QIAN GE

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EDUCATION

North Carolina State University, Raleigh, NC   *Jan 2019 (expected)*
Ph.D. in Electrical Engineering   GPA: 4.0/4.0
Advisor: Dr. Edgar Lobaton

University of Electronic Science and Technology of China, Chengdu, P.R. China   *Jun. 2011*
M.S. in Electrical Engineering   GPA: 3.69/4.0

University of Electronic Science and Technology of China, Chengdu, P.R. China   *Jul. 2008*
B.S. in Electrical Engineering   GPA: 3.76/4.0

AREAS OF EXPERTISE

Computer Vision, Image Segmentation, Classification, Object Detection, Convolutional Neural Networks, Recurrent Neural Networks, Generative Adversarial Networks, Visual Attention Models

SKILLS

Computer Languages	Python, MATLAB, C/C++
Framework/Tools	TensorFlow, OpenCV, Git, MySQL

WORK EXPERIENCE

Research Aid Intern, Argonne National Laboratory, Lemont, IL   Jan 2018 – May 2018

- Cleaned and aligned raw data from multiple resources including historical load demands, climate data and weekdays.
- Designed a next day hourly load demand forecasting algorithm using a Sequence-to-Sequence model with Long Short-Term Memory (LSTM) units and Gated Recurrent Units (GRU), and developed a feature attention mechanism to improve the efficiency of feature learning.
- Achieved better or comparable performance to state-of-the-art load demand forecasting models on three public dataset while required less effort in model design and feature engineering.

SELECTED PROJECTS (Python + TensorFlow code can be accessed in GitHub repository [name])

Generative Adversarial Networks (GANs)   [tf-gans] [adversarial-autoencoders-tf] [pix2pix-tf]

- Implemented DCGAN, LSGAN and InfoGAN, and experimented on MNIST and CelebA face dataset.
- Implemented the adversarial autoencoders for variational inference and semi-supervised learning.
- Implemented and trained the pix2pix conditional GAN for edge-to-photo and map-to-photo translation.

Visualization of Convolutional Neural Networks (CNNs)   [CNN-Visualization]

- Visualized CNN features using transposed convolutional networks and the guided back propagation.
- Implemented and visualized attentions of pre-trained VGG using the Gradient-weighted Class Activation Mapping and the Class Activation Mapping.

Image Classification   [recurrent-attention-model-tf] [GoogLeNet-Inception-tf] [VGG-cifar-tf]

- Implemented the recurrent visual attention model for image recognition (97.82% on translated MNIST).
- Implemented and trained a modified Inception network and a fully convolutional VGG network for image classification (93.64% and 91.81% on CIFAR-10).

Image Translation   [neural-style-tf] [fast-style-transfer-tf]

- Implemented the neural style transfer and fast style transfer for image style transfer.

RESEARCH EXPERIENCE

A Visual System for Autonomous Foraminifera (forams) Identification
- Developed a coarse-to-fine fully convolutional edge detection network to find edges between forams chambers of similar texture in blurred and low quality images by using several edge detection models iteratively (achieved 88% edge accuracy with a small training set of 100 labeled edge images).
- Designed a topological based metric for hard negative mining to improve the efficiency of training and reduce gaps on detected edges (improved edge-based region segmentation recall from 84% to 88%).
- Leaded the creation of a forams image dataset which contains 1437 forams samples and 457 manually segmentation samples. And generated synthetic images refined by GANs for data augmentation.

Robust Traffic Scenes Obstacle Detection and Image Segmentation [Presentation]
- Developed a persistent homology based segmentation framework which is robust to image conditions and parameter selection.
- Designed a pipeline of outdoor scene obstacle detection based on this framework through extracting persistence regions in occupancy grids computed from disparity maps, which is able to correctly segment obstacles from input images of various quality in KITTI dataset.
- Designed a pipeline of consensus-based image segmentation based on this framework to robustly extract consensus information from segmentation results generated by varying parameters of different segmentation algorithms. The consensus segmentation achieved better performance over a wide parameter range than all the input algorithms with their best parameters on Berkeley Segmentation Database.

Non-Rigid Image Registration with Uncertainty Analysis [Presentation][Poster]
- Developed a topological-based correspondence point matching algorithm under a Lipschitz non-rigid deformation with zero false negative rate and high precision. Then extended the point matching to region registration by solving a graph matching problem with geometric constraints.
- Developed an approach to quantify the uncertainty of the region registration for iterative refinement.

Exploring Victorian Newspapers through Computer Vision Techniques [Project Page]
- Created a Victorian newspaper illustration dataset by extracting illustration regions from scanned newspaper pages with high accuracy.
- Designed a Fourier transform based feature to distinguish line engravings and halftone images to help track the historical progress of halftone techniques applied in nineteenth-century British newspapers.

SELECTED PUBLICATIONS

1. **Q. Ge**, DB. Zhao, JH. Wang, "Short-Term Load Demand Forecasting through Rich Features using Recurrent Neural Networks" *(Preparation)*

2. **Q. Ge**, E. Lobaton, "Obstacle Detection in Outdoor Scenes based on Multi-Valued Stereo Disparity Maps" *IEEE Symp. Series Comput. Intell.,* Dec., 2017

3. **Q. Ge**, B. Zhong, B. Kanakiya, R. Mitra, T. Marchitto, E. Lobaton, "Coarse-to-Fine Foraminifera Image Segmentation through 3D and Deep Features" *IEEE Symp. Series Comput. Intell.,* Dec., 2017

4. B. Zhong, **Q. Ge**, B. Kanakiya, R. Mitra, T. Marchitto, E. Lobaton, "A Comparative Study of Image Classification Algorithms for Foraminifera Identification" *IEEE Symp. Series Comput. Intell.,* Dec., 2017

5. **Q. Ge**, E. Lobaton, "Consensus-Based Image Segmentation via Topological Persistence" *IEEE Conf. on Comput. Vis. Pattern Recognit. Workshops (CVPRW),* July, 2016

6. CP. Wei, **Q. Ge**, S. Chattopadhyay, E. Lobaton, "Robust Obstacle Segmentation based on Topological Persistence in Outdoor Traffic Scenes" *IEEE Symp. Series Comput. Intell.,* Dec., 2014

7. **Q. Ge**, N. Lokare, E. Lobaton, "Non-Rigid Image Registration under Non-Deterministic Deformation Bounds" *10th International Symposium on Medical Information Processing and Analysis,* Oct., 2014