Hae Jin (Hayley) Song

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https://cocoaaa.github.io/blog

Education

University of Southern California — Los Angeles, CA
- Candidate for Doctor of Philosophy in Computer Science — Fall 2018 -

Massachusetts Institute of Technology (MIT) — Cambridge, MA
- Master of Science in Electrical Engineering and Computer Science — Spring 2018
- Bachelor of Science in Electrical Engineering and Computer Science (w/ Minor in Mathematics) — Spring 2016

Current Research

- **Interpretability and transferability** of deep neural networks in spatiotemporal data from satellites
- Hybrid intelligence systems that incorporate **knowledge-based symbolic AI to neural networks**
- Main projects
  - Road and building detection on multispectral satellite data with neural networks and spatial reasoning
  - MINT-Viz: Interactive visualization tool for spatiotemporal data and deep neural networks

Internship Experience

Mobile Pattern Detection using Machine Learning
Intern at Apple Inc. — Feb. 2018-Sep. 2018
- Designed acoustic experiments for data collection on iPhones
- Built predictive models for iPhones using Random Forest and Neural Networks

Robot localization and object detection
Intern at Keecker — *Summer,* 2016
- Improved the accuracy of robot's 3D position via camera calibration using Aruco and OpenCV in C++
- Built a recognizer for the Keecker logo that is robust in various illuminations and scales
- Implemented an Android application that commands the robot to rotate in search of the Keecker's logo and moves towards the logo upon its detection

Machine Learning and Web Development — Saclay, France
Intern at INRIA, France — *Summer,* 2015
- Optimized the parameters of three classifiers (KNN, Linear SVM and Random Forest) and ranked their performances on gestural datasets
- Implemented a recommendation system to find the most useful set of gestures using the optimized classifiers
- Built a web application for Human Computer Interaction researchers to upload their datasets and interact with the results from the recommendation system

Research Experience

Non-rigid alignment of mammogram images for breast cancer detection — Cambridge, MA
Masters student with Regina Barzilay in CSAIL, MIT — *2017*
- Deformable image alignment using Optical Flow and Demons algorithm to localize and track tumors
- Improved learning algorithms for the displacement field estimation with annotated datae

Computer Vision and 3D reconstruction
Masters student with Regina Barzilay and Julian Straub in CSAIL, MIT — *2016 -2017*
- Built a multi-camera system for 3D reconstruction of human arms for early diagnosis of lymphedema using multiple depth sensors (Intel *Realsense*)
- 3D point cloud alignment using functional maps and minute volume changes detection
- Visual magnification of volume changes in 3D

Free-Flow: Unintrusive Reading Device for a Printed Text Cambridge, MA
SuperUROP Researcher with Dr. Suvrit Sra in LIDS, MIT *2015-2016*

- Developed a software for a hand-held, pen-style device that allows a quick search of words in printed texts
- Used Optical Character Recognition, filtering and image processing for word extraction and recognition

Data Science and Big Data Cambridge, MA
Undergraduate Researcher in Anyscale Learning For All in CSAIL, MIT *Summer, 2014*

- Constructed predictive models based on large data from medical and physical fields using data reduction, regression, classification and Gaussian Models on the cloud
- Parsed and organized raw data using Python and MATLAB, and then conducted statistical data analysis

Mcgovern Institute for Brain Research at MIT Cambridge, MA
Undergraduate Researcher in Graybiel Lab

- Organized a large amount of neural data and improved the database using MATLAB
- Developed algorithms to test rats' decision-making and calculate reaction times
- Automated the outlier filtering and image alignment process using ImageJ and MATLAB
- Calculated the distances in 3D between an injection site and different parts of the brain

Camera Culture Group at MIT Media Lab Cambridge, MA
Undergraduate Researcher *Spring,* 2012

- Designed and developed glass-free 3D image layers and prototypes for exhibition using a laser cutter
- Reduced by half the amount of required materials by optimizing the alignment of the layers

Papers & Presentations

Please visit: my website

- Road and building detection from multispectral satellite images using semantic segmentation and spatial reasoning (Fall 2018)
- Generating Gaussian, Pictures, and Stories with Generative Adversarial Networks (Fall 2016)
- Automatic Cell Detection using HOG features and SVM (Fall 2016)
- Unintrusive Reading Device for a Printed Text (MIT EECS SuperUROP Poster Sessions, 2016)
- 3D air gesture recognition using Dynamic Time Warping and KNN (MIT EECS Poster Sessions, 2016)

Relevant Projects

- IOS application for 3D gesture recognition on air using Dynamic Time Warping and KNN
- Optimization of the blog traffic using a distributed memory caching system (Memcached)
- Analysis of Tweets and essays using Twitter API, sentiment analyzer and statistical inference techniques
- Modeling of Hidden Markov Model of a robot using message-passing algorithms
- Implementation of sampling techniques (Metropolis-Hasting, Gibbs) and Monte Carlo simulations

Scholarship

- MIT EECS - Foxconn Undergraduate Research and Innovation Scholar through MIT Research and Innovation Scholars Program

Leadership

MIT Yearbook and Photography Club (Technique) 2012 - 2013
Publicity Editor

- Applied graphic design skills such as Photoshop and In Design to publicize Technique's weekly meeting, book sales and Senior Portraits

MIT Experimental Study Group 2012 - 2013
Associate Advisor

- Organized academic and social events and connected the Associate Director with students

MIT Korean Class 2012 - 2013

- Prepared curriculum and led lectures and recitations for the beginner and intermediate Korean classes at MIT as a volunteer

Teaching

TA for Advanced Natural Language Processing (MIT, 6.864) Fall 2017
TA for Engineering Computation and Data Science (MIT, 1.001) Spring 2016

Skills

Languages: Korean (Native), English (Fluent), French (Intermediate)
Programming: C++, Python, MATLAB, Android Programming, Web development