SHEN ZHENG

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EDUCATION

Carnegie Mellon University **Aug. 2024 — May. 2028 (Expected)**
PhD in Robotics *Pittsburgh, PA*

Carnegie Mellon University **Aug. 2022 — Dec. 2023**
Master of Science in Computer Vision (MSCV) | GPA: 4.07/4.33 *Pittsburgh, PA*
- Advisor: Dr. Srinivasa Narasimhan
- Coursework (A+): Learning-based Image Synthesis, Visual Learning and Recognition, Computer Vision, MultiModal Machine Learning.

Wenzhou-Kean University **Sep. 2017 – Jun. 2021**
Bachelor of Arts in Mathematical Sciences | Major GPA: 3.94/4.00 *Wenzhou, China*
- Advisor: Dr. Gaurav Gupta
- Honors: Dean's List (Top 3%); Zhejiang Provincial Government Scholarship (Top 3%); Outstanding Graduate (Top 10%).

PROFESSIONAL EXPERIENCES

Lucid Motors **Feb. 2024 – Jul. 2024**
- Full-time perception software engineer in the ADAS perception team responsible for auto-parking, traffic light detection, and blockage detection.
- Improved BEVFormer for auto-parking (reverse & parallel) by using extrinsic calibration to interpolate and smooth edges to enhance curb detection.
- Trained YOLO6 on traffic light images and finetuned arrow types, confidence, IoU, and area thresholds, improving 42+% mAP for night images.
- Developed a binary segmentation model based on CenterNet to detect blockages (ice, snow, mud, blur, raindrops, sun glares), achieving 93%+ IoU.

SELECTED PUBLICATIONS

- Anurag Ghosh, **Shen Zheng**, et al (2024), *ROADWork Dataset: Learning to Recognize, Observe, Analyze and Drive Through Work Zones*.
- **Shen Zheng**, et al. (2024), *Saliency Guided Image Warping for Unsupervised Domain Adaptation*. **WACV**.
- **Shen Zheng**, et al. (2024), *TPSeNCE: Towards Artifact-Free Realistic Rain Generation for Deraining and Object Detection in Rain*. **WACV**.
- **Shen Zheng**, et al. (2022), *PointNorm: Dual Normalization is All You Need for Point Cloud Analysis*. **IJCNN** (Oral).
- Changjie Lu, **Shen Zheng**, et al. (2022), *AS-IntroVAE: Adversarial Similarity Distance Makes Robust IntroVAE*. **ACML**.
- **Shen Zheng** and Gaurav Gupta (2022), *Semantic-Guided Zero-Shot Learning for Low-Light Image/Video Enhancement*. **WACV**.

RESEARCH EXPERIENCES

ROADWork Dataset: Learning to Recognize, Observe, Analyze and Drive Through Work Zones [Webpage] **Feb. 2024 – May. 2024**
- Proposed ROADWork, the largest open-source work zone dataset, to enhance baseline and foundation models in understanding work zones.
- Achieved +12.8× work zone discovery, +26.2% mAP for object detection, +36.7 SPICE for image captioning, and -21.3% error for path prediction.

Saliency Guided Image Warping for Unsupervised Domain Adaptation [Webpage] **May. 2023 – Jan. 2024**
- Propose an instance-level image warping to oversample objects, enhancing object feature learning amidst dominant and highly varied backgrounds.
- Integrate image warping and feature unwarping into unsupervised domain adaptation in a task-agnostic way without test-time warping.
- Achieved +6.1% mAP50 for BDD100K Clear → DENSE Foggy object detection and +6.3% mIoU for Cityscapes → ACDC semantic segmentation.

TPSeNCE: Towards Artifact-Free Realistic Rain Generation for Deraining and Object Detection in Rain [Webpage] **Dec. 2022 – Apr. 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 results for rain generation (KID=72.19), rain removal (MUSIQ=61.853), and object detection (mAP50=52.6%) on BDD100K.

PointNorm: Dual Normalization is All You Need for Point Cloud Analysis [Webpage] **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 superior 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 [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 superb 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 [Webpage] **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 state-of-the-art UNIQUE/BRISQUE (0.805/27.01), mIOU/mPA (65.87%/74.50%) and inference time (0.001s).

ACADEMIC ACTIVITIES

- **Reviewer**: AAAI 2022, IJCNN 2023, ECCV 2024, WACV (2023-2025), TNNLS, IJCV.
- **Co-Instructor**, MATH 3291/3292: *Computer Vision*, Wenzhou-Kean University, Summer 2023 [Slides] [Recordings] .
- **Guest Speaker**: *Image Processing with Machine Learning*, Fudan University, Spring 2021 [Slides].
- **LeetCode Content Creator**: Created 90+ LeetCode tutorial videos on YouTube, garnering over 20,000 views [Link].

SKILLS

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