Zhiming Ruan

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EDUCATION

University of Michigan -- Shanghai Jiao Tong University(SJTU) Joint Institute   Sep 2015 - May 2019
B.S.E. in Electrical and Computer Engineering, Overall GPA: 3.7/4.0
University of Michigan -- Ann Arbor   Aug 2017 - May 2019
B.S.E. in Computer Science (Joint Program), Overall GPA: 3.8/4.0
- ❑ Course Highlight: Intro. to Machine Learning, Computer Vision, Natural Language Processing, Autonomous Robotics, Reinforcement Learning, Information Retrieval, Operating System, Web System

RESEARCH EXPERIENCES

SMC inference in tracking large articulated models | University of Michigan | Research Assistant   Mar 2019 - Sep 2019
Advisor: Chad Jenkins, Associate Professor in Computer Science and Engineering, University of Michigan
- ❑ Researched and applied faster-rcnn on tool detection and tool parts detection
- ❑ Built infrastructure for human-robot interaction and a Rviz interface for demonstration and testing
- ❑ Designed a user-friendly user interface for robot manipulation on tools
- ❑ Formulating and designing Sequential Monte Carlo factor graph message passing in objects pose estimation and tracking
- ❑ Implemented Particles Filter pose estimation for baseline comparison on RBO dataset
- ❑ Submitted research paper to **ICRA 2020** (under review)

Deep Learning on Velocity Flow Field Prediction | UM-SJTU Joint Institute | Research Assistant   May 2018 - Sept 2019
Advisor: David Hung, Associate Dean and Professor at the University of Michigan -- Shanghai Jiaotong University Joint Institute
- ❑ Researched and applied deep learning models based on LSTM-RNN on velocity flow field prediction in real engines
- ❑ Managed to provide real-time prediction on patterns of upcoming flow fields with small errors
- ❑ Proposed a novel way of studying traditional in-cylinder air flow structure based on deep learning models
- ❑ Submitted research paper to **Applied Thermal Engineer** (under review)

WORKING EXPERIENCES

UM-SJTU Joint Institute | Teaching Assistant for Probabilistic Method in Eng. | Shanghai   May 2018 - Aug 2018
- ❑ Provided recitation or review class every week
- ❑ Graded homework assignments and exam papers
- ❑ Held office hours every week
- ❑ Provided students feedbacks to course instructor to improve overall course quality

PROJECT EXPERIENCES

The Botanist -- an Autonomous Plant Caring Robot | University of Michigan   Jan 2019 - Apr 2019
- ❑ Implemented 2D SLAM on robots for navigation in unknown environment
- ❑ Built a communication system between robot and plant pots
- ❑ Designed an algorithm based on Deep Q-learning for light source searching using encoded sensor measurements as states
- ❑ Implemented a Spanning-Tree based algorithm for coverage of continuous areas by a mobile robot
- ❑ Designed and implemented a robust state machine for the autonomous system

Automatic Timeline Builder for Social Events | University of Michigan   Feb 2019 - Apr 2019
- ❑ Designed an efficient recursive searching pipeline for social event timeline builder
- ❑ Researched and applied a rapid automatic keyword extraction algorithm for search result summary
- ❑ Researched and applied *GloVe* model for word embedding
- ❑ Implemented a tool to filter out irrelevant information and build timeline for social events

Customized region replacement tool on RGB images | University of Michigan   Oct 2018 - Dec 2018
- ❑ Implemented a tool to remove undesirable elements in an image and fill in with meaningful global texture in its background
- ❑ Applied YOLOv3 to provide object bounding boxes for customized object selection
- ❑ Designed an algorithm to calculate region patch size for inpainting using *Potts Energy* and *Gaussian Kernel*
- ❑ Implemented Exemplar-Based Inpainting for content selection and improved it for higher computational efficiency

Genre Prediction | University of Michigan   Oct 2018 - Dec 2018
- ❑ Implemented seven different methods for genre prediction including *Gradient Boosted Decision Tree*, *SVM*, *Naive Bayes*, *Random Forest*, *Neural Network*, *Logistic Regression* and etc.
- ❑ Implemented different word representation models including *Binary Features*, *Bag of Words*, *Tf-idf*
- ❑ Provided meaningful evaluation on each word representation model and genre prediction model

Dynamic pages for photo sharing application | University of Michigan   Jan 2018 - Feb 2018
- ❑ Implemented a dynamic pages photo sharing application similar to Instagram
- ❑ Applied React framework for front end user interface
- ❑ Built a database of user information with SQL and applied Rest API to realize dynamic pages

SKILLS

Programming: C/C++, Python, R, Matlab, Html, Java Script, Mathematica, Latex, Shell, Linux, ROS, PyTorch, TensorFlow
Modelling: Blender, AutoCAD