QIAN GE

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EDUCATION

North Carolina State University Raleigh, NC, USA
Ph.D. in Electrical Engineering. GPA: 4.0/4.0 *Aug. 2019*

University of Electronic Science and Technology of China Chengdu, P.R. China
M.S. in Electrical Engineering. GPA: 3.69/4.0 *Jun. 2011*
B.S. in Electrical Engineering. GPA: 3.76/4.0 *Jul. 2008*

SKILLS

Computer Languages	Python, MATLAB, C/C++
Framework/Tools	TensorFlow, Keras, Numpy, Pandas, Sklearn, OpenCV, Git, CMake, Linux
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 Scientist, Meta Platforms, Inc., Menlo Park, CA, USA *Jan 2020 – Present*

- **Content Level Classification.** Develop and productionize machine learning algorithms to classify integrity issue contents in Facebook APP.
- **Personalized Recommendation.** Develop and productionize personalized machine learning algorithms to reduce user bad experience causing by integrity contents in Facebook APP.

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. Implemented with Python (Pandas, TensorFlow) and 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 RESEARCH EXPERIENCE

Visual System for Foraminifera (Forams) Species Identification [Project Page]
Python (TensorFlow), C++ *Apr. 2016 – Nov. 2019*

- **Data Collection.** Leaded 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 for Autonomous Car [Presentation]
MATLAB, C++ (OpenCV) *Jan. 2014 – May. 2016*

- **Data Collection.** Calibrated stereo cameras and collected road scene stereo-pair images. Computed disparity maps using Semi-Global Block Matching method.
- **Obstacle Detection.** Designed a robust traffic scene obstacle detection pipeline for autonomous driving to extract obstacles from stereo images. Demonstrated that the detections were insensitive 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 [Project Page]

Python, MATLAB *Feb. 2016 – Dec. 2016*

- **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 extracted specific scenes such as portraits, crowds, buildings and weather charts using k-means and KNN based on GIST descriptor.

SELECTED OPEN SOURCE PROJECTS

Python+TensorFlow code available on GitHub *Aug. 2017 – Oct. 2019*

YOLOv3 for Object Detection [yolov3]

- Designed and implemented an object detection pipeline using YOLOv3 for both detection 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 appoarch.
- 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 class activation mapping and gradient-weighted class activation mapping for attention visualization.

Image Classification with VGG and Inception [VGG-cifar][GoogLeNet-Inception]

- Implemented VGG and Inceptionv1 image classification for training, inference and feature extraction.
- Designed a modified Inception network for training on low resolution dataset from scratch (achieved 93.64% accuracy on CIFAR-10 testing set).

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.

SELECTED PUBLICATIONS

1. DB. Zhao, **Q. Ge**, Y. Tian, J Cui, B Xie, T Hong "Shortterm load demand forecasting through rich features based on recurrent neural networks" *IET Generation, Transmission Distribution* Mar., 2021
2. **Q. Ge**, T. Richmond, B. Zhong, TM. Marchitto, E. Lobaton, "Enhancing the morphological segmentation of microscopic fossils through Localized Topology-Aware Edge Detection" *IET Generation, Transmission Distribution* Nov., 2021
3. **Q. Ge**, "Robust Image Segmentation: Applications to Autonomous Car and Foraminifera Morphology Identification" *Ph.D. Dissertation* 2019
4. R. Mitra, TM. Marchitto, **Q. Ge**, B. Zhong, B. Kanakiya,..., E. Lobaton, "Automated species-level identification of planktic foraminifera using convolutional neural networks, with comparison to human performance" *Marine Micropaleontology,* Mar., 2019

5. P. Fyfe, **Q. Ge** "Image analytics and the Nineteenth-Century Illustrated Newspaper" *Journal of Cultural Analytics,* Oct., 2018
6. **Q. Ge**, E. Lobaton, "Obstacle Detection in Outdoor Scenes based on Multi-Valued Stereo Disparity Maps" *IEEE Symp. Series Comput. Intell.,* Dec., 2017
7. **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
8. 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
9. T. Marchitto, R. Mitra, B. Zhong, **Q. Ge**, B. Kanakiya, E. Lobaton, "Automated species-level identification and segmentation of planktonic foraminifera using convolutional neural networks" *AGU Fall Meeting Abstracts,* 2017
10. **Q. Ge**, E. Lobaton, "Consensus-Based Image Segmentation via Topological Persistence" *IEEE Conf. on Comput. Vis. Pattern Recognit. Workshops (CVPRW),* July, 2016
11. S. Chattopadhyay, **Q. Ge**, CP. Wei, E. Lobaton, *Robust Multi-Target Tracking in Outdoor Traffic Scenarios via Persistence Topology based Robust Motion Segmentation* IEEE Global Conf. Signal Inf. Process. Dec., 2015
12. 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
13. N. Lokare, **Q. Ge**, W. Snyder, Z. Jewell, S. Allibhai, E. Lobaton Manifold Learning Approach to Curve Identification with Applications to Footprint Segmentation IEEE Symp. Series Comput. Intell. Dec., 2014
14. **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