SHEN ZHENG

5000 Forbes Ave, Pittsburgh, PA 15213

📞 (+1)412-909-6416 ✉️ shenzhen@andrew.cmu.edu in Linkedin 🦡 Personal Webpage ⚙️ Github </> Leetcode G Google Scholar

PERSONAL STATEMENT

- Experienced machine learning engineer with 6 top-venue publications, currently completing a master's at CMU. Seeking a full-time role from Jan. 2024. Expertise includes image restoration, enhancement, translation, 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 BDD.

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**, 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 Revision **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, 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 5,000 views." [Link]