

QIAN GE

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EDUCATION

North Carolina State University

Ph.D. in Electrical Engineering. GPA: 4.0/4.0

Raleigh, NC, USA

May 2019 (*expected*)

University of Electronic Science and Technology of China

M.S. in Electrical Engineering. GPA: 3.69/4.0

B.S. in Electrical Engineering. GPA: 3.76/4.0

Chengdu, P.R. China

Jun. 2011

Jul. 2008

SKILLS

Computer Languages

Python, MATLAB, C/C++

Framework/Tools

TensorFlow, Keras, Numpy, Pandas, Sklearn, OpenCV, Git

Professional

Computer Vision, Image Segmentation and Classification, Object Detection
Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs),
Generative Adversarial Networks (GANs), Visual Attention Models

WORK EXPERIENCE

Research Aid Intern, Argonne National Laboratory, Lemont, IL, USA

Jan 2018 – May 2018

- **Load Forecasting.** Developed a Sequence-to-Sequence-based model with LSTM/GRU for load demand forecasting. Achieved better or competitive performance with state-of-the-art load forecasting models on three public dataset.
- **Model interpretability.** Designed a rich feature learning procedure to improve the performance by 4% in root mean square error and provide better interpretation of the prediction results.

SELECTED OPEN SOURCE PROJECTS (Click [\[name\]](#) to access *Python + TensorFlow* code.)

YOLOv3 for Object Detection

[\[yolov3\]](#)

- Designed and implemented an object detection pipeline using YOLOv3 for both inference and training.
- Provided customized training blocks, including bounding box clustering, data augmentation and multi-scale training.
- Trained on PASCAL VOC object detection dataset for 20 object class detection on natural images.

Person Re-Identification with Triplet Loss

[\[triplet-loss\]](#)

- Designed and implemented a person re-identification pipeline through metric learning using triplet loss with batch hard mining training strategy.
- Improved the performance by 10% in mAP by using re-ranking approach during person image retrieval.

Attention-based Image Classification

[\[recurrent-attention-model\]](#)

- Implemented a RNN-CNN-based recurrent visual attention model for image classification which reduces computational complexity by only paying attention to a sequence of small regions of the image.
- Trained the model with a reinforcement learning approach.
- Provided interpretation of the classification results by visualizing the attention regions during inference.

Interpretation of Trained CNN Models through Visualization

[\[CNN-Visualization\]](#)

- Provided interpretation of trained CNN models by visualizing the learned features and the image regions where the models focus on.
- Implemented transposed convolutional network and guided back propagation for feature visualization.
- Implemented class activation mapping and gradient-weighted class activation mapping for attention visualization.

Human Face Generation using GANs

[\[tf-gans\]](#)

- Designed and implemented a synthetic image generation pipeline using DCGAN, LSGAN and InfoGAN.
- Generated face images with controlled context, such as emotion, hairstyle and azimuth, using InfoGAN.

Image Classification with VGG and Inception

[\[VGG-cifar\]](#)[\[GoogLeNet-Inception\]](#)

- Implemented VGG and Inceptionv1 image classification for training, inference and feature extraction.
- Modified VGG to a fully convolutional network to accept arbitrary size of input images during inference.
- Designed a modified Inception network for training on low resolution dataset from scratch (achieved 93.64% accuracy on CIFAR-10 testing set).

SELECTED RESEARCH EXPERIENCE

Visual System for Foraminifera (Forams) Species Identification (*Python, C++*) [\[Project Page\]](#)

- **Data Collection.** Led the creation of a forams dataset containing 1437 samples and 457 manually segmentation samples. Created synthetic images refined by GANs for data augmentation.
- **Image Classification.** Designed a transfer learning pipeline for identification of six forams species using features extracted using pre-trained VGG, Inception and ResNet.
- **CNN Edge Detection.** Developed a coarse-to-fine CNN-based edge detection network. Achieved 0.91 edge F1 score on the forams dataset for finding vague edges between forams chambers.
- **Topology-Aware Edge Detection.** Developed a topology-aware edge detection network which focuses on preserving topological structures of edges. Improved edge F1 score from 0.91 to 0.93

Robust Obstacle Detection and Image Segmentation (*MATLAB*)

[\[Presentation\]](#)

- **Robust Segmentation Framework.** Proposed a persistent homology based image segmentation framework which is insensitive to image qualities and parameter selection.
- **Obstacle Detection.** Designed a robust traffic scene obstacle detection pipeline for autonomous driving to extract obstacles from stereo images. Demonstrated that the detections are robust to input image quality through experiments on KITTI dataset.
- **Image Segmentation.** Designed a consensus-based image segmentation to extract consensus information from a segmentation set generated by different segmentation algorithms. Achieved better performance over a wide range of parameters than any input algorithm on Berkeley Segmentation Database.

Nineteenth-Century Newspaper Analytics (*Python*)

[\[Project Page\]](#)

- **Dataset Creation.** Created a Victorian newspaper illustration dataset by extracting illustration regions from scanned newspaper pages with high accuracy.
- **Halftone Image Detection.** Developed a Fourier transform based feature to distinguish line engravings and halftone images for tracking the presence of halftone images in late nineteenth-century British newspapers.
- **Scene Extraction.** Designed a pipeline to extract specific scenes such as portraits, crowds, buildings and weather charts using k-means and KNN based on GIST descriptor.

SELECTED PUBLICATIONS

1. **Q. Ge**, DB. Zhao “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