

Yan Zhang

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Research Interests

- **Learning to reason and abstract.**
- Representation of sets and graphs in deep neural networks.
- Generative models for structured data.

Publications

under review Qian Huang, Horace He, Abhay Singh, Yan Zhang, Ser-Nam Lim, Austin Benson. [Set-Structured Latent Representations](#). Submitted to *International Conference on Machine Learning*, 2020.

ICLR 2020 Yan Zhang, Jonathon Hare, Adam Prügel-Bennett. [FSPool: Learning set representations with featurewise sort pooling](#). In *International Conference on Learning Representations*, 2020.

NeurIPS 2019 Yan Zhang, Jonathon Hare, Adam Prügel-Bennett. [Deep Set Prediction Networks](#). In *Advances in Neural Information Processing Systems* 32, 2019.

ICLR 2019 Yan Zhang, Jonathon Hare, Adam Prügel-Bennett. [Learning representations of sets through optimised permutations](#). In *International Conference on Learning Representations*, 2019.

ICLR 2018 Yan Zhang, Jonathon Hare, Adam Prügel-Bennett. [Learning to count objects in natural images for visual question answering](#). In *International Conference on Learning Representations*, 2018.

Education

PhD Machine Learning

University of Southampton

Southampton, United Kingdom

2016–2020

Thesis: *Learning to Represent and Predict Sets with Deep Neural Networks*.

Supervisor: Adam Prügel-Bennett.

- **Four first-author papers** published in **top machine learning conferences**.
- **79 citations** on Google Scholar show the impact my work has already had.
- Thesis summary: Deep Learning with sets as input or output. Sets are useful for modeling structured data like agents in an environment and objects in images. I pioneered work on sets by identifying several issues with existing approaches and developed new models that avoid these problems.

BSc Computer Science: First Class Honours

University of Southampton

Southampton, United Kingdom

2013–2016

Thesis: *Biologically-inspired Entropy Feedback Neurons in Deep Learning Architectures*.

Supervisor: Klaus-Peter Zauner.

- **Top of the year** in Computer Science **for all three years**.
Average grade: **89.75**/100 (>70 equivalent to GPA 4.0). Thesis grade: 91.

Research Experience

- Strongly **self-managed, interest-driven research**. Path from research agenda to initial idea to completed papers with very little guidance from supervisors necessary.
- Experienced with writing successful papers, especially **communicating ideas clearly**. Three out of four of my first-author papers accepted on first submission.
- Reviewer for seven papers at AAAI-2020, including one emergency review. Evaluated and discussed submissions in-depth and within the deadlines. My reviews matched all 7 final decisions, showing my excellent judgement of quality.
- Research assistant internship on “Analysing Programs with Graphs” in automata theory with Gennaro Parlato, University of Southampton, in 2015.

Invited talks

PyData Cambridge (scheduled)	Cambridge, United Kingdom
<i>Deep Learning with Sets (45 minute talk)</i>	<i>scheduled July 2020</i>
London Machine Learning Meetup	London, United Kingdom
<i>Deep Learning with Sets (45 minute talk)</i>	<i>February 2020</i>
FiveAI	Cambridge, United Kingdom
<i>Deep Learning with Sets (45 minute talk)</i>	<i>July 2019</i>

Awards and Funding

Postgraduate awards	Undergraduate awards
PhD studentship , 60,000 GBP + tuition fees.	Zepler Project Prize (Bachelor thesis grade above 90), 50 GBP.
NeurIPS 2019 travel award, hotel during conference worth ~1,800 USD.	ICL Prize (top grades of year 3), 50 GBP.
ICLR 2019 travel award, 1,000 USD.	BAE Systems Applied Intelligence Prize (top grades of year 2).
ICLR 2018 travel award, 1,000 USD.	Netcraft Prize (top 10 grades of year 2), 250 GBP.
	Winton Capital Management Prize (top grades of year 1), 250 GBP.

Competitions

Recommender system challenge	
1st out of ~10 teams	2015
Won using collaborative filtering approach with pipeline in Python.	
IEEEExtreme 8.0	
50th out of ~2000 teams internationally	2014
24 hour programming competition in teams of 3 with very little practice.	
Robocode tournament	
1st out of ~10 teams	2013
Classical AI in Java. Winner of both 1-vs-1 and battle royale tournaments as a group of 3.	
IEEEExtreme 7.0	
79th out of ~2000 teams internationally	2013
24 hour programming competition in teams of 3 with very little practice.	

Open source projects

Leela Chess Zero (★900+)

Contributor

2018–Current

Neural network chess engine that reproduces and improves on AlphaZero.

- Collaboratively discussed ideas and evaluated them in **PyTorch** and **TensorFlow** to improve neural network performance. Implemented PyTorch training script from scratch.
- Implemented high-performance C++ data loader, Q-learning, policy masking, gradient accumulation, featurewise linear modulation (Perez et al., 2017), transformers (Vaswani et al., 2017), linear context transforms (Dongsheng et al., 2020), manifold mixup (Verma et al., 2019), weight histograms, weight update ratios, and more.

Deep Set Prediction Networks (★50+, 6 citations)

Author

2019

- Implemented *Deep Set Prediction Networks* (Zhang et al., 2019).
- Implemented *Deep Perm-Set Net: Learn to predict sets with unknown permutation and cardinality using deep neural networks* (Rezatofghi et al., 2018).

Featurewise Sort Pooling (★8)

Author

2019

- Implemented *FSPool: Learning set representations with featurewise sort pooling* (Zhang et al., 2020).
- Implemented *Janossy Pooling: Learning Deep Permutation-Invariant Functions for Variable-Size Inputs* (Murphy et al., 2019).
- Implemented *A simple neural network module for relational reasoning* (Santoro et al., 2017).
- Implemented *Learning Representations and Generative Models for 3D Point Clouds* (Achlioptas et al., 2018).

Permutation-Optimisation (★30+, 6 citations)

Author

2018

- Implemented *Learning representations of sets through optimised permutations* (Zhang et al., 2018).
- Implemented *Learning Latent Permutations with Gumbel-Sinkhorn Networks* (Mena et al., 2018).

Counting in Visual Question Answering (★150+, 60+ citations)

Author

2017

- Implemented *Learning to count objects in natural images for visual question answering* (Zhang et al., 2018).
- Used by *Bilinear Attention Networks* (Kim et al., 2018) to obtain **single-model state-of-the-art** in VQA Challenge 2018.

Strong Baseline for Visual Question Answering (★110+)

Author

2017

- Implemented *Show, Ask, Attend, and Answer: A Strong Baseline For Visual Question Answering* (Kazemi et al., 2018).

★ denotes number of stars on GitHub.