

# Shijie Geng

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RESEARCH INTERESTS	Computer Vision, Deep Learning, and Machine Learning	
EDUCATION	<b>Rutgers University</b> , New Brunswick, New Jersey, USA Ph.D. Student, Computer Science Advisor: Prof. Dimitris Metaxas	2017 - Now
	<b>Shanghai Jiao Tong University</b> , Shanghai, China M.S., Control Science and Engineering	2013 - 2016
	<b>Xi'an Jiaotong University</b> , Xi'an, China B.E., Electrical Engineering	2009 - 2013
PUBLICATIONS	Z. Tang, X. Peng, <b>S. Geng</b> , S. Zhang, L. Wu, D. Metaxas, “Quantized Densely Connected U-Nets for Efficient Landmark Localization”, ECCV 2018.  Z. Tang, X. Peng, <b>S. Geng</b> , Y. Zhu, D. Metaxas, “CU-Net: Coupled U-Nets”, BMVC 2018, Oral Presentation.  Z. Fu, <b>S. Geng</b> , Y. Ge, Y. Wang, G. de Melo, “Cross-Lingual Sentence Representations with Limited Parallel Data”, submitted to AAAI 2019.  <b>S. Geng</b> , S. Jia, Y. Qiao, “Combining Multiple Instance Learning and Conditional Adversarial Networks for Hotspot Segmentation in Bone Scintigraphy”, submitted to IEEE Transactions on Medical Imaging (Under Review).  Z. Cui, Q. Zhang, <b>S. Geng</b> , X. Niu, J. Yang, Y. Qiao, “Semantic Segmentation with Multi-path Refinement and Pyramid Pooling Dilated-ResNet”, the 24th IEEE International Conference on Image Processing (ICIP 2017), Oral Presentation.  X. Niu, Z. Cui, <b>S. Geng</b> , J. Yang, Y. Qiao, “Robust Visual Tracking via Occlusion Detection Based on Depth-layer Information”, the 24th International Conference on Neural Information Processing (ICONIP 2017), Oral Presentation.  Q. Zhang, Z. Cui, X. Niu, <b>S. Geng</b> , Y. Qiao, “Image Segmentation with Pyramid Dilated Convolution based on ResNet and U-Net”, the 24th International Conference on Neural Information Processing (ICONIP 2017), Oral Presentation.  S. Jia, <b>S. Geng</b> , and Y. Qiao, “Adaptive Location and Size for Saliency Detection”, submitted to Pattern Recognition (Under Review).  <b>S. Geng</b> , J. Ma, X. Niu, S. Jia, Y. Qiao, and J. Yang, “A MIL-Based Interactive Approach for Hotspot Segmentation from Bone Scintigraphy”, the 41st IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP 2016).	

ACADEMIC  
EXPERIENCE

**S. Geng**, S. Jia, Y., J. Yang, and Z. Jia, “Combining CNN and MIL to Assist Hotspot Segmentation in Bone Scintigraphy”, the 22nd International Conference on Neural Information Processing (ICONIP 2015), Oral Presentation.

S. Jia, **S. Geng**, Y. Gu, J. Yang, P. Shi, and Y. Qiao, “NSLIC: SLIC Superpixels based on Non-stationarity Measure”, the 22nd IEEE International Conference on Image Processing (ICIP 2015), Oral Presentation.

**Quantized Neural Network for Efficient Visual Landmark Localization**

*Rutgers University*

Dec.2017 - Mar.2018

- Propose an efficient densely connected U-Nets for visual landmark localization: utilize order-K dense connectivity to trim off unnecessary shortcuts; use a memory-efficient implementation to significantly boost the training efficiency; finally, investigate an iterative refinement that may slice the model size in half.
- The results show that the proposed model achieves state-of-the-art localization accuracy, but using at least 70% less parameters compared with other benchmark localizers.
- To further improve memory efficiency and reduce model size of landmark localization while maintain a similar performance, low bit-width integer quantization is applied to our model for both training and inference stages.

**Multilingual Sentence Embedding**

*Rutgers University*

Nov.2017 - Now

- Set up a baseline for cross-lingual sentence representations using aligned word embeddings.
- Utilized generative adversarial network (GAN) to simultaneously train bidirectional models for cross-lingual sentence embeddings based on limited parallel corpora.
- Make use of the mismatch pairs that are almost for sure false pairs to improve the robustness of GAN performance. These mismatch pairs can be sampled from any non-parallel corpora which are available.

**Robust Visual Tracking via Occlusion Detection**

*Shanghai Jiao Tong University*

Jan.2017 - Jun.2017

- Propose an occlusion detection algorithm based on depth-layer clue which exploits both temporal and spatial context information to discriminate occlusion from target appearance.
- Design a template updating strategy based on the location and response map information from the target and background patches, which can prevent the target template from false updating in case of occlusion and ensure robust visual tracking.

**Semantic Segmentation for Natural and Medical Images**

*Shanghai Jiao Tong University*

Oct.2016 - Jun.2017

- Propose a segmentation framework based on ResNet-101 with cascaded dilated residual unit, which combines multiple resolution of feature maps from intermediate layers to refine the output precision.
- Adopt pyramid pooling to gather global and local information, then utilize multi-path refinement to reach high-resolution prediction.
- Propose an end-to-end segmentation architecture named Pyramid Dilated Res-U-Net, which could effectively combine the features from shallow and deep layers through multi-path information fusion.
- Experiment shows that the proposed method can successfully extract features for and apply to medical image segmentation.

## **Computer-Aided Diagnosis and Medical Image Segmentation**

*Shanghai Jiao Tong University*

Oct.2014 - Jun.2017

- Propose a lesion detection and automatic segmentation method for bone scintigraphy based on convolutional sparse auto-encoder and multiple instance learning to improve lesion segmentation accuracy.
- Propose an interactive lesion segmentation algorithm for bone scintigraphy based on belief propagation and multiple instance learning, allowing physicians to acquire quantitative information conveniently and precisely.
- Utilize conditional adversarial networks to offer region features, thus further increase the segmentation accuracy of hotspots.

## **Super-pixel Segmentation and Saliency Detection**

*Shanghai Jiao Tong University*

Nov.2014 - Apr.2016

- Collaboratively proposed nSLIC, a super-pixel segmentation algorithm based on non-stationarity measure, which both increased the accuracy and efficiency of super-pixel segmentation.
- Adopted affinity propagation method to cluster the salient points for multiple salient objects location, which improves the quality of saliency map.

## **Dense Layered Steel Plates Separation and Counting**

*Shanghai Jiao Tong University*

Apr.2015 - Mar.2016

- Designed a steel plate counting algorithm based on semi-supervised learning, non-stationarity measure, Leung-Malik filter bank and dynamic programming.
- Applied to industrial fields to ease the burden of manual counting, with a counting error rate less than 2%.
- Submitted a patent application to State Intellectual Property Office of P.R. China.

### **PROFESSIONAL ACTIVITIES**

#### **Journal Reviewer:**

Image and Vision Computing (Elsevier)

2017

#### **Conference Reviewer:**

IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2018

European Conference on Computer Vision (ECCV) 2018

### **COMPUTER SKILLS**

- Languages: Python, C/C++, MATLAB, MySQL, Java, JavaScript
- Packages: PyTorch, Tensorflow, OpenCV, Keras, Theano, OpenGL, L<sup>A</sup>T<sub>E</sub>X
- System: Linux, GPU Cluster, Hadoop DFS

### **HONORS AND AWARDS**

Second-class Scholarship of Shanghai Jiao Tong University 2014

Second Prize in National Postgraduate Mathematical Modeling Contest of China 2014

Top 100 in Alibaba Big Data Competition (< 1%) 2014

Excellent Student of Xi'an Jiaotong University 2011

Siyuan Scholarship of Xian Jiaotong University 2010, 2011, 2012