Cheng Wan
Undergraduate Student in Computer Science

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Education

- **Shanghai Jiao Tong University** — Shanghai, China
  Bachelor of Science in Computer Science — *Sep. 2014 – present*
  - Member of ACM Honored Class, an elite CS program for top 5% talented students
  - GPA in Major: 90.1/100

Research Experience

- **Knowledge Computing Group, Microsoft Research Asia** — *Aug. 2017 – present*
  Research Intern
  Adviser: Dr. Chin-Yew Lin
  Target: use personal information data from LinkedIn to solve a problem as essential as possible.
  - Invested what is the most important problem related to the LinkedIn data with regard to different groups of people (students, employees, colleges, employers, and governments), and decided to build a life coaching system which assists students with setting life goal by demonstrating the lifestyle of typical people who satisfy one of their potential goals and gives them advice on how to achieve a specific goal according to their personal experience
  - Extracted LinkedIn information of the people living in the United States or Canada which is stored in **SQL Server**
  - Implemented a parser to extract primary information from the raw data with **ANTLR**
  - Invested several state-of-the-art **word/graph embedding** methods, and identified the particular usage and limitations of these methods
  - Established a novel model for embedding one stage of personal life in a vector space based on previous studies about **knowledge graph embedding** and **autoencoder**
  - Now implementing the model, and designing validation mechanism
  - Joined **reinforcement learning** study group, and studied RL course given by David Silver
- **Center for Brain-like Computing and Machine Intelligence, Shanghai Jiao Tong University** — *Jun. 2016 - present*
  Research Assistant
  Adviser: Dr. Liqing Zhang
  Target: apply machine learning methods to visualizing features of EEG signals (brain waves)
  - Learned techniques of **signal processing** including **discrete Fourier transform** and **wavelet**, and studied advanced methods for dealing with EEG signals such as denoising algorithms, feature extraction methods, and classification methods.
  - Invested several methods for visualizing features of EEG signals, and studied various state-of-the-art **feature visualization** methods in computer vision field, and identified the specific advantages and limitations of these methods
  - Proposed a novel classifier for characterizing EEG features based on FBCSP, which is the most widely used model for classifying EEG signals, and visualized features by calculating the gradient of the class score with regard to the input, which shows the features in three main domains (space, frequency and time)
  - Implemented the feature extraction method in **Python**, utilizing **NumPy** and **PyTorch**, and demonstrated results using **Matlab**
  - Implemented traditional methods for comparison, which confirms that our method derives more reasonable result
  - Applied this method to analyzing features of EEG signals of stroke patients, which reveals interesting phenomenon during the rehabilitation of stroke patients
  - Designed a method based on **attention mechanism** for comparing different feature extraction methods quantitively
  - In the future will implement the comparison method
- **Department of Computer Science, Cornell University** — *Jun. 2017 – Jul. 2017*
  Visiting Student
  Adviser: Dr. Adrian Sampson
  Target: improve DECAF, a type-based approach to controlling quality in approximate programs
  - Learned materials about **approximate programming**
  - Proposed several suggestions, two most important of which are a new feature for avoiding introducing bugs and an idea about parameterized type
  - Proposed three ways to realizing a simplified version of the parameterized type

Working Papers

[1] Wan, C., and Zhang, L. Characterizing eeg dynamic features for motor imagery classification. Under review at: *The Thirty-Second AAAI Conference on Artificial Intelligence (AAAI 2018).*

Projects

- **SimpleDB** *May. 2017 – Jun. 2017*
  A MySQL-like database
  - Collaborated with a peer, implementing the simulator of buffer pool and heap page, realizing some basic functions of MySQL, and implementing **B+ tree** to deal with queries efficiently in **Java**
- **Tone Classifer** *Dec. 2016 – Jan. 2017*
  A deep learning model for tone classification
  - Designed denoising methods and feature extraction algorithms, and implemented these methods in **Python**
  - Implemented a succinct fully connected neural network with **MXNet**, and achieved 97% validation accuracy while the baseline was 88%
- **BadKid** *Nov. 2016 – Jan. 2017*
  A virus which infects ELF files
  - Explored the structure of **ELF file**
  - Collaborated with two peers, designing the mechanism for attacking ELF files
- **MIPS CPU** *Sep. 2016*
  A five-stage pipeline for (almost) all MIPS integer operations
  - Implemented **pipelined MIPS** with **forwarding optimization** in **Verilog HDL**
- **Mugic** *Feb. 2016 – May. 2016*
  A highly functional compiler of Mugic, a language mixing C and JAVA
  - Designed and implemented a parser, an abstract syntax tree and IR language in **Java**.
  - Designed and implemented a variety of optimizations with regard to register allocation
- **iGit** *Apr. 2015 – Jun. 2015*
  A toy version control system like Git.
  - Collaborated with a peer, designing the framework of iGit, which realizes all basic functions of Git except 'branch' and 'merge', and implementing the project in **C++**

Awards

- **Honorable Mention** in The Mathematical Contest in Modeling *2017*
- **Gold Medal** in The 2015 ACM-ICPC China Shanghai Metropolitan Programming Contest (**6**/193) *2015*
- **Honorable Mention** in The 2014 ACM-ICPC Asia Bangkok Regional Contest (**7**/102) *2014*
- **First Prize** in The 18th National Olympiad in Informatics in Provinces (**8**/891) *2012*

Teaching Experience

- **External Teacher** at **Shanghai Kongjiang High School** *Fall 2016*
  Design and Analysis of Algorithms
  - Taught algorithms including divide and conquer, graph theory, dynamic programming, and number theory
  - Introduced practical data structures such as stack, queue, merge-find set, heap, segment tree, hash table and trie
- **Teaching Assistant** at **Shanghai Jiao Tong University** *Fall 2015*
  CS122: Introduction to Programming
  - Prepared the problems of tests and assignments
  - Conducted one-on-one meeting to help students with forming good programming style habits

Skills

- **Programming Languages:** C++, Java, Python, Matlab, MySQL, HTML, Javascript, jQuery, Verilog HDL
- **Tool Kits:** NumPy, PyTorch, Tensorflow, MXNet, OpenCV, ANTLR, BCILab
- **Others:** Git, LaTeX, Markdown, Jupyter Notebook, Robot Operating System (ROS), Socket, IntelliJ IDEA

Interests

- Medical Science, Biology, Philosophy, Psychology