COLUMBIA | ENGINEERING
The Fu Foundation School of Engineering and Applied Science

Jianjin Xu

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Education

Columbia University — New York, NY
M.S. in Computer Science — 8/2019 – 5/2021
Thesis: Semantic Controllable Image Generation in Few-shot Settings
Advisor: Prof. Changxi Zheng

Tsinghua University — Beijing, CN
B.Eng. in Computer Science — 8/2015 – 7/2019
Thesis: Training GANs with the Sunway Taihulight Supercomputer
Advisor: Prof. Guangwen Yang

Employment

Carnegie Mellon University — Pittsburgh, PA
Research Assistant, supervised by Prof. Fernando De La Torre Frade — 8/2022 –

Tsinghua University — Beijing, China
Research Assistant, supervised by Prof. Xiaolin Hu — 8/2021 – 08/2022

Research Interests

Generative Models, 3D Generative Modeling, Neural Network Interpretation, Computer Vision

Publications and Manuscripts

Extracting Semantic Knowledge from GANs with Unsupervised Learning [paper][project page]
Jianjin Xu, Zhaoxiang Zhang, Xiaolin Hu
Submitted to IEEE Transactions on Pattern Analysis and Machine Intelligence.

PATMAT: Person Aware Tuning of Mask-Aware Transformer for Face Inpainting
Sam Motamed, Jianjin Xu, Chen Henry Wu, Fernando De la Torre, Christian Häne, Jean-Charles Bazin
Submitted to Conference on Computer Vision and Pattern Recognition 2023 (**CVPR 2023**).

Teaching Others is Teaching Yourself: Regularization for Controllable Language Models
Han Liu, Bingning Wang, Ting Yao, Haijin Liang, Jianjin Xu, Xiaolin Hu
Submitted to International Conference on Learning Representations 2023 (**ICLR 2023**).

Linear Semantics in Generative Adversarial Networks [paper][project page]
Jianjin Xu, Changxi Zheng — Citation: 14
Conference on Computer Vision and Pattern Recognition 2021 (**CVPR 2021**).

Frame Difference-Based Temporal Loss for Video Stylization [paper][project page]
Jianjin Xu, Zheyang Xiong, Xiaolin Hu
ArXiv preprint.

Research Experience

Personalized Diffusion Models for Identity-Preserving Face Inpainting and Editing — 07/2022 –
Research Assistant at CMU, supervised by Prof. Fernando De La Torre Frade — *In progress*

- Proposed the CelebAHQ-IDI dataset for benchmarking identity-preserving inpainting task.
- Proposed to personalize Stable Diffusion by learning a feature transformer to incorporate feature from reference images.
- Presented the applications of personalized face inpainting and editing with diffusion models.

Extracting Semantic Knowledge from GANs with Unsupervised Learning 6/2021 – 05/2022

Research Assistant at Tsinghua University, supervised by Prof. Xiaolin Hu *Submitted to TPAMI*

- Proposed KLiSH (K-means with Linear Separability Heuristic) to cluster GAN's features by leveraging GAN's linear semantics.
- Realized unsupervised fine-grained segmentation and unsupervised semantic-conditional synthesis on various datasets, which are both unattainable with previous methods.

Linear Semantics in Generative Adversarial Networks 6/2020 – 11/2020

Columbia University, supervised by Prof. Changxi Zheng *Accepted by CVPR2021*

- Discovered and empirically proved that semantic classes learned by GANs are linearly separable.
- Constructed a linear transformation to extract semantics from GAN's features and showed that it achieved close performance to nonlinear transformations on various GANs.
- Proposed two few-shot image editing applications: semantic-conditional sampling and semantic image editing.

Neural Painter: Smart Image Editing with Simple Line Drawings 10/2017 – 4/2018

Tsinghua University, supervised by Prof. Xiaolin Hu *[project page]*

- Led a team to build an image editing application capable of editing anime faces guided by simple color strokes.
- Implemented the core GAN modules and coordinated dataset filtering, UI design, and backend development.

Frame Difference Based Temporal Loss for Video Stylization 6/2017 – 11/2018

Tsinghua University, supervised by Prof. Xiaolin Hu

- Proposed to use frame difference measured on pixel and feature space as a loss to stabilize stylized videos. Compared to the optic flow-based loss baseline, the proposed loss matches the baseline's performance while it is faster and avoids estimating the entire dataset's optic flow.
- Developed an experiment system for evaluation and hosted experiments involving 62 subjects and 25,600 votes.

Unrestricted Vehicle Re-Identification System with Deep Metric Learning 6/2018 – 10/2018

Intership at MSRA, supervised by Lead Researcher Xun Guo

- Developed a re-identification system that inputs raw videos of monitors and identifies re-appeared vehicles. The system first detects vehicles by faster RCNN, then conducts tracking and matching by learned deep metrics.
- Trained the deep metric model on VeRi dataset and validated it on VID dataset and collected traffic videos.

Selected Projects

Jungle, 2022 1/2022 – 4/2022

In META-SCAPE, Pavilion of China of the 59^{th} International Art Exihibition, La Biennale di Venezia *[project page]*

- *Jungle, 2022* is an artwork that prints GAN-generated plants onto mirrors.
- Communicated with artists to collaborate on the creation of the artwork.

Optional Depth Pathway for Mask-RCNN 10/2019 – 1/2020

Robotic Learning, supervised by Prof. Shuran Song

- Proposed to enhance Mask-RCNN with the ability to take in depth modality optionally such that Mask-RCNN can be trained with both RGB and RGB-D datasets to improve its performance.

Interactive Editing in Aesthetic Painting Generation System 5/2018 - 6/2018

Professional Practice, supervised by Prof. Jia Jia *[project page]*

- Enabled interactive segmentation and image editing using GrabCut, image inpainting using GANs and image fusion using poisson image editing.

Weakly Supervised Object Localization with LRP 10/2017 – 4/2017

Student Research Training, supervised by Prof. Xiaolin Hu

- Proposed to use the network visualization results obtained with Layerwise Relevance Propagation for weakly supervised object localization.

A CUDA/GPU Accelerated Spiking Neural Network Simulator 4/2016 – 7/2016

Student Research Training, supervised by Prof. Feng Chen

- Implemented a Spiking Neural Network simulator using CUDA and accelerated the simulation for around 20 times on GPU compared to CPU.

Awards

3rd Prize in 36th the Challenge Cup Competition, Tsinghua University 4/2018

2nd Prize in Mathematical Contest in Modeling, 2017 2/2017

Teaching Experience

TA @ Columbia University, COMS-W4995 Special Topics In Computer Science, I: Causal Inference, 2020

Miscellaneous Experience

Chairman of Tsinghua Microsoft Student Club 6/2018-6/2019

Skills

pytorch / tensorflow / python / C++ / javascript / CUDA