

# SHEN ZHENG

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## PERSONAL STATEMENT

- Experienced in computer vision, with 6 top-venue publications. Currently completing a master's at CMU. Seeking a full-time role starting in Jan. 2024. Expertise includes generative models, image-to-image translation, image restoration, object detection, and unsupervised domain adaptation.

## EDUCATION

### Carnegie Mellon University

Aug. 2022 — Dec. 2023

Master of Science in Computer Vision (MSCV) | GPA: 4.17/4.33

Pittsburgh, PA

- Coursework (A+): Learning-based Image Synthesis, Visual Learning and Recognition, Computer Vision, MSCV Project I.

### Wenzhou-Kean University

Sep. 2017 – Jun. 2021

Bachelor of Arts in Mathematical Sciences | Major GPA: 3.94/4.00 (Rank: 1/29)

Wenzhou, China

- Coursework (A-level): Applied Machine Learning, Big Data Computing, Statistical Data Mining, Numerical Analysis, Data Visualization
- Honors: Dean's List (Top 3%); Zhejiang Provincial Government Scholarship (Top 3%); Outstanding Graduate (Top 10%).

## SKILLS

- Languages:** Python, C++, Java, R, C, Matlab, Shell, SQL, HTML, LaTeX, Markdown
- Frameworks & Tools:** PyTorch, TensorFlow, Keras, MMCV, Docker, Git, ONNX, CUDA, Jupyter, AWS, Ubuntu
- Libraries:** Scikit-Learn, NumPy, OpenCV, SciPy, Pandas, Matplotlib, Seaborn
- DL Models:** CNN, RNN, Transformer, GAN, VAE, MLP, Diffusion

## PROFESSIONAL EXPERIENCES

### Momenta (Autonomous Driving Company)

Sep. 2021 – Feb. 2022

- Worked as a computer vision engineer intern in the perception team responsible for data augmentation, auto-labeling and traffic light detection.
- Implemented CycleGAN for unsupervised data augmentation, transforming traffic lights from left arrow to round and left U-turn arrow.
- Constructed a traffic light auto-label model using quantized VoVNet-57, filtering 14,618 incorrect annotations from 1.16M frames.
- Boosted leftUturn traffic light classification accuracy from 78.41% to 87.27% and elevated mAP from 93.01% to 94.80%.

## RESEARCH EXPERIENCES

### TPSeNCE: Towards Artifact-Free Realistic Rain Generation [\[Github\]](#) [\[Video\]](#)

Dec. 2022 – Mar. 2023

- Introduce a Triangular Probability Similarity (TPS) loss based on GAN discriminator to minimize the artifacts and distortions during rain generation.
- Propose a Semantic Noise Contrastive Estimation (SeNCE) strategy based on patch similarity and semantic similarity to optimize the rain amount.
- Obtained the best performances in rain generation (KID=72.19), rain removal (MUSIQ=61.853), and object detection ( $mAP_{50}=0.526$ ) at BDD100K.

### PointNorm: Dual Normalization is All You Need for Point Cloud Analysis [\[Github\]](#) [\[Slides\]](#)

Jun. 2022 – Aug. 2022

- Introduced PointNorm, a point cloud analysis network leveraging local mean and global standard deviation to boost loss and gradient stability.
- Proposed a plug-and-play DualNorm that normalize sampled and grouped points to each other to optimize the point cloud density.
- Achieved excellent results on shape classification at ScanObjectNN (OA = 86.8%), part segmentation at ShapeNetPart (Inst. mIoU = 86.2%).

### AS-IntroVAE: Adversarial Similarity Distance Makes Robust IntroVAE [\[Github\]](#) [\[Slides\]](#)

Mar. 2022 – May. 2022

- Introduced Adversarial Similarity Distance IntroVAE (AS-IntroVAE) to address posterior collapse and vanishing gradient in image generation.
- Proposed Adversarial Similarity Distance (AS-Distance) using 2-Wasserstein distance, kernel trick, and batch-wise prior matching.
- Delivered promising results on image generation (FID=129.61) and reconstruction (PSNR=23.156) at CelebA with fast convergence (<20 epochs).

### Semantic-Guided Zero-Shot Learning for Low-Light Image/Video Enhancement [\[Github\]](#) [\[Video\]](#)

Apr. 2021 – Jun. 2021

- Proposed a semantic-guided, zero-shot, low-light image enhancement network that consolidates high-level semantics into low-level enhancement.
- Constructed a recurrent image enhancement network that only demands an enhancement factor map with five non-reference loss functions.
- Attained the best UNIQUE/BRISQUE (0.805/27.01) and mIOU/mPA (65.87%/74.50%) with the best inf. time (<0.001s)

### SAPNet: Segmentation-Aware Progressive Network for Perceptual Contrastive Deraining [\[Github\]](#) [\[Video\]](#)

Feb. 2021 – Aug. 2021

- Built a real-time deraining network that integrates supervised rain removal, unsupervised semantic segmentation, and perceptual contrastive loss.
- Designed a progressive dilated unit with channel residual attention and Learned Perceptual Image Similarity to characterize multi-scale rains.
- Obtained the best average PSNR/SSIM (29.46/0.897) at Rain100H, and the best mAP/mPA/mIOU (81.0%/76.6%/60.1%) at CityScape150.

## SELECTED PUBLICATIONS

- Shen Zheng, et al., and Srinivasa Narasimhan (2023), "TPSeNCE: Towards Artifact-Free Realistic Rain Generation". Under Review.
- Shen Zheng, et al. (2023), "Low-light Image and Video Enhancement: A Comprehensive Survey and Beyond". TNNLS (IF=14.26).
- Shen Zheng, et al. (2022), "PointNorm: Dual Normalization is All You Need for Point Cloud Analysis". IJCNN (Oral).
- Shen Zheng and Gaurav Gupta (2022), "Semantic-Guided Zero-Shot Learning for Low-Light Image/Video Enhancement". WACV.
- Shen Zheng, et al. (2022), "SAPNet: Segmentation-Aware Progressive Network for Perceptual Contrastive Deraining". WACV.
- Changjie Lu, Shen Zheng, et al. (2022), "AS-IntroVAE: Adversarial Similarity Distance Makes Robust IntroVAE". ACML.

## ACADEMIC ACTIVITIES

- Reviewer:** CVIP 2021, CVIP 2022, AAAI 2022, WACV 2023, WACV 2024, IJCNN 2023, TNNLS, IJCV.
- Co-instructor,** MATH 3291/3292: "Computer Vision", Wenzhou-Kean University, Summer 2023. [\[Recordings\]](#) [\[Slides\]](#)
- Guest Speaker:** "Image Processing with Machine Learning", Fudan University, Spring 2021. [\[Slides\]](#)
- LeetCode Content Creator:** Created 90+ LeetCode tutorial videos on YouTube, garnering over 10,000 views. [\[Link\]](#)