

Larry Zhang

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EXPERIENCE

INDIANA UNIVERSITY BLOOMINGTON

Bloomington, IN

NSF-NRT Graduate Fellow

August 2020 - Present

- Investigating behavioral and physiological measures of synchrony for affective computing applications
- Implemented tensor decomposition to study synchronization on brain connectivity networks
- Developed multimodal cross-atlas reference brain organ for user studies in HuBMAP interface
- Proposed new predictive model of semantic memory search outperforming existing methodologies
- Conducting research under Prof.'s Katy Borner, Michael Jones, Yong-Yeol Ahn, Gregory Lewis at IU

USC INSTITUTE OF CREATIVE TECHNOLOGIES

Playa Vista, CA

Research Assistant

February 2020 – July 2020

- Investigated multimodal sensing on vocal behaviors with Intelligent Human Perceptions Lab at USC
- Published paper on automatic coding in motivational interviewing via representation learning
- First authoring study on linking multimodal vocal behaviors to psychological distress symptoms

NEUROLEX DIAGNOSTICS

Remote, San Jose, CA

Research Manager

April 2019 – January 2020

- Lead research efforts and data science projects; manage and develop projects for 20 tribe members
- Developed computational analysis direction for clients including Harvard, Stanford, Biogen, LEO I-Lab
- Explored machine learning and signal processing methodology for internal product improvement

STANFORD SNAP LAB

Palo Alto, CA

Research Assistant

August 2018 – June 2019

- Lead machine learning analysis across psychiatric data (Digital Phenotyping, Voice, Survey Data)
- Piloted collaboration across institutions to develop robust ML models on language and acoustic data
- Devised data analysis approach to identify key features with predictive power in remission detection
- Co-first author abstract accepted to Society for Biological Psychiatry Conference 2019 on research

UW DIGIPSYCH LAB

Remote, San Jose, CA

Computational Psychiatry Research Assistant

April 2018 – June 2019

- Head Developer of lab's data science team; supervising 12 undergraduate and graduate students.
- Built acoustic models of depression with near-SOTA performance on non-curated clinical datasets
- Established extensive data-featurization pipeline to collect thousands of features to model voice data
- Published two manuscripts on voice biomarkers for depression on psychomotor disturbances
- Published two manuscripts on voice biomarkers for clinical detection of cognitive decline applications

NVIDIA MIXED SIGNAL TEAM

Santa Clara, CA

Mixed Signal Intern

March 2018 – March 2019

- Deploying automation framework to accelerate data collection and analysis from key GPU endpoints
- Established end-to-end analytics framework for circuit verification insights from millions of datapoints
- Achieved 94% accuracy classifying silicon health of data; predicted parameters within ± 0.5 loss range

INTEL BIGDL DEEP LEARNING PLATFORM

Santa Clara, CA

Community Developer

September 2017 – January 2018

- Tuned parameters for a Neural Collaborative Filtering model on corpus of resumes and job postings
- Implemented Bi-recurrent LSTM on IMDB Sentiment Dataset in BigDL framework as proof of concept
- Implemented LSTM in a time series-based model on Pollution Dataset in BigDL as proof of concept

UCSD UNDERGRADUATE RESEARCH

San Diego, CA

Pattern Recognition Undergraduate Researcher

September 2016 - June 2017

- Investigated implementation of convolutional neural networks on the TrueNorth neuromorphic chip
- Implemented EEDN spiking network implementation of convolutional neural networks on TrueNorth
- Presented on backprop methodology utilizing binary weights in spiking network to discussion group

NVIDIA MIXED SIGNAL TEAM

Santa Clara, CA

Hardware Methodology Intern

June 2016 - September 2016

- Developed internal central database tool for hardware team to optimize chip development workflow
- Utilized python data mining modules to extract Word and .pdf data from non-standardized datasheets
- Achieved 70% success rate with singular robust algorithm on high number of user and edge cases

PUBLICATIONS

- **Zhang L**, Ngo AD, Thomas JA, et al. Neuropsychological Test Validation of Speech Markers of Cognitive Impairment in Framingham Cognitive Aging Cohort. *Exploration of Medicine* 2021. doi: 10.37349/emed.2021.00044
- Tavabi L, Stefanov K, **Zhang L**, et al. Multimodal Automatic Coding of Client Behavior in Motivational Interviewing. *ICMI 2020*. doi: 10.1145/3382507.3418853
- Thomas JA, Burkhardt HA, Chaudhry S, et al. Assessing the Utility of Language and Voice Biomarkers to Predict Cognitive Impairment in the Framingham Heart Study Cognitive Aging Cohort Data. *J Alzheimers Dis* 2020. doi:10.3233/JAD-190783
- **Zhang L**, Duvvuri R, Chandra K, et al. Automated voice biomarkers for depression symptoms using an online cross-sectional data collection initiative. *Depression and Anxiety* 2020. doi: 10.1002/da.23020
- Phi H, Phi H, Janarthanan S, **Zhang L**, et al. Voice Biomarker Identification of Deep-Brain Stimulation on Parkinson’s Disease. *arXiv Published Online First: 2020*. <https://arxiv.org/abs/1912.00866>
- **Zhang L**, Driscoll J, Chen X, et al. Evaluating Acoustic and Linguistic Features of Detecting Depression Sub-Challenge Dataset. *ACM Multimedia* 2019. doi: 10.1145/3347320.3357693
- Zhang L, Chen X, Vakil A, et al. DigiVoice: Voice Biomarker Featurization and Analysis Pipeline. *arXiv Published Online First: 2019*. <https://arxiv.org/abs/1906.07222>

EDUCATION

INDIANA UNIVERSITY BLOOMINGTON, LUDDY SCHOOL	Bloomington, IN
Dual Ph.D. in Intelligent Systems Engineering and Informatics	<i>August 2020 - Present</i>
Specialization in Neuroengineering and Complex Network Systems	GPA: 4.0/4.0
UNIVERSITY OF CALIFORNIA, SAN DIEGO, JACOBS SCHOOL OF ENGINEERING	San Diego, CA
B.S. in Electrical Engineering w/ Machine Learning and Controls Specialization	<i>June 2017</i>

Machine Learning	Machine Learning for Signal Processing, Deep Learning Systems, Linear and Nonlinear Optimization, Pattern Recognition and Machine Learning, Robotics and Machine Intelligence, Linear Control Systems Theory, Unsupervised Learning, Digital Signal Processing
Neuroengineering	Intro to Neuroengineering, Functional Neuroimaging, Biological and Artificial Neural Networks, Medical Image Processing, Data Science of Physiological Time Series

SKILLS/ACTIVITIES

Research	Multimodal Behavior Sensing, Scientific and Data Visualization, Tensor Decomposition, Complex Systems, Network Science, Digital Biomarkers, Behavioral and Physiological Synchrony, Time-Series Analysis, Digital Biomarkers, Biomedical Informatics, Behavioral Signal Processing, Affective Computing, Machine Learning
Programming Languages	Python, C, C++, Java, MATLAB, CSS, HTML, Julia
AI/ML/DS Modules	Pytorch, Keras, Tensorflow, Tensorly, OpenCV, Scikit-learn, NumPy, SciPy, Pandas, Statsmodel, Dipy (Diffusion Imaging in Python), NLTK, spaCy, Huggingface (transformers – BERT), NetworkX, Librosa, GeMAPS, COVAREP
Visualization Modules	Matplotlib, Seaborn, Plotly, Vega, Altair, Fury.gl, Blender, trimesh
Tools	GitHub, UNIX, AWS, MySQL, Postgres, High Performance Computing, Apache Spark, REDCAP, REST API
Languages	English (Fluent), Chinese (Fluent), French (Moderate)