of its Python version. It aims to combine the expressiveness of Lisp and the efficiency of C++/CUDA. It is designed to work by compiling Lisp and C++ into the intermediate representation (IR) of LLVM, and GPU computation is accessed through wrappers provided by C++ variables/classes. The IR of LLVM enables the two languages to share the same symbol tables, thus code written in Lisp and C++ can interact with each other without foreign function interfaces.

Skills

Programming

Proficient	Common Lisp, C/C++, Python, Shell Script, Matlab(Octave)
Warmup in fortnight	Java, Elisp, VimL, Prolog, Javascript, HTML, CSS, XML, YAML, Ruby, Lua, SED, AWK, SQL, Action Script, Assembly Language, Verilog

Technology

Linux, Emacs, Vim, Eclipse, Eclim
Chef, Docker, Kubernetes, GlusterFS, Hadoop
Tensorflow, Torch, Caffe, CUDA
LaTeX, Markdown, reStructuredText