Zihao Hu

Curriculum Vitae

3-East 307 SEIEE Building
Shanghai Jiao Tong Uinversity, Shanghai, 200240
(+86) 158 21901669
zihaohu@sjtu.edu.cn
zihaohu.github.io

Research Interests

Machine Learning *Inference and Optimization*

Education

9.2015–3.2018 **M.S. in Computer Technology**, *Shanghai Jiao Tong University*, Advisor: Prof. Hongtao Lu.

- Cumulative GPA: 3.89/4.00. Rank: 3/115.

9.2011–6.2015 **B.E. in Telecommunications Engineering**, *Huazhong University of Science and Technology*.

- Major GPA: 85.14/100. Cumulative GPA: 84.55/100.

Publications

Zihao Hu, Xiyi Luo, Hongtao Lu, Yong Yu. "Supervised Hashing based on Energy Minimization". Submitted to the **IEEE Conference on Computer Vision and Pattern Recognition 2018 (CVPR 2018)**.

Zihao Hu, Junxuan Chen, Hongtao Lu, Tongzhen Zhang. "Bayesian Supervised Hashing". **Spotlight** of the **IEEE Conference on Computer Vision and Pattern Recognition 2017 (CVPR 2017, 8%)**.

Wei Shen, Xiang Bai, **Zihao Hu**, Zhijiang Zhang. "Multiple Instance Subspace Learning via Partial Random Projection Tree for Local Reflection Symmetry in Natural Images". Pattern Recognition 2016.

Research Experience

Supervised Hashing

Goal Learning compact binary codes to ensure that the Hamming distance between two semantically similar data points is low and vice versa.

Advisor Hongtao Lu, Center for Brain-like Computing and Machine Intelligence, SJTU, China.

7.2016–11.2016 **Bayesian Supervised Hashing**.

http://ieeexplore.ieee.org/document/8099833

- The performance of previous hashing methods highly depended on manually tuned hyper-parameters.
- Proposed the first Bayesian inference approach to tune hyper-parameters automatically; used automatic relevance determination (ARD) prior to discriminate the relative significance of various hashing bits.
- Corresponding paper was published in Proceedings of IEEE CVPR 2017.

4.2017–11.2017 **Supervised Hashing based on Energy Minimization**.

https://arxiv.org/abs/1712.00573

- The space cost of *Bayesian Supervised Hashing* was $\mathcal{O}(nd^2)$ while learning d-bit codes for n points; I devised an efficient energy minimization based method to reduce the cost while maintaining the performance.
- Modeled each bit by a binary random variable and derived consistency equations by mean-field inference.
- Approximated a fixed point of these equations by a piecewise linearization of the sigmoid function.
- Refined the space cost from $\mathcal{O}(nd^2)$ to $\mathcal{O}(nd)$ and speeded up the training process by orders of magnitude.
- Corresponding paper was submitted to CVPR 2018.

11.2017–Now **Further Improvement of Supervised Hashing based on Energy Minimization**.

http://zihaohu.github.io/notes/consistencyequations.pdf

- There remains room to ameliorate the technique proposed in my recently submitted paper, like improving the linearization strategy or bounding the approximation error theoretically.
- Proposed another piecewise linearization scheme to reduce the approximation error.
- Further study is needed since the calculation of polylogarithm involved in this method is time-consuming.

Data Mining Competition

12.2016–1.2017 **Two Sigma Financial Modeling Challenge in Kaggle**.

- Based on anonymized features extracted from financial instruments, predicted an index which showed the market's expectation of volatility in the near future.
- Combined the linear regression model, the genetic programming model with extremely randomized trees to construct a reliable and efficient model.
- Ranked in the top 7.15% (148/2070) in the final evaluation.

Skills

Languages C/C++, Matlab, Python, Shell, LaTeX, Mathematica, PHP, HTML

Tools Vim, Linux, CodeBlocks

Honors and Awards

2017 **National Scholarship,China** *Highest scholarship in China, Top 2.6% (3/115)*

2017 **Student Travel Scholarship** *CVPR 2017*

2017 **Two Sigma Financial Modeling Challenge in Kaggle** *Top 7.15% (148/2070)*

2016 **First Prize in China Post-Graduate Mathematical Contest in Modeling** *Top 1.69% (150/8872)*

2016 **Academic Excellence Scholarship (first-class) of Shanghai Jiao Tong University**

Interests

Table Tennis, Chinese Chess, Go and Math Puzzles