SHUYUAN YANG

sxy841@case.edu | +1 551-358-0486
12201 Larchmere BLVD, Apt 324, Cleveland, OH, 44120

EDUCATION

Case Western Reserve University (CWRU), *Cleveland, OH* Aug. 2022 - Present
MS in Computer Science, GPA: 3.33/4.0

University of West Florida (UWF), *Pensacola, FL* Aug. 2019 - Jul. 2020
International Exchange Program, GPA: 3.7/4.0
Honor: Dean's List for Fall 2019 & Spring 2020

Taiyuan University of Technology (TYUT), *Taiyuan, China* Sep. 2016 - Jul. 2020
BS in Software Engineering, GPA: 3.11/4.0
Honor: Individual Scholarship of TYUT in 2017

POSTER

My H. Le[1,2], **Shuyuan Yang**[2], Kyle R. Golobish[3], Juan C. Beaver[2], and Zonghe Chua[1], ***Vision-Based Force Estimation for Minimally Invasive Telesurgery through Contact Detection and Local Stiffness Models***, submitted to ***IROS 2023***

RESEARCH

Vision-based Force Estimation of Surgical Robot May. 2023 - Present
Supervisor*: Prof. Zonghe Chua (CWRU)*

In scenarios where access to robot kinematic and camera parameters data is not available, this research devises an alternative approach to estimate a normalized 3D end-effector position from video data based on extracted keypoints from DeepLabCut. The movement of the end-effector is tracked from stereoscopic video of the surgical robot and then deep neural network (DNN) and graph neural network (GNN) are used to estimate the relative depth of the end-effector.

- Train and fine-tune neural models on a stereo video dataset to estimate the 3D coordinates of the end-effector
- Train DNN and GNN using keypoints coordinate matrices from stereo video, evaluate and compare data efficiency between DNN and GNN
- Pass 3D results to another part of the project to calculate displacement for force estimation

Reconstructing Surgical Robotic Operations Using Reinforcement Learning Aug. 2023 - Present
Supervisor*: Prof. Zonghe Chua (CWRU)*

- Take advantage of stereo keypoints of tracking techniques and coordinates from the previous project
- Follow the algorithm of Perspective-n-Point to find the optimal position of the camera for each video
- Put reinforcement learning agent into a dVRK simulator based on PyBullet, and find alignment position sets of the robot, which has the same viewpoint in the real and simulation

Application of Microblog Data Mining Based on K-means Algorithm Oct. 2019 – May. 2020
Supervisor*: Prof. Fan Liu (TYUT)*

This project used a web crawler to collect a certain range of data. Natural language processing (NLP) techniques were employed for embedding the raw data, making it fit the k-means clustering algorithm. To enhance the clustering performance, a user feature model was constructed by the principal component analysis (PCA). The project applied the k-means clustering algorithm to categorize user data effectively.

- Reviewed the background and similar scenario of the k-means algorithm and microblog data mining
- Crawled the microblog for dataset, and analyzed the text data with the natural language processing methods
- Considered the application of clustering on microblog data mining and mixed the clustering results with the principal component analysis embedding the user feature model

- Tired different methods to optimize the number of clusters for k-means to expand the decision boundary

Chinese Semantic Automatic Grading System Oct. 2018 - Jan. 2019

***Supervisor**: Prof. Zehua Chen (TYUT)*

- Compared the similarity of Chinese paragraphs based on natural language processing
- Searched open sources software for distributed processing of data streams, and integrated multiple tools
- Used Tkinter to make GUI and implemented a simple sentence similarity comparison system

SELECTED PROJECTS

Machine Learning Project: Multiple Instance Learning Aug. 2022 - Dec. 2022

Supervisor: Prof. Soumya Ray (CWRU)

- Implemented two Multi-Instance Learning algorithms miBoosting and miFV using Python
- Used Numpy objects and methods to significantly optimize the program's runtime
- Proposed an improvement method and hyperparameter optimization instance that can improve the accuracy of cross validation greatly

Capstone Project: Single Page Web Application Development Jan. 2020 - Apr. 2020

Supervisor: Dr. Steven P Bitner (UWF)

- Developed a course schedule planner system to help students manage and preview their course selection
- Used Git to coordinate multi-person development, such as module development and bug fixing
- Loaded on the cloud, collected data by MongoDB Atlas and deployed the server on the AWS domain and deployed the project to AWS periodically

INTERNSHIP

China Telecom Group System Integration Co., Ltd, Taiyuan Branch Aug. 2021 - Sep. 2021

Intern of the Network Operation Section

- Provided maintenance and solutions for the local network operators
- Helped users to appropriately allocate IPv6 in fiber optic modems and routers, and add Dynamic DNS
- Undertook telecom wireless network coverage test, analyzed and summarized the test data in matplotlib

EXTRACURRICULAR INVOLVEMENT

TYUT Robot Team

Fighting Robot Project, *Team Leader* Dec. 2017 - Aug. 2018

- Designed Robot with Solidworks, manufactured and assembled the wheel type robot
- Coded movement and drew fighting strategy on STM32 series single-chip microcomputer by C, built two different styles of fighting robot
- Learned MCU programming, used digital filtering algorithm to solve the problems of sensor numerical fluctuation, and utilized timer output high-frequency PWM square wave control motor
- Won the **First Prize** in the 2018 World Robot Contest Fighting Robot Competition (5%)

3D Printing Project, *Team Leader* Sep. 2017 - Dec. 2017

- Got familiar with preprocessing, such as slicing the model and optimizing the support structure, of the FMD 3D Printer and 3D Scanner
- Utilized 3D Printer to manufacture the digital models
- Won the **Second Prize** in the National 3D Innovative Design Competition

SKILLS

Programming Languages: C/C++, JavaScript, Python, Bash