Naoki H. Yokoyama

Portfolio: naoki.io

Self-motivated researcher strongly passionate about learning.

EDUCATION

Northeastern University, Boston, MA **GPA: 3.70** 2013-2018
MSc. & BSc. Electrical & Computer Eng, Concentration in Machine Learning and Computer Vision

Stuyvesant High School, New York, NY **GPA: 3.70** 2009-2013

RESEARCH EXPERIENCE

Charles River Analytics, Cambridge, MA July 2018 - Present
Scientist II

- Wrote a government proposal to fuse data collected by an indeterminate amount of sensor viewpoints and modalities scanning the same area in order to generate context-driven detections.
- Developed several ROS nodes utilizing Mask R-CNN, Darknet (YOLOv3), OpenPose, and Convolutional Pose Machines to detect/track targets and recognize gestures from video feeds on mobile robots.
- Implementing a Bayesian belief network using Figaro (probabilistic programming language) to generate better informed detections made from camera feeds based on environmental conditions.

Northeastern University, Boston, MA Dec 2017 - Present
Research Assistant @ Robotics and Intelligent Vehicles Research Lab (RIVeR)

- Used Tensorflow, Keras, and Darknet to train and implement Mask R-CNN, YOLOv2, and SSD object detection models.
- Implemented OSLSM, a low-shot semantic segmentation deep learning model, using Caffe in order to instantly teach the robot to detect novel objects.
- Created OpenCV scripts to generate exhaustive artificial training sets from videos taken of objects, augmented with various types of noise. Produced detections robust against varying size, proximity to the camera, orientation, occlusions, lighting, and noise.
- Integrated Google's Speech-to-Text API, Natural Language API, and Word2Vec neural network to recognize, label, and map perceived words in order to translate verbal commands into discretized sequential tasks for the robot to execute.
- Used TensorFlow and Keras to implement OpenPose in order to segment detected humans and process sections of their bodies with various deep classifiers to determine their age, gender, emotion, and clothing fashion/color.
- Led Northeastern team to compete using Toyota Research Institute's (TRI) Human Support Robot (HSR), placing 1st among the US teams and 4th internationally in the 2018 RoboCup@Home competition.
- Led team again using the HSR for the 2018 World Robot Challenge in Tokyo.
- Supporting Northeastern team with competing in HSR Challenges hosted by TRI every 2-3 months. Achieved fastest successful completion time against teams from MIT, Stanford, U.C. Berkeley, and University of Michigan.

PROJECTS

Demonstration and Analysis of Deep Convolutional Generative Models Apr 2018
naoki.io/dlt/deep_generative_models

- Presented and discussed the mechanisms behind different types of deep convolutional autoencoders (AE) and generative adversarial networks.
- Modeled and trained a normal convolutional AE, a residual AE, and a variational AE to denoise corrupted images of my face and generate smooth animations of myself making different facial expressions.

Deep Learning Tutorials Mar 2018 - Present
naoki.io/dlt

- Creating posts on my site detailing various computer vision and deep learning concepts, citing papers published at various conferences.

Udacity AI for Robotics Project Feb 2017 - May 2017
naoki.io/portfolio/lane_detection

- Used OpenCV to highlight lanes in dashcam footage recorded from driving around Boston.
- Implemented convolutional filters, Canny edge detection, color and contour thresholding, and perspective warping to isolate, detect, and label lane markers.

INDUSTRY EXPERIENCE

Bluefin Robotics, Quincy, MA July 2017 - Dec 2017
Electrical Engineering Co-op

- Designed a ground fault detection system to sense and locate faults in the AUV using FFT and pilot signals, implemented in C.
- Designed a robust power interface board to provide power and communication busses between the main computer, peripherals, and smart lithium batteries.

iRobot, Bedford, MA July 2016 - Dec 2016
Robotics Engineering Co-op

- Designed the hardware and software of a smart Li-ion battery charger that charged batteries quickly and efficiently and communicated with its onboard battery management system through SMBus.
- Developed Python scripts for the Roomba 900 to collecting more information about the home using various sensors, which would be conveyed to users in an informative graphical map.

Medtronic, Boston, MA May 2015 - Dec 2015
Robotics Engineering Co-op

- Designed the schematic of a new version of the embedded system that interfaced the robot's computer with peripherals.
- Developed Python scripts to allow users to change display and scaler settings using PySerial.
- Designed schematic and layout for the robot's power distribution system.

Pavlok, Boston, MA May 2014 - Dec 2014
Electrical and Software Engineering Intern

- Programmed device and added various capabilities to allow the user to execute commands like self-shock without their smartphone.
- Developed software and redesigned circuit of secondary product in C++.
- Created an alarm app incorporating Parse's and Facebook's API to allow users to shock (only) themselves at a set time with Ruby on Rails.

TEACHING EXPERIENCE

Northeastern University Culture & Language Learning Society Sep 2016 - May 2018
Japanese Instructor

- Taught other college students beginner and intermediate Japanese, developing curriculum, slides, and homework for weekly classes.

Sherman Center for Engineering Entrepreneurship Education Mar 2014 - May 2016
Workshop Instructor

- Planned out and taught hands-on student-led workshops for groups of 20 students and faculty every month.
- Taught crash courses on Arduino, C programming, closed loop control systems, 3D printing, and front-end web design using HTML/CSS/JavaScript and Twitter Bootstrap.
- Demonstrated to all 1st year engineering professors how students could be introduced to microcontrollers and embedded programming using Arduino; Arduino was subsequently adopted and integrated into the official freshman curriculum.

Fundamentals of Computer Science I Jan 2015 - May 2016
Teaching Assistant

- Ran lab sessions, managed tutors/graders, held office hours for students, and graded exams.

RELEVANT COURSEWORK

Introduction to Machine Learning and Pattern Recognition
Introduction to Computer Vision (Udacity)
Robotics Sensing & Navigation
Assistive Robotics
Robotics
Classical Control Systems

PUBLICATIONS

T. Kelestemur, N. Yokoyama, J. Truong, A. Allaban, and T. Padir. System Architecture for Autonomous Mobile Manipulation of Everyday Objects in Domestic Environments. *PETRA 2019 (under review)*

AWARDS

Joseph Spear Scholarship 2017
Recognizes outstanding contributions to student activities by students. Must have demonstrated good citizenship and exemplary leadership abilities. One Northeastern recipient out of all senior engineering applicants.

SASE Kellogg Scholarship 2016
Recognizes and rewards deserving SASE Collegiate members who have demonstrated exceptional academic achievements and leadership credentials. Five recipients across all national chapters.

Clara & Joseph Ford Scholarship 2016
Recognizes the contributions of students who have demonstrated good citizenship and embody leadership qualities. Three Northeastern recipients out of all second to fourth year applicants.

SASE National InnoService Competition 3rd Place 2014-15, 3rd Place 2013-2014
Competition to design an innovative product and business strategy.

Karen T. Rigg Scholarship 2014
Recognizes students who are seen as a shining example within their student organization through their enthusiasm and positive attitude. Two Northeastern recipients out of all freshman applicants.

Gordon CenSSIS Scholar 2013
One of 18 selected freshman applicants to get involved in research projects, K-12 STEM outreach programs, and professional development training and seminars.

George Alden and Amelia Peabody Scholarship
Recognizes Honors students who have good academic standing, demonstrate financial need, and actively participate in the Honors Program.

Dean's Scholarship
Prestigious scholarship awarded to top 10-15% of Northeastern applicants to help fund tuition for 5 years.

Northeastern Honors Program

MEDIA COVERAGE

News@Northeastern - *Sick of Household Chores? These Students are Building a Robot to Help You at Home,* June 2018
WCVB-TV (ABC-affiliated) - *Cutting Edge: Robot designed to make aging easier,* March 2018
Northeastern Magazine - *Role Reversal: Student writes curriculum,* January 2016

PROTOTYPING/ DEVELOPMENT

Languages: Python, C/C++, MATLAB, HTML/CSS/JavaScript, Ruby on Rails
Libraries: TensorFlow, Keras, OpenCV, ROS