

YANSHUAI CAO

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

EMPLOYEMENT	<i>Senior Research Team Lead</i> , Borealis AI	Jan 2021 - Present
	<i>Integrated Research Team Lead</i> , Borealis AI	May 2018 - Jan 2021
	<i>Fundamental Research Team Lead</i> , Borealis AI	Aug 2017 - May 2018
	<i>Researcher</i> , 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;
- Responsible for establishing and leading multi-year research programs.

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

Optimizing Deeper Transformers on Small Datasets

Peng Xu, Dhruv Kumar, Wei Yang, Wenjie Zi, Keyi Tang, Chenyang Huang, Jackie Chi Kit Cheung, Simon J.D. Prince, Yanshuai Cao
Association for Computational Linguistics (ACL) 2021

Code Generation from Natural Language with Less Prior and More Monolingual Data

Sajad Norouzi, Keyi Tang, Yanshuai Cao
Association for Computational Linguistics (ACL) 2021

TURING: an Accurate and Interpretable Multi-Hypothesis Cross-Domain Natural Language Database Interface

Peng Xu, Wenjie Zi, Hamidreza Shahidi, Ákos Kádár, Keyi Tang, Wei Yang, Jawad Ateeq, Harsh Barot, Meidan Alon, and Yanshuai Cao
Association for Computational Linguistics: System Demonstrations (ACL-Demo) 2021

A Globally Normalized Neural Model for Semantic Parsing

Chenyang Huang, Wei Yang, Yanshuai Cao, Osmar Zaiane, and Lili Mou
Proceedings of the 5th Workshop on Structured Prediction for NLP 2021

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

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

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 US10802822B2

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