

# MENGXUAN MA

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## EDUCATION

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|--|---------------------|-----------------------------|
| University of Missouri- Columbia                       | Overall GPA: 3.81/4 | Expected May 2020           |
| • Doctoral Degree in Electrical & Computer Engineering |                     |                             |
| University of Missouri- Columbia                       | Overall GPA: 3.85/4 | August 2013 - December 2015 |
| • Master of Science of Electrical Engineering          |                     |                             |
| Beijing Jiaotong University, China                     | Overall GPA: 3.19/4 | September 2009 - June 2013  |
| • Bachelor of Engineering                              |                     |                             |

## SKILLS

### **Programming:**

- Python (sklearn, pandas, numpy), SQL, C#, C/ C++, MATLAB, HTML, Verilog, VHDL, Assembly language

### **Analysis Techniques:**

- Classical & Penalized Regression Methods (Lasso, Ridge), Decision Tree, Random Forest, Support Vector Machine, Clustering Algorithms (K-means, Fuzzy C-Means, Density-based clustering algorithms), K Nearest Neighbors
- Principal Component Analysis (PCA), Regularization, Feature Engineering, Model Evaluation
- Exploratory Data Analysis, Experimental Design, Hypothesis Testing, A/B testing

### **Tools:**

- MySQL, Spark, Tensorflow, Keras, Caffe, AWS

## WORK EXPERIENCE

McNerney Management Group, Inc. Columbia, Missouri June - August 2018

### ***Web Application Development Internship***

- Developed a customer relationship management web application that helps agents and staffs manage complex business database and information.
- Designed and implemented a MySQL database to store the data of clients and employees with different roles.
- Implemented the register and login panel, admin panel and to-do-list function in the web application.
- Leveraged Knowledge in .NET, MySQL, Git, and debugged using Visual Studio and Chrome Developer Tools.

University of Missouri-Columbia Columbia, Missouri August 2016 - Present

### ***Graduate Research Assistant in Center for Eldercare and Rehabilitation Technology, College of Electrical and Computer Engineering***

## PROJECTS

### **Daily Activity Recognition and Assessment System for Stroke Rehabilitation**

- Developed a daily activity logging system to record depth frames and skeletal joint data of a stroke patient.
- Investigated variety depth sensors to provide a more efficient and stable system including the Microsoft Kinect, a VicoVR sensor TVico sensor and a compact standalone system using the Orbbec sensor.
- Proposed a Convolutional-De-Convolutional Networks to recognize actions from the recorded depth videos.
- Tested the algorithm on real-life cooking videos in four different kitchen environments with ten participants. The action recognition accuracy for real-life continuous unsegmented videos was 87.5%.
- Performed quantitative assessments for each recognized action. The proposed reaching, speed, efficiency and smoothness metrics were employed to assess hand motions using the collected skeletal joint data.
- Utilized: Caffe, C++ programming, C#, Python

### **Movie Recommendation System**

- Implemented a movie recommendation system using Collaborative Filtering algorithms.
- To predict the ratings for movies accurately, two models were investigated. An Alternating Least Squares (ALS) model was implemented using Spark APIs and an autoencoder network was implemented on Tensorflow platform.
- Implemented models were evaluated using the MovieLens 1M dataset. 70% of the data were randomly selected for training and the rest of the data was used for testing. The mean square errors of ALS model and autoencoder network on test set were 0.877 and 0.989, respectively.
- Utilized: Spark, Tensorflow, Python

### **Angel-Echo: A Personalized Health Care Application**

- Designed a personal health monitoring system that allows a user to acquire health information with a speech interface.

- Developed a system that received health information (heart rate, steps and skin temperature) collected from the Angel Sensor via Bluetooth GATT Protocol, and then stored the data to the Amazon DynamoDB database.
- Designed a new Amazon Echo skill on Amazon Web Service (AWS) to handle users' health-related requests, fetch the corresponding data from the database, organize the data to responses, and forward them to the Alexa Voice Service.
- Tested the Amazon Echo speech recognition accuracy on different populations. The voices from the younger subjects were more accurately recognized than the elderly subjects where the misunderstanding rate was 2.6% lower.
- Utilized: Python, Amazon DynamoDB, AWS, JavaScript

#### **Long-term Kinect-based Stroke Rehabilitation Game Assessment**

- Implemented a module to perform longitudinal motion assessments for a Kinect-based stroke rehabilitation game.
- Preprocessed the collected data by removing the duplicate samples, filling the missing samples and filtering the noise.
- Performed upper-body kinematic assessment using range of motion measures, efficiency and smoothness measures.
- Evaluated the structure of hand movement trajectories by applying a density-based algorithm, OPTICS.
- Performed the longitudinal assessments using polynomial regression for eight stroke patients to evaluate their recovery statuses.
- Utilized: Python (sklearn, pandas, numpy)

#### **HONORS**

- Student Travel Award for the IEEE BIBM 2018 conference
- NSF-funded Student Travel Award for the ACM/IEEE CHASE'17 conference
- Curator's Grant-in-Aid Scholarship - University of Missouri Fall 2014
- Second Class Scholarship—Beijing Jiaotong University October 2012

#### **PUBLICATION**

- [1] M. Ma, R. Proffitt, and M. Skubic, "Validation of a Kinect V2 based rehabilitation game," *PLOS ONE*, vol. 13, p. e0202338, 2018.
- [2] M. Ma, B. Meyer, L. Lin, R. Proffitt, and M. Skubic, "VicoVR-based Wireless Daily Activity Recognition and Assessment System for Stroke Rehabilitation," in *2018 IEEE International Conference on Bioinformatics and Biomedicine (BIBM)*, 2018.
- [3] M. Ma, M. Skubic, K. Ai, and J. Hubbard, "Angel-echo: a personalized health care application," presented at the Proceedings of the *Second IEEE/ACM International Conference on Connected Health: Applications, Systems and Engineering Technologies*, Philadelphia, Pennsylvania, 2017.
- [4] M. Ma, R. Proffitt, and M. Skubic, "Quantitative Assessment and Validation of a Stroke Rehabilitation Game," in *2017 IEEE/ACM International Conference on Connected Health: Applications, Systems and Engineering Technologies (CHASE)*, 2017, pp. 255-257.
- [5] M. Ma, B. Hotrabhavananda, J. Hall, and M. Skubic, "Assistive adjustable smart shower system," presented at the Proceedings of the *Second IEEE/ACM International Conference on Connected Health: Applications, Systems and Engineering Technologies*, Philadelphia, Pennsylvania, 2017.
- [6] M. Ma, "Reducing chip count with a programmable system on chip in personnel detection using signal scavenging," M.S., Electrical engineering, University of Missouri--Columbia, 2015.
- [7] J. Collins, J. Warren, M. Ma, R. Proffitt, and M. Skubic, "Stroke patient daily activity observation system," in *2017 IEEE International Conference on Bioinformatics and Biomedicine (BIBM)*, 2017, pp. 844-848.