KEYUAN ZHANG

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EDUCATION

Cornell University, Ithaca, New York *August 2017 – May 2018*
Master of Engineering in Electrical Engineering

Purdue University, West Lafayette, Indiana *August 2013 – May 2017*
Bachelor of Science in Electrical Engineering
Honors: Dean's List Honor (Top 1% in class); Semester Honor (Top 3% in college)

TECHNICAL SKILLS

Programming Languages:	Python, C/C++, Objective-C, MATLAB, Swift, Java, JavaScript, R
Frameworks & Tools:	TensorFlow, Keras, PyTorch, CoreML, MXNet, OpenCV, Metal Scikit-Learn, OpenVINO, FFmpeg, WebRTC, Git, GitHub, SourceTree IDE (Microsoft Visual Studio, Xcode, Visual Studio Code, Intellij IDEA) Video Codecs (AV1, H264)
Hardware	Altium (PCB Design), Oscilloscope, Spectrum Analyzer EAGLE simulation, AutoCAD, Raspberry Pi

THESIS

Cornell University Ithaca, NY
Machine Learning Based Stock Predictor *September 2017 – May 2018*

- Built a stock index predictor using Long-Short Term Memory (LSTM) and Recurrent Neural Nets (RNNs). Preprocessed both short and long-term stock data from S&P 500 with normalization to ensure the convergence of optimization process. Focus on short-term stock forecasts by comparing the evaluation results of short and long-term prediction of varying time periods.
- Performed sentimental analysis to investigate the impacts of textual information on stock price. Gathered data of news with Google API. Processed data by applying Naive Bayes classifier, removing compound and neutral score based on cross observation, and evaluating the effects with ANN in DJIA dataset. Increased the prediction accuracy at least 1.2% by incorporating news as a factor into the model.

PROFESSIONAL EXPERIENCE

Juphoon System Software Zhejiang, China
Deep Learning Algorithm Engineer *September 2019 – Present*

- Develop an AI-powered virtual background feature in TensorFlow for telecommunication apps. Conduct research in the field of semantic segmentation. Preprocessed aisegment and high-quality matting datasets and extracted alpha matte of input images using OpenCV. Designed a U-Net-like portrait matting network by replacing traditional convolution layer with combination of depth wise separable convolution and linear bottleneck and training the matting net with combined loss function to fine the edges. Wrote a Python script in collaboration with the team to evaluate the mean absolute difference (MAD) and gradient error. Benchmark the training results against Mobile DeepLabv3.
- Commercialize the final model to China market and support the adoption of China Everbright Bank and China Mobile. Integrate the above TensorFlow model on iOS platform with C++ and Objective-C. Converted TensorFlow-based frozen model to CoreML model with CoreML tools. Reach the

overall speed of 25fps in 720p on iPhone 11. Design a visual demo for the TensorFlowjs-converted model in JavaScript.
- Independently develop a real-time facial landmark detector for iOS demo. Improve the performance of the face detection model by tailoring the base facial detection model (MobileNet backbone) with MXNet model trucking. Boost the performance of the baseline Practical Facial Landmark Detector (PFLD) by data augmentation, loss function replacement with Wing Loss and loss weight tuning.
- Design and deploy AV1 focused video transmission pipeline into Windows, Mac OS, Linux, and iOS platforms using C++ and open-source decoder library libdav1d.

Dun & Bradstreet Shanghai, China
Product Development Intern *June 2018 – August 2018*
- Completed tasks to support the industry analysis of automobile parts in the region outside of Yangtze River Delta, including growth capability evaluation of the automobile market in China and financial performance analysis on the auto parts industry.
- Conducted growth analysis for a medical company by collecting quarterly sales data of clients from 2015-2016 income statements, calculating growth rates of each quarter in R, performing calculations of standard deviations of growth rates based on product lines

Purdue University West Lafayette, Indiana
Teaching Assistant for Electronic Measurement Techniques *August 2016 – December 2016*
- Enhanced students' learning by answering questions, organizing course materials and mentoring students one-on-one in lab office hours.
- Monitored labs in equipment operations, electronic circuits troubleshoot, operational amplifier circuits analysis and design. Assisted in grading assignments and lab quizzes.

Geely Automobile Holdings Ltd Zhejiang, China
Hardware Engineer Intern *June 2015 – August 2015*
- Supported to design a prototype of audio systems using EAGAL simulation of Geely new car model. Designed a noise reduction model to enhance user experience.

RESEARCH EXPERIENCE

USB Audio Headphone Amplifier Purdue University
Senior Design, Prof. Stanislaw H. Zak *September 2016 – December 2016*
- Collaborated with the team to develop a system using CPLD, PCM 2706, TIVA C series board, Kentec touchscreen, EAGAL simulation, Altium (PCB design), which accepted USB DC signal and outputs the converted AC signal to headphone. The system included DAC & reconstruction filter, amplifier control, VU+GUI, and power amplifier.
- Responsible for the design and improvement of the amplifier control subsystem in EAGLE simulation, including removing unnecessary DC voltage, developing frequency and volume control system using LF353 (op-amp).

PROJECT

Lung Nodules Detector in 3D CT Scans *March 2018 – May 2018*
- Created a lung nodules classifier using machine learning under Prof. Mert Rory Sabuncu
- Executed preprocessing steps including CT scan images resampling using ResampleImageFilter in SimpleTK library and lung segmentation in 3D CT scan by k-means clustering, region growing algorithm, and morphological filtering

- Developed a method to localize candidate nodules. Selected the possible nodules with Laplacian of Gaussian (LOG); sliced 3D image into 2D; reduced the checking range by calculating Z(nodule)/Z(image); reduced false alarms by checking neighbor slices information.
- Trained the model with the implementation of SVM, MLP, random forest, and bagging classifier.

Moving Object Tracker based on Raspberry Pi *March 2018 – May 2018*

- Established a Raspberry Pi tracker to automatically track objects in motion from camera stream.
- Optimized the tracking algorithms in OpenCV to Raspberry Pi with Tracking-Learning-Detection.
- Designed an algorithm to track the positions of specific objects by detecting targeted colors and calculating the relative position frame by frame

Effect of Alcohol Consumption on Students Grade using Machine Learning *April 2018 – May 2018*

- Employed MSE and R2 as evaluation metrics to choose the most appropriate model to explain the largest variance of dataset from Kaggle. Sorted the importance of variables to study the effects of alcohol consumption and other possible factors on students' grades under Prof. Yudong Chen.
- Explored and preprocessed dataset by checking the data completeness, ploting scatterplots of shared students in different datasets in R, merging two datasets and cleaning the irreverent variables based on the correlation map in Python, and normalizing data to reduce the variable scale effect.
- Applied Non-parametric Model (KNN, random forest, SVR) to the dataset. Used R2 to choose the best model (random forest). Used increased MSE of each factor to sort the top 10 important features in the random forest. Concluded that weekday alcohol consumption would affect students' grades, and other causal effects might include weekly study time, willingness to take higher education, and mother's education level.

Video-based Vehicle Tracking and Counting System *November 2017 – December 2017*

- Built a video-based vehicle tracking and counting system from MIT Traffic Dataset to monitor traffic flow in different directions, including detector, tracker, and counter under Prof. Anthony P. Reeves.
- Detected the moving objects using a Mixture of Gaussian adaptive background subtraction. Denoised the video frame using a median filter. Bounded detected objects based on their size on the image.
- Tracked the moving vehicles by MIL-Tracker in OpenCV and got the trajectory of vehicles based on updating centroid. Counted the number of vehicles on each lane and direction in their trajectories.