Qiran Zou

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Research Interests

My research interests lie in generative models and representation learning, where I am fascinated by the possibilities for groundbreaking applications that can truly transform our world. My previous research has focused on unsupervised segmentation, aiming to reduce the annotation burden and improve the efficiency of learning knowledge from data.

Education

Tsinghua University Sept.2019 – Jun.2022

- *Master of Control Engineering* | GPA: 3.68/4.0 | Superviser: Prof. Xiangyang Ji

China University of Mining and Technology – Beijing Sept.2015 – Jun.2019

- *Bachelor of Computer Science and Technology* | GPA: 3.76/4.0

Research Experience

Broadband Network and Digital Media Lab, Tsinghua University Sept.2019 – present

- **ILSGAN: Independent Layer Synthesis for Unsupervised Foreground-Background Segmentation [AAAI 2023]. [paper]. (Oral).**
  - Found the interlayer semantic/visual confusion exists in layered GAN that undermines segmentation.
  - Our ILSGAN improves interlayer independence by MI minimization, which powerfully enhances IoU performance.
  - ILSGAN achieves strong state-of-the-art generation quality and unsupervised foreground-background segmentation performance on complex real-world data.
- **Learning Foreground-Background Segmentation from Improved Layered GANs [WACV 2022]. [paper].**
  - We proposed an improved layered GAN and a learning objective maximixing the mutual information between generated images and private latent codes, which avoids trivial decompositions and contributes to segmentation.
  - Our method achieves competitive generation quality and unsupervised F-B segmentation performance.
- **Tailoring atomic 1T phase $CrTe_2$ for in situ fabrication [Nanotechnology, 2021]. [paper].**
  - We trained a segmentation model to automatically identify the nanopores of TEM images, to help analyze the healing process of nanopore after tailoring.
  - We colleted a dataset of nanopore images and corresponding segmentations; proposed a preprocessing strategy specifical for nanopore images that facilitates segmentation.
- **BigQuery-Geotab Intersection Congestion [Top 3% in Kaggle, 2019]**
  - We predicted the wait times at city intersections through feature engineering, model training and model fusion.

Publications

Conference&Journal:

[1] **Qiran Zou**, Yu Yang, Wing Yin Cheung, Chang Liu, Xiangyang Ji. "ILSGAN: Independent Layer Synthesis for Unsupervised Foreground-Background Segmentation". *Proceedings of the AAAI Conference on Artificial Intelligence* (**AAAI**) 2023. [paper]. (**Oral**).

[2] Yu Yang, Hakan Bilen, **Qiran Zou**, Wing Yin Cheung, Xiangyang Ji. "Learning Foreground-Background Segmentation from Improved Layered GANs". *IEEE/CVF Winter Conference on Applications of Computer Vision* (**WACV**) 2022. [paper].

[3] Chaolun Wang, **Qiran Zou** *(Student First Author)*, Zhiheng Cheng, et al. "Tailoring atomic 1T phase $CrTe_2$ for in situ fabrication". *Nanotechnology,* 2021, 33(8): 085302. (Journal). [paper].

Patents:

[1] Xiangyang Ji, **Qiran Zou** *(Student First Author)*. "A GAN based Independent Layer Generation Method and Device". No. 202210434944.4 (Pending), P.R. China. (Chinese Patent).

[2] Xiangyang Ji, Yu Yang, **Qiran Zou**. "A GAN based Asymmetric Layer Generation Method and Device". No. 202110120086.1 (Pending), P.R. China. (Chinese Patent).

Programming Skills

Python (frameworks: Pytorch; analyzing tools: Matplotlib, seaborn), Git, Matlab, web development, C/C++, Java, SQL