

YUTING (SOPHIA) WANG

Carnegie Mellon University, Language Technologies Institute, Pittsburgh, PA, 15213, USA +1 412-478-6366
wyt811stuha@gmail.com utdyc@student.kit.edu <https://yutingsophiawang.github.io/website/>

EDUCATION

- Carnegie Mellon University** Pittsburgh, USA
Exchange M.S., Language Technologies Institute, School of Computer Science August 2016 – Present
• InterACT Program: Exchange program between KIT and CMU for Master's thesis project (**Top 1%**).
• Advisors: Professor Florian Metze at CMU, Professor Alexander Waibel at KIT.
• Master's Thesis: Modular Deep Neural Networks (mDNN) with Improved Bottleneck Features and Residual Learning for Speech Recognition.
- Karlsruhe Institute of Technology** Karlsruhe, Germany
M.S. Candidate, Informatics (Computer Science) October 2014 – Present
• Grad: **2.2/1.0** (1.0 (Very Good) – 5.0 (Failed)).
• Advisors: Professor Alexander Waibel at KIT, Professor Florian Metze at CMU.
• Research Interests: Cognitive System, Speech Recognition, Computer Vision, Human-Computer Interaction, Machine Learning, Data Mining, Deep Learning.
- University of Duisburg-Essen** Duisburg, Germany
B.S., summa cum laude, Electrical and Electronic Engineering October 2010 – July 2014
• Grad: **1.4 (Very Good)**/1.0 (1.0 (Very Good) – 5.0 (Failed)).
• **50% Courses 1.0, 70% Courses 1.0–2.0.**
• Bilingual Education: first-year courses in English and the remaining courses in German.
• Bachelor Thesis: LO Signal Generation Circuit for Power Amplitude in a 7 Tesla MRI System.
• Advisor: Professor Klaus Solbach.
- China University of Mining and Technology** Xuzhou, China
B.S., Electrical and Electronic Engineering September 2008 – July 2010
• GPA: **90.1/100**. Department Rank: **9/636**.

RELATED COURSES

- Machine Learning & Cognitive Systems**
- Cognitive Systems, Neural Networks, Pattern Recognition
 - Stochastic Plan, Fundamentals of Automatic Speech Recognition
 - Topics in Deep Learning (audit, CMU)
 - Introduction to Information Fusion
 - Robotics I & III, Machine Learning I & II
- Information System & Data Mining**
- Big Data Analytics, Data Mining Project: Big Data Analytics
 - Mechanisms and Applications of Workflow Systems
 - Computer Structures, Formal Systems
 - Deployment of Database Systems
- Operation Research**
- Nonlinear Optimization I & II, Markov Decision Models I & II

RESEARCH EXPERIENCE

- Modular Deep Neural Networks (mDNN) with Improved Bottleneck Features and Residual Learning for Speech Recognition**
- Interactive Systems Lab, Institute of Anthropometrics and Robotics** Karlsruhe, Germany & Pittsburgh, USA
Master's Thesis Supervised by Florian Metze (CMU) & Professor Alexander Waibel (KIT) August 2016 – Present
- Developing a speech recognition system based on modular DNN for acoustic models (mDNN-AM), which consists of a bottleneck features (BNF) module as features and a DNN module as classifiers.
 - Evaluating the speech recognition system on the large-scale IWSLT 2014 benchmark.
 - Developed a modified BNF module, which reduces both temporal and spectral variations widely existing in speech signals.
 - Combined 9 frequency-shift-invariant windows with the IMEL features as inputs to the BNF module.
 - Reduced **5%** word error rate (WER) compared with the baseline mDNN-AM.
 - Developed a modified DNN module by using a residual learning framework to facilitate the training of the network with increased depth and achieve much lower WER.
 - Introduced skip connections between certain DNN hidden layers.
 - Evaluated variants of skip connection structures and reduced **3%** WER.
 - Proposed additional modifications for further variation reduction and performance improvement.
 - Introduced a second BNF module to reduce the dimension of the stacked BNF layers and decrease WER.
 - Replaced the modified BNF with a time delay/convolutional layer to evaluate the function of shift windows.

Multilingual Bottleneck Features for Language Recognition

- Institute of Anthropometrics and Robotics** Karlsruhe, Germany
Seminar Project Supervised by Professor Alexander Waibel October 2015 – May 2016

- Surveyed the research on multilingual bottleneck features for language recognition, including architectures, properties, optimization and variants, especially focusing on their generalization and applicability to different data statistics.
- Implemented different neural network architectures, such as combining a cascade of two stacked bottleneck neural networks with a multilingual bottleneck neural network.
- Evaluated and compared these networks on several benchmark datasets, such as NIST LRE 2009 and OGI multilingual, and determined which architecture was most suitable for the relevant dataset.

Deep Convolutional Neural Networks for Roadwork and Crosswalk Recognition in Traffic Scenes

Humanoids and Intelligence System Lab, Institute of Anthropometrics and Robotics & FZI Research Center for Information Technology

Karlsruhe, Germany
April 2015 – September 2015

Capstone Project Supervised by Professor J. Marius Zoellner

- Developed recognition systems that detected roadworks and crosswalks using deep convolutional neural networks (CNNs) to facilitate self-driving cars.
- Implemented the systems by combining off-the-shelf CNN features (including ImageNet-CNN, Places-CNN and Hybrid-CNN) and different classifiers (such as SVM and logistic regression), which achieved **85%** recognition accuracy and significantly outperformed those using handcrafted features (such as HOG and LBP).
- Fine-tuned the CNNs on the target datasets (the FZI and SUN benchmarks), which significantly improved the recognition performance by **10%**. Further introduced a multi-stage training procedure by first fine-tuning on a large-scale auxiliary dataset then fine-tuning on the small-scale target dataset, leading to a more robust classifier.
- Performed an ablation study, and visualized features using the deconvolutional networks to compare the features learned by both pre-trained and fine-tuned CNNs.

Big Data Analytics

Institute of Program Structures and Data Organization

Karlsruhe, Germany

Data Mining Cup Competition Supervised by Professor Klemens Boehm

April 2015 – June 2015

- Developed a model that effectively predicted the impact of personalized coupons on ordering behavior, i.e., the redeemed coupons and the shopping basket value for new orders, by analyzing the historical order data from an online shop with accompanying coupon generation.
- Implemented the feature pre-processing module that dealt with time related features with missing elements.
- Implemented the classification and regression module, and systematically evaluated various related approaches, such as decision tree, neural networks, SVM, KNN, AdaBoost, linear regression and polynomial regression.
- Tools: R, SPSS and KNIME.

Face Recognition based on Sparse Representation

**College of Information and Control Engineering
China University of Petroleum**

Shandong, China
January 2015 – May 2015

Collaborative Project Supervised by Professor Bao-Di Liu

- Proposed a novel approach to class-specific dictionary learning that considered the weight of each sample when generating dictionary for sparse/collaborative representation, which increased the face recognition rate by **2% to 6%**.
- Generalized to class-specific *centralized* dictionary learning that guaranteed the concentration of sparse codes within the same class, which further improved the face recognition rate by **2% to 4%**.
- Extended the approaches from Euclidean space to reproducing kernel Hilbert spaces that captured and combined various nonlinear structures, leading to superior performance in face recognition and image classification compared with conventional classification algorithms.

LO Signal Generation Circuit for Power Amplifier in a 7 Tesla MRI System

Institute of Microwave and RF-Technology

Duisburg, Germany

Department of Electrical Engineering and Information Technology

March 2014 – July 2014

Bachelor Thesis Supervised by Professor Klaus Solbach

- Developed an LO signal generation circuit for a 7 Tesla MRI power amplifier in the Larmor frequency.
- Designed the circuit based on directional couplers, limiting amplifiers, resonant filters and buffer amplifier.
- Conducted a series of experiments to test the circuit, and used the measured data to rectify the circuit, especially to redesign the resonant filter to work in the desired frequency.

Simulation of a New Aerosol Source for the Test of Smoke Detectors in False Alarm Scenarios

Institute of Communications System

Duisburg, Germany

Department of Electrical Engineering and Information Technology

April 2012 – October 2012

Bachelor Project Supervised by Professor Ingolf Willms

- Developed a simulation system that used airbrushes to effectively generate a new aerosol source for testing the performance of smoke detectors in false alarm scenarios in public space.
- Built the simulation model (hardware), and controlled the relevant parameters (e.g., pressure, duty cycle and fan speed) to generate the desired aerosol source.
- The simulated source was successfully used to evaluate smoke detectors to decrease the chance of false alarms.

Practice on Electronic Working Techniques

China University of Mining and Technology

Xuzhou, China

Student Research Training Program

June 2010 – June 2010

- Manufactured a battery charger and a small radio using welding and plug-in mounting techniques.
- Surveyed the knowledge of relevant components, wrote control scripts, designed and welded the PCB.

INTERNSHIP

Guangzhou Guangha Communication Company Limited (GHT Co., Ltd.)

Softswitch Programming

Beijing, China

August 2012 – October 2012

August 2011 – October 2011

- Participated as a team member in developing and testing softswitch for communication in rail systems.
- Gained familiarity with key techniques in softswitch and stored program control switching systems, and learned the corresponding hardware and software developed by the company in the dispatching console of softswitch.
- Improved the software in the touch screen of the dispatching console, making the entire system more efficient by increasing **5%** of the interface sensitivity.
- The software was successfully used in high-speed rail systems due to its small size, portability and sensitivity.
- Involved in the technical support for troubleshooting of the softswitch control device.

PUBLICATIONS

- **Yuting Wang**, Florian Metze, Alexander Waibel, Kevin Kilgour, “Modular Deep Neural Networks with Improved Bottleneck Features and Residual Learning for Speech Recognition”, in preparation.
- Bao-Di Liu, Liang-Ke Gui, **Yuting Wang**, Yu-Xiong Wang, Bin Shen, Xue Li, Yu-Jin Zhang, Yan-Jiang Wang, “Self-Explanatory Sparse Representation for Dictionary Learning”, to be submitted to *International Journal of Computer Vision*.
- **Yuting Wang***, Liang-Ke Gui*, Yu-Xiong Wang, “Learning from Small Sample Sets Using Unsupervised Binary Codes”, submitted to *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2017. (* indicates equal contribution)
- Bao-Di Liu, **Yuting Wang**, Liang-Ke Gui, Yu-Xiong Wang, Bin Shen, Xue Li, Yan-Jiang Wang, “Class Specific Discriminant Dictionary Learning with Kernels for Face Recognition”, in *SPIE Electronic Imaging*, 2016. **(Oral)**
- Bao-Di Liu, Liang-Ke Gui, **Yuting Wang**, Yu-Xiong Wang, Bin Shen, Xue Li, Yan-Jiang Wang, “Class Specific Centralized Dictionary Learning for Face Recognition”, *Multimedia Tools and Applications*, 2015.
- Linchen Zhu*, Mushi Duan*, **Yuting Wang***, “Two Approaches for Recognizing Roadworks and Crosswalks in Traffic Scenes”, Technical Report, Karlsruhe Institute of Technology, 2015. (* indicates equal contribution)

HONORS AND AWARDS

- InterACT-Scholarship (**Top 1%**), Karlsruhe Institute of Technology, 2016.
- VDI Ruhrbezirksverein-Scholarship, University of Duisburg-Essen, 2013.
- VDI Ruhrbezirksverein-Scholarship, University of Duisburg-Essen, 2012.
- UDE-Scholarship, University of Duisburg-Essen, 2011.
- National Scholarship for Encouragement (**Top 1%**), China University of Mining and Technology, 2008.
- Sunshine Scholarship (**Top 3%**), China University of Mining and Technology, 2008.

SPECIAL SKILLS

- Computer Language: C/C++, Python, Tcl, R, Java, JavaScript, Matlab, Verilog, Labview, CAD.
- Databases: MySQL, MongoDB.
- Deep Learning Tools: Detl, Caffe, Torch, TensorFlow, Theano, Keras.
- Software: Microsoft Word, Excel, PowerPoint, Latex.
- OS/Platform: Unix/Linux, Windows, Macintosh, Server Administration, Amazon AWS (EC2, S3, Mturk, etc).
- Language: Chinese (Native Language), Deutsch (DSH 2), English.

EXPERIENCE AND ACTIVITIES

- Assistant for a Chinese company in the International Trade Fair Wines and Spirits, Düsseldorf, 2011.
- Mathematical Contest in Modeling, China University of Mining and Technology, 2009.
- Electronic Design Contest, China University of Mining and Technology, 2009.
- Life Secretary, Department of Information and Electrical Engineering, 2009.
- Member of Electronics Association, China University of Mining and Technology, 2009.
- Member of Computer Association, China University of Mining and Technology, 2009.
- Volunteer of Fengxing Youth Volunteer Club, Department of Information and Electrical Engineering, 2008.

HOBBIES

- Jogging, Ping-Pong, Music.