

# Haowen Lin

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## Education:

### **University of Southern California**

B.S. Computer Science  
Minor: Business Finance  
Cumulative GPA:3.97

Expected Graduation Year: May 2019

Coursework: Data Mining, Data Structure and Object-Oriented Programming, Algorithms, Professional C++, Accounting

## Research Experience:

### **Historical Map Text Recognition and connection**

Haowen Lin with Professor Yao-Yi Chiang

- An automatic algorithm that combined single words recognized from historical maps into meaningful phrases, which represent complete location descriptions and can be used to link historical sites to other datasets. This algorithm is potential to improve digital map processing by increasing the automation of text extraction on maps.
- Characterized map labels by location size and text content using Support Vector Machines. Built the back-end with Python and Postgres.
- Wrote an evaluation program on Strabo, a semi-automatic system that extracts and recognizes text labels in map images into text and integrated tesseract into Strabo.
- Won First Place of **ACM SIGSPATIAL Student Research Completion**.

### **An Uncertainty Aware Method for Geographic Data Conflation**

Haowen Lin with Professor Yao-Yi Chiang

- Analyzed uncertainty generated in the vector to vector conflation of geospatial sources.
- Our algorithm is unique in incorporating uncertainty value from a geographical feature recognition model that using Convolutional Neural Network and centerline extraction of linear feature. The uncertainty value is commonly overlooked by current vector data generation and process. Our algorithm proved that the uncertainty value can improve the accuracy and efficiency of the conflation process.
- Oral presentation in ACM SIGSPATIAL BIG SPATIAL DATA workshop.

### **Row-convexity constraint solver**

Haowen Lin with Professor Satish Kumar Thittamaranahalli

- Implemented a randomized algorithm to solve connected row-convexity constraint (CRC) problems in C++.
- Compared the result with none-randomized algorithm. The randomized algorithm outperforms in time complexity.

### **Cluster analysis of automobile innovative users based on interactive innovation value**

- Classified the innovative users in Automobile forums and analyzed the characteristics of different user groups. The algorithm is effective in identifying different category users based on their innovative score from large-scale of data and proposed corresponded interactive method that can get effective feedbacks to improve new product development.
- The algorithm classified users based on six characteristics: community activity, network connectivity, user experience, domain knowledge, ahead of market trend, willingness to innovate and combined Balanced Iterative Reducing and Clustering Using Hierarchies (BIRCH) algorithm with Agglomerative Nesting (AGENES) algorithm for clustering.
- Submitted a paper to Mathematical problems in Engineering.

### **Facebook Chatbot Referral**

Haowen Lin with research group in USC Information Retrieval and Data Science

- Improved a Facebook Chatbot for 211 LA County, a non-profit organization which provides information and referrals for all health and human services in LA County. Extended functions to query and return the data from database based on the taxonomy of each service. <https://www.facebook.com/211lacounty>
- Tested Chatbot's referrals on different locations by optimizing the best-fit taxonomy for each service from 211 website.
- Automatically converted the phone-call recordings into text by using Kaldi, a speech recognition toolkit written in C++.

## Working Experience:

### **C++ Teaching Assistant, University of Southern California**

Fall 2017

- Taught fundamentals of C++ syntax and semantics including function prototypes, overloading, memory management.
- Mentored 60+ students in class, held regular office hours and graded weekly lab and exams.
- Collaborated with professors to verify correctness and ambiguity.

## Software Development Teaching Assistant, University of Southern California

Spring 2018

- Peer-tutored 130+ students about concepts of project management, architecture, design, testing and maintenance phases.
- Held regular office hours and answered programming questions about JavaScript, PHP, Cucumber/
- Graded project documents, midterm and final exams.

## Project Experience:

### ScholarCloud App (JavaScript, PHP, CSS)

Spring 2017

- Developed a paper searching website that uses data from ACM and IEEE papers. Users can search the paper by keyword and author name and download the paper with highlighted keyword.
- Implemented a word cloud for data visualization including webpages with d3-rendered data graphs using **d3 JavaScript library**. Used PHP to handle the data request from webpages. **Agile** methodology and **Test-Driven Development** adopted.

### Factory Simulation (Java, MySQL)

Fall 2016

- Created a simulated Factory where workers update storage and build materials in a panel using **Java Swing**. Built the factory-info service & task post with **Java** and **MySQL**.
- Engaged in **multithreading** and **network programming** to communicate and transform factory materials

### Hamiltonia Traveling (Java, JavaScript, CSS)

Fall 2016

- Built a website that allows user to individually generate their travelling path by drawing the path on the google map and the web application would generate the most popular cities for references.
- Used **Amadeus API** and **google API** to get traveling information to generate popularity rate for each city.
- Implemented all the webpages with **HTML5**, **JavaScript** and **Bootstrap**.

### Cache Simulator (C/C++, course project in Intro to Computer System)

Spring 2017

- Built a trace-driven simulator using temporal locality and recorded cache hits, misses and evictions.

### Happy Farmers (JavaScript, Python)

Spring 2017

- Created an interface for people in Morocco to recommend farm land and provide prediction insights for next year's Wheat and Barley production and consumption. **Win Expedition Hack 2<sup>nd</sup> Place**.

## Publications

Lin, Haowen, and Yao-Yi Chiang. "SRC: automatic extraction of phrase-level map labels from historical maps." SIGSPATIAL Special 9.3 (2018): 14-15.

Lin, Haowen, and Yao-Yi Chiang. "An Uncertainty Aware Method for Geographic Data Conflation" Proceedings of the 7th Workshop on analytics for Big Geospatial Data. ACM, 2018.

Lin Haowen, Chen Yaping, and Yang Yushu. "Cluster analysis of automobile innovative users based on interactive innovation value". Mathematical problems in Engineering. (Under Review).

## Honors & Awards

First Place of Student Research Competition in ACM SIGSPATIAL

Fall 2017

USC Provost Research Fellowship

Spring 2017 - Present

Expedition Hack 2<sup>nd</sup> Place

Spring 2017

Cal Hack 3.0 "Best Traveling application"

Fall 2017

Morning Light Foundation Domestic Scholarship of \$5000

Spring 2018

USC Academic Achievement Award

Fall 2016 - Present

The Dean's List of Viterbi School of Engineering, USC

Fall 2015 - Present

Member of Phi Kappa Phi all-university Honour Society

Fall 2017 - Present

Member of Golden Key International Honour Society

Fall 2017 - Present

USC Undergraduate Research Apprentice Program (URAP)

Summer 2018

## Professional Activities

Association for Computing Machinery (ACM) student member

Fall 2016 - Present

Society of Women Engineers (SWE) student member

Fall 2017 - Present

Center for AI in Society's student branch (CAIS++)

Fall 2017 - Present

## Organizations and Activities

**IT Department Chair- USC CSSA**

Fall 2015 - Present

- Provided technical support, updated and maintained organization website and forum of USC CSSA.
- Hold regularly meeting and plan on upcoming events

- Assisted in organizing Research/Internship panel by inviting senior students to share their experience to the CSSA member

#### **Volunteer – HackSC**

- Taught elementary school students programming in Scratch and basic programming concepts such as control flow statements
- Coordinate with other volunteers and help signing in for the programming competition.

#### **Links**

<https://haowenlin.github.io/> (Personal website)

<https://spatial-computing.github.io/> (Research group page of Spatial Science Institute)

<https://irds.usc.edu/> (Research group page of Information Retrieval and Data Science Group)

<https://src.acm.org/binaries/content/assets/src/2018/haowen-lin.pdf> (SRC paper abstract)

<https://spatial.usc.edu/spatial-computing-successes/> (News report on receiving ACM student research competition)