YANSHUAI CAO

Contact info at: https://yanshuaicao.github.io

EMPLOYEMENT

Senior Research Team Lead, Borealis AI — Jan 2021 - Present
Integrated Research Team Lead, Borealis AI — May 2018 - Jan 2021
Fundamental Research Team Lead, Borealis AI — Aug 2017 - May 2018
Researcher, Borealis AI (Royal Bank of Canada) — Dec 2016 - Aug 2017

Responsibilities:

- Jointly lead a cross-functional team consisting of research, engineering, product, business units in delivering new transformative technologies to RBC;
- Manage a group of researchers and research engineers;
- Responsible for delivering R&D work into products in multiple business lines;
- Responsible for developing novel intellectual properties in AI;

Key accomplishments:

- Invented a technology enabling non-technical users to reliably interact with structured data using natural language; developed a multi-year technical roadmap to achieve the long-term vision and a POC to successfully obtain the necessary resources to implement this roadmap;
- Led a team to develop and deliver a novel ML approach to forecast working capital funding shortfall for commercial banking, producing reliable early warnings months ahead of the existing system;
- Built and maintaining a network of academic collaborations with researchers in top Canadian research institutions and universities, such as Vector Institute, Mila, University of Toronto, Queen's University, McGill, UBC, University of Alberta;
- Published in a range of top AI conferences, many as either the first author or supervisor;
- Created a portfolio of patents and patent applications;
- Contributed to the research team hiring standard and protocol; conducted interviews across research, engineering and product roles; hired many members who became the pillars of Borealis AI.
- Supervised over ten interns, all of whom produced publications or patent applications; helped all graduating students to be admitted to Ph.D. programs, or hired at top technology companies.

EDUCATION

Ph.D., 2010 - 2017
Supervisor: David J. Fleet
Department of Computer Science, University of Toronto
Thesis: Scaling Gaussian Processes

Honours Bachelor of Science, 2006 - 2010, graduated with High Distinction
University of Toronto
Specialist program in Computer Science: AI Option
Specialist program in Mathematics and Statistics

PUBLICATIONS Venues: NIPS/NeurIPS, ICML, ICLR, ACL, AISTATS, TPAMI

On Variational Learning of Controllable Representations for Text without Supervision
Peng Xu, Jackie Chi Kit Cheung, Yanshuai Cao
International Conference on Machine Learning (ICML) 2020

Evaluating Lossy Compression Rates of Deep Generative Models
Sicong Huang, Alireza Makhzani, Yanshuai Cao, Roger Grosse
International Conference on Machine Learning (ICML) 2020

Better Long-Range Dependency By Bootstrapping A Mutual Information Regularizer
Yanshuai Cao*, Peng Xu*
International Conference on Artificial Intelligence and Statistics (AISTATS) 2020
(indicates co-first authorship)*

A Cross-Domain Transferable Neural Coherence Model
Peng Xu, Hamidreza Saghir, Jin Sung Kang, Teng Long, Avishek Joey Bose, Yanshuai Cao, Jackie Chi Kit Cheung
Association for Computational Linguistics (ACL) 2019 (long paper)

Compositional Hard Negatives for Visual Semantic Embeddings via an Adversary
Avishek Joey Bose, Huan Ling, Yanshuai Cao
NeurIPS Workshop on ViGIL (2018)

Adversarial Contrastive Estimation
Avishek Joey Bose*, Huan Ling*, Yanshuai Cao*
Association for Computational Linguistics (ACL) 2018 (long paper, oral)
(indicates co-first authorship)*

Improving GAN Training via Binarized Representation Entropy (BRE) Regularization
Yanshuai Cao, Gavin Weiguang Ding, Kry Yik-Chau Lui, Ruitong Huang
International Conference on Learning Representations (ICLR) 2018

Improving GAN Training via Binarized Representation Entropy (BRE) Regularization
Yanshuai Cao, Gavin Weiguang Ding, Kry Yik-Chau Lui, Ruitong Huang
International Conference on Learning Representations (ICLR) 2018

Implicit Manifold Learning on Generative Adversarial Networks
Kry Yik Chau Lui, Yanshuai Cao, Maxime Gazeau, Kelvin Shuangjian Zhang
ICML Workshop on Implicit Models (2017)

Automatic Selection of t-SNE Perplexity
Yanshuai Cao, Luyu Wang
ICML Workshop on AutoML (2017)

Adversarial Manipulation of Deep Representations
Sara Sabour*, Yanshuai Cao*, Fartash Faghri, David J. Fleet
International Conference on Learning Representations (ICLR) 2016
(indicates co-first authorship)*

Efficient Optimization for Sparse Gaussian Process Regression
Cao, Y., Brubaker, M., Fleet, D.J. and Hertzmann, A.
IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), vol.37, no.12, pp.2415-2427, Dec. 1, 2015.

Transductive Log Opinion Pool of Gaussian Process Experts
Yanshuai Cao, David J. Fleet
NIPS Workshop on Nonparametric Methods for Large Scale Representation Learning, Montreal, 2015.

Generalized Product of Experts for Automatic and Principled Fusion of Gaussian Process Predictions
Yanshuai Cao, David J. Fleet
Modern Nonparametrics 3: Automating the Learning Pipeline workshop at NIPS, Montreal, 2014.

Efficient Optimization for Sparse Gaussian Process Regression
Cao, Y., Brubaker, M., Fleet, D.J. and Hertzmann, A.
Advances in Neural Information Processing Systems (NIPS), Lake Tahoe, 2013.

Preprints

Semantic Parsing with Less Prior and More Monolingual Data
Sajad Norouzi, and Yanshuai Cao
arXiv:2101.00259 2021

Optimizing Deeper Transformers on Small Datasets: An Application on Text-to-SQL Semantic Parsing
Peng Xu, Wei Yang, Wenjie Zi, Keyi Tang, Chengyang Huang, Jackie Chi Kit Cheung, and Yanshuai Cao
arXiv:2012.15355 2020

Variational Hyper RNN for Sequence Modeling
Ruizhi Deng, Yanshuai Cao, Bo Chang, Leonid Sigal, Greg Mori, Marcus A Brubaker
arXiv:2002.10501

Preventing Posterior Collapse in Sequence VAEs with Pooling
Teng Long, Yanshuai Cao, Jackie Chi Kit Cheung
arXiv:1911.03976

Few-shot self reminder to overcome catastrophic forgetting
Junfeng Wen, Yanshuai Cao, Ruitong Huang
arXiv:1812.00543

Adversarial robustness of pruned neural networks
Luyu Wang, Gavin Weiguang Ding, Ruitong Huang, Yanshuai Cao, Yik Chau Lui
https://openreview.net/pdf?id=SJGrAisIz

Selected Patents

System and method for improving deep neural network performance
Yanshuai Cao, Ruitong Huang, Junfeng Wen
US Patent App. 16/562,067

Robust pruned neural networks via adversarial training
Luyu Wang, Weiguang Ding, Ruitong Huang, Yanshuai CAO, Yik Chau Lui
US Patent App. 16/270,373

System and method for visual construction of nested operations for data querying
Yanshuai Cao, Luyu Wang
US Patent App. 16/189,634

System and method for improved neural network training
Yanshuai Cao, Yik Chau Lui, Weiguang Ding, Ruitong Huang
US Patent App. 16/172,451

Method and device for conducting measurements for an n-dimensional data structure
Weiguang Ding, Ruitong Huang, Luyu Wang, Yanshuai Cao
US Patent App. 16/177,010

Method and device for generative adversarial network training
Yanshuai Cao
US Patent App. 16/179,469

System and method for reproducible machine learning
Weiguang Ding, Yanshuai Cao
US Patent App. 16/107,124

System and method for adaptive data visualization
Luyu Wang, Yanshuai Cao
US Patent US10739955B2

Systems and methods for malicious code detection
C Smyth, F Cory, YC Lui, Yanshuai Cao
US Patent. US10685284B2

Systems and methods for cyberbot network detection
Ashkan Amiri, Bryce Croll, FONG Cory, Athinthra Krishnaswamy Sethurajan, Vikash Yadav, Sylvester King Chun Chiang, QIN Zhengyi, Cathal Smyth, Yik Chau Lui, Yanshuai Cao
US Patent US10819724B2

ACADEMIC SERVICES

Program Committee Member for NeurIPS, ICLR, ICML, ECCV
Journal reviewer for *IEEE Transactions on Neural Networks and Learning Systems*
Journal reviewer for *IEEE Transactions on Knowledge and Data Engineering*

PREVIOUS WORK EXPERIENCE

Consulting Research Scientist, Disney Research — Aug 2016 - Dec 2016

Sessional Lecturer, University of Toronto Scarborough — Sept 2016 - Dec 2016
- CSCC11: Introduction to Machine Learning

Researcher, Architech Inc. — Feb 2015 - Feb 2016
- Co-founded the data analytics service offering at the company.

Teaching Assistant, University of Toronto — 2012 - 2014
- CSC2503 Foundations of Computer Vision (graduate course)
- CSCC11: Introduction to Machine Learning and Data Mining.

Machine Languages

Python, Pytorch, Matlab, Unix shell scripting, C/C++, R, SQL.

Human Languages

English, Chinese, French

Last updated: March 2021