SHEN ZHENG

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EDUCATION

Wenzhou-Kean University **Sep 2017 – Jun 2021**
B.A. in Mathematical Science, Minor in Economics *Wenzhou, China*

- Major GPA: 3.944/4.000 (Top 1%) | Overall GPA: 3.800/4.000 (Top 5%)
- Relevant Coursework: Applied Machine Learning, Computer Organization & Programming, Big Data Computing, Statistical Data Mining, Foundation of Data Analysis, Data Visualization, Numerical Analysis, Differential Equations, Probability & Statistics, Econometrics, etc.
- Honors: Dean's List (Top 1%), Zhejiang Provincial Government Scholarship (Top 3%), Outstanding Graduate (Top 10%), Magna Cum Laude.

PUBLICATIONS

1. **Shen Zheng** and Gaurav Gupta (2022), "Semantic-Guided Zero-Shot Learning for Low-Light Image/Video Enhancement". Accepted by the IEEE/CVF Winter Conference on Applications of Computer Vision **(WACV)**. IEEE. [arxiv link]
2. **Shen Zheng**, Changjie Lu, Yuxiong Wu, and Gaurav Gupta (2022), "SAPNet: Segmentation-Aware Progressive Network for Perceptual Contrastive Deraining". Accepted by the IEEE/CVF Winter Conference on Applications of Computer Vision **(WACV)**. IEEE. [arxiv link]
3. **Shen Zheng**, Yuxiong Wu, Shiyu Jiang, Changjie Lu, and Gaurav Gupta (2021), "Deblur-YOLO: Real-Time Object Detection with Efficient Blind Motion Deblurring", International Joint Conference on Neural Networks (**IJCNN**). IEEE.
4. **Shen Zheng**, Liwei Wang, and Gaurav Gupta (2020), "Efficient Ensemble Sparse Convolutional Neural Networks with Dynamic Batch Size", International Conference on Computer Vision and Image Processing (**CVIP**). Springer.

RESEARCH EXPERIENCE

Implicit Neural Representation for Isosurface Rendering **Jul 2021 – Sep 2021**
Team Member | Advisor: Dr. Chaoli Wang. University of Notre Dame *Notre Dame, USA*

- Selected as one of the only 15 students from China to participate in the iSURE research program hosted by the University of Notre Dame in 2021.
- Constructed a fully convolutional neural network with Siren activation function to render isosurfaces with image resolution, viewpoints and isovalue.
- Leveraged Greene's bisection method and Jacobian matrix's eigenvalue for critical point detection and classification in the simulated 3D isosurface.

Semantic-Guided Zero-Shot Learning for Low-Light Image/Video Enhancement **Apr 2021 – June 2021**
Team Leader | Advisor: Dr. Gaurav Gupta. Wenzhou-Kean University *Wenzhou, China*

- 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 average UNIQUE/BRISQUE (0.805/27.01) and mIOU/mPA (65.87%/74.50%) for six datasets with the best inf. time (<0.001s)

SAPNet: Segmentation-Aware Progressive Network for Perceptual Contrastive Deraining **Feb 2021 – Aug 2021**
Team Leader | Advisor: Dr. Gaurav Gupta. Wenzhou-Kean University *Wenzhou, China*

- Built a semi-supervised 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 (33.19/0.945) at Rain12, Rain100L, and Rain100H and the best mAP/mPA/mIOU (81.0%/76.6%/60.1%).

Deblur-YOLO: Real-Time Object Detection with Efficient Blind Motion Deblurring **Oct 2020 – Jan 2021**
Team Leader | Advisor: Dr. Gaurav Gupta. Wenzhou-Kean University *Wenzhou, China*

- Invented Deblur-YOLO, a Generative Adversarial Network (GAN) with a dilated feature pyramid generator, a pair of multi-scale discriminators, and a YOLO discriminator performing real-time object detection with fast blind motion blur removal.
- Achieved a state-of-the-art inference time of 0.0772s, mAP of 47.5%, PSNR of 23.94, and SSIM of 0.817 at the blurred COCO 2014 dataset.

Efficient Ensemble Sparse Convolutional Neural Networks with Dynamic Batch Size **Mar 2020 – Jun 2020**
Team Leader | Advisor: Dr. Gaurav Gupta. Wenzhou-Kean University *Wenzhou, China*

- Integrated weighted average stacking, network pruning, Winograd-ReLU convolution for AlexNet, VGG-16, and ResNet-32.
- Developed an Electromagnetism-inspired dynamic batch size algorithm for accumulating the learning rate, momentum coefficient, and batch size.
- Accelerated CNNs on FASHION-MNIST, CIFAR-10, and CIFAR-100 to 1.55x, 2.86x, and 4.15x with 2.66%, 1.37%, and 4.48% acc. improvement.

PROFESSIONAL EXPERIENCE

Momenta (An Autonomous Driving Company) **Sep 2021 – Present**
Computer Vision Engineer | Mentor: Mr. Yongjun Yu & Dr. Wangjiang Zhu *Suzhou, China*

- Responsible for the long-tailed class imbalance problem of traffic light detection algorithms in L4 autonomous driving.
- Implementation of CycleGAN to conduct unsupervised data augmentation, converting traffic light bulbs from left arrow to leftUturn arrow.
- Utilized OpenCV and mmcv to categorize and crop traffic lights bulbs from 350357 frames according to color, pattern and lighting conditions.
- 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%.

China Life Insurance Company **Jul 2019**
Sales Analyst Intern | Mentor: Mr. Yifeng He *Hangzhou, China*

- Applied K-means clustering to group text data as three significant categories to highlight 20,000+ unannounced expired insurance from 7 cities.
- Employed t-test and Adjusted R Squared to assist the sales manager deciding the bonus percentage for consecutive monthly sales as 6.00 %.

MISCELLANEOUS

Online Courses: Machine Learning (Coursera), Deep Learning (Coursera), Convolutional Neural Networks for Visual Recognition (Stanford), Natural Language Processing with Deep Learning (Stanford), Computer Graphics in the Era of AI (Stanford), Convex Optimization I (Stanford)
Programming Languages: Python, R, Java, C++, Matlab, Mathematica, SQL, Julia, Go, Shell, LaTeX, Markdown
Frameworks & Platforms: Pytorch, TensorFlow, Keras, OpenCV, Matplotlib, Ubuntu, Git, CUDA, Docker
Reviewer: AAAI 2022, CVIP 2021