

# Chang Ye

347-320-1201 | [yooceii19960620@gmail.com](mailto:yooceii19960620@gmail.com) | <https://yooceii.github.io> | [github.com/yooceii](https://github.com/yooceii)

## EDUCATION

### New York University

Master of Science in Computer Science. 3.778/4.0

New York, NY

Aug. 2018 - May 2020

### Dalhousie University

Joint Program in Computer Science. 3.44/4.3

Halifax, NS, Canada

Aug. 2017 - April 2018

### Zhejiang University of Technology

Bachelor of Engineering in Software Engineering. 3.3/4.0. Ranking: 24/186

Hangzhou, ZJ, China

Aug. 2014 - Jun 2017

## RESEARCH INTEREST

- Neuroscience and psychology inspired RL.
- Causal Representation learning in RL.

## PUBLICATION (\*=EQUAL CONTRIBUTION)

- Y. Yao\*; C. Ye\*; J. He; GF. Elsayed. Teacher-generated pseudo human spatial-attention labels boost contrastive learning models. *SVRHM Workshop@ NeurIPS*, 2022. [paper]
- H. Shengyi; R.F.J. Dossa; C. Ye and J. Braga. CleanRL: High-quality Single-file Implementations of Deep Reinforcement Learning Algorithms. *Journal of Machine Learning Research (JMLR)*, 2022. [paper, code]
- C. Ye; A. Khalifa; P. Bontrager and J. Togelius. Rotation, Translation, and Cropping for Zero-Shot Generalization. *IEEE Conference on Games (CoG)*, 2020. (39.9% Acceptance Rate) [paper, code, presentation]
- C. Ye\*; G. Mittal\*; Y. ruksachatkun\*; L. Cui\*. SeqG(SC)AN: SeqGAN baseline for Grounded SCAN. DS-GA 1016 Final Project. [paper, code, Course Website]
- C. Ye and M. Heywood. Uniform Cost Search in Procedural Content Generation for Angry Bird Games. **Honour Thesis**. [paper, code]

## RESEARCH & PROJECTS EXPERIENCE

### Boost self-supervised representation learning model with pseudo-spatial human attention

Aug 2022 - present

- Trained the **SimCLR** model with different types of saliency distance function as an additional supervised signal.
- Implemented linear evaluation and image retrieval experiments for analyzing trained model's performance.
- Conducted model performance analysis by calculating **mCE**, **mAP** and **PR** curve.

### CleanRL open source project

July 2020 - present

- Reimplemented the **Deep Q-learning** algorithm in **JAX** and achieved the same level performance compared to the original implementation.
- Added the **EnvPool** support to the **Random Network Distillation** algorithm and reduced the runtime to **30%** of the original OpenAI VecEnv Gym environment version.
- Coauthored the technique paper and it's accepted by **JMLR** in software track.
- Reviewed major PRs and helped release the 1.0.0 version of the lib.

### Consecutive-step curiosity diff as intrinsic reward for exploration in reinforcement learning

July 2020 - Jan 2021

- Reimplemented the **Random Network Distillation** algorithm in PyTorch and achieved state-of-the-art performance. The code is contributed to the Github repository: **CleanRL** which has around **1.7k** stars on GitHub.
- Designed a new curiosity reward based on the difference between RND's curiosity reward in 2 consecutive steps.
- Experimented with different forms of scaling function and analyzed the intrinsic reward at the different states in game.

### Policy-Dynamics Value function (PD-VF) extension

Sep 2020 - Jan 2021

- Designed a **transformer** encoder that takes rewards, states and actions as input, and a feed-forward network decoder that takes states and actions as input and outputs rewards. Trained network by using the  $\ell_2$  error of predicted rewards and real rewards as the objective function.
- Performed an ablation study by training PPO agents conditioned on learned embeddings.

### Imitation Learning through watching videos

July 2019 - Aug 2019

- Implemented a tree-search algorithm by adopting the **Monte Carlo tree search** methods to play game zelda.
- Took the play-traces from tree-search agent and trained a embedding that maintains pixel sequence information by using temporal distance between 2 frames as the objective function.
- Adopted the **A2C** algorithm and used cosine distance between the trained embedding and current state's embedding as an extra reward to train agent on game zelda.

### Representation learning for reinforcement learning

Feb 2020 - March 2020

- Designed an algorithm that learns the representation while performing policy gradient by incorporating **SimCLR** structure into the standard **A2C** algorithm.

- Created an asynchronous version that learns representations simultaneously and added more data augmentation options

## Human-face recognition and mosaic

Jan 2016 – May 2016

- Utilized **histogram equalization** in **OpenCV** to solve the low contrast problem that causes the face recognition algorithm unable to recognize the face features. The face recognition rate improved **30%** by adopting that technique.
- Took function from **Dlib** to extract face features and used these features to designed a module that can efficiently locate the multiple facial features on multiple faces and convert them to contours for Gaussian blur purpose.
- Designed the whole backend pipeline, implemented in **C++** under the **Qt** platform and ran backend unit tests. Built the system that is able to process up to **40** frames per sec with ignorable latency. The system achieved a **95%** detection rate in the real-time video under a low-light environment.

## EXPERIENCE

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### Research Intern

Jan 2019 - Jul 2021

*New York University, Game Innovation Lab, Supervisor: Julian Togelius*

*New York, NY*

- Designed and executed the **MAP-Elites** algorithm to explore the generalization in policy space. Created t-SNE plots to visualize the search space.
- Conducted various research projects on **evolutionary algorithms** and **reinforcement learning**, and presented the results during the lab meeting.

### Google LLC

California, United States

*Software Engineer*

*August 2021 - Present*

- Designed a system to automatically validate and alert cloud compute resource supply forecast signals in Golang by using RPC and internal toolstack that runs on multiple data centers.
- Migrated the supply forecast system to new data sources and improved the system runtime by **40%**.
- Joined the **Google brain** team as a 20%er and worked on human attention inspired representation learning model.

## TEACHING

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### Course Assistant

*New York University*

*New York, NY*

- CS-GY 6943 AI for Game. Instructor: Julian Togelius (2020 Spring)
- ECE-GY 6143 Introduction to Machine Learning. Instructor: Anna choromanska (2019 Fall)

## TECHNICAL SKILLS

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**Languages:** Python, Go, Java, C++, C, C#, Shell, SQL, Haskell, Matlab

**Software & Tools:** PyTorch, JAX, Tensorflow, OpenAI Gym, OpenAI Baseline, Numpy, Scipy, Git, L<sup>A</sup>T<sub>E</sub>X, .Net, Vim, Tmux