








# SHEN ZHENG

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## EDUCATION

### Carnegie Mellon University

Aug. 2022 — Dec. 2023

Master of Science in Computer Vision (MSCV)

Pittsburgh, PA

- GPA: 4.17/4.33 | Research Advisor: [Dr. Srinivasa Narasimhan](#)
- Coursework: Learning-based Image Synthesis (A+), Visual Learning and Recognition (A+), MSCV Project I (A+), Computer Vision (A+), Math Fundamentals for Robotics (A), Machine Learning (A-)

### Wenzhou-Kean University

Sep. 2017 – Jun. 2021

Bachelor of Arts in Mathematical Sciences

Wenzhou, China

- Major GPA: 3.944/4.000 (Rank: 1/29) | Research Advisor: [Dr. Gaurav Gupta](#)
- 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

- Programming Languages:** Python, R, Java, HTML, C++, Matlab, Mathematica, Shell, LaTeX, Markdown
- Frameworks & Platforms:** Pytorch, TensorFlow, Keras, Ubuntu, Docker, Git, ONNX, CUDA
- Libraries:** Scikit-Learn, SciPy, NumPy, OpenCV, Matplotlib, Pandas
- Reviewers:** CVIP 2021, CVIP 2022, AAAI 2022, WACV 2023, IJCNN 2023, IEEE TNNLS

## PROFESSIONAL EXPERIENCES

### Momenta (An Autonomous Driving Company)

Sep. 2021 – Feb. 2022

- Responsible for long-tailed data augmentation, training data auto-labeling and cleaning, and model evaluation for traffic light detection algorithms.
- Implemented CycleGAN to conduct unsupervised data augmentation, converting traffic light bulbs from left arrow to round & leftUturn arrow.
- Constructed a traffic light auto-label model using quantized VoVNet-57, filtering 14,618 incorrect annotations from 1,160,513 labeled frames.
- Increased the classification accuracy for leftUturn traffic light from 78.41% to 87.27%, and the mean average precision from 93.01% to 94.80%.

## RESEARCH EXPERIENCES

### TPSeNCE: Towards Artifact-Free Realistic Rain Generation

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 BDD.

### PointNorm: Dual Normalization is All You Need for Point Cloud Analysis

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

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

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

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.

### Deblur-YOLO: Real-Time Object Detection with Efficient Blind Motion Deblurring

Oct. 2020 – Jan. 2021

- Proposed Deblur-YOLO with dilated feature pyramid generator, multi-scale discriminators, and a detection discriminator to remove motion blur.
- Achieved a state-of-the-art inference time of 0.0772s, a mAP of 47.5%, PSNR of 23.94, and SSIM of 0.817 on blurred COCO 2014 dataset.

## SELECTED PUBLICATIONS

- Shen Zheng**, Changjie Lu, 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". Under Review **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**.
- Shen Zheng**, et al. (2021), "Deblur-YOLO: Real-Time Object Detection with Efficient Blind Motion Deblurring", **IJCNN** (Oral).