JUNJIA LIU

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PERSONAL STATEMENT

My research interest lies primarily in Reasoning, Representation Learning, Reinforcement Learning and Probabilistic Deep Learning applied on Robot Intelligent Control.

EDUCATION

01/09/2018-01/06/2021 Shanghai Jiao Tong University   **Shanghai, CN**

Master of Engineering in Robotics   **GPA: 3.65/4.0**

Main courses: *Fundamental modules including Intelligent Control Theory (A+) Digital Signal Processing (A), Matrix Theory (A); Practice-based modules on Robotics including Performance Simulation and Control of Robot (A-), Intelligent and Connected Vehicle Technology (A-).*

01/09/2014-01/06/2018 Southwest Jiaotong University   **Chengdu, CN**

Bachelor of Engineering in Mechatronic Engineering   **GPA: 3.71/4.0**   **Rank: 1/22**

Main courses: *modules mainly covering Mechanical Engineering, Electronic Engineering and Control Theory. Linear Algebra (97), Engineering Courses Mathematics Analysis (94), Probability Theory and Mathematical Statistics (93), Computer Programming and Database Basis (93), Electrotechnics (90), Theory of Machines and Mechanisms (87), Basics of Control Engineering (99), Machine Vision and Intelligent Mechanical and Electrical Equipment (91).*

Awards and honours:

2019 SJTU School Scholarship for Technological Innovation

2019 Best Technology Award, Deecamp 2019 Deep Learning Summer Camp

2019 Silver Medal Winner, RoboMaster Competition

2017 1st Prize in Sichuan Province, "Challenge Cup" for Academic and Technology Contest

2017 National Scholarship for undergraduate students

2016 National Scholarship for undergraduate students

2015 1st Prize in Sichuan Province, National Mathematical Modelling Contest for University Students

Publications:

1. (To be published) **Junjia Liu**, Jianfei Guo, Jingtao Xue. ReGReT: Regret Reasoning and explicit Graph Representation for Target-driven navigation.

2. (To be published) **Junjia Liu**, Jiaying Shou, Zhuang Fu, Hangfei Zhou, Rongli Xie, Jun Zhang, Jian Fei, Yanna Zhao. Efficient reinforcement learning control for continuum robots based on Inexplicit Prior Knowledge. *Paper Link*

3. **Junjia Liu**, Huimin Zhang, Zhuang Fu, Yao Wang. Learning Scalable Multi-Agent Coordination by Spatial Differentiation for Traffic Signal Control, *Engineering Applications of Artificial Intelligence (EAAI)*. *Paper Link*

4. Yuxin Li, **Junjia Liu**, Zhuang Fu , Rongli Xie, Jun Zhang, Jian Fei, Yanna Zhao. A novel cRes-GAN algorithm for thyroid node detection and classification, *Mechanical and electronic engineering*.

5. Huimin Zhang, Yafei Wang, **Junjia Liu**, Chengwei Li, Taiyuan Ma, Chengliang Yin. A Multi-Modal States based Vehicle Descriptor and Dilated Convolutional Social Pooling for Vehicle Trajectory Prediction, *SAE Conference 2020*. _Paper Link_

RESEARCH AND WORK EXPERIENCE

08/07/2020-present Central Research Institute, 2012 Laboratory, Huawei Technologies Co., Ltd.   **Beijing, CN**
Intern Robotics AI Engineer
➢ Engaged with Huawei robotics research on enhancing the active object navigation of domestic robot employing reasoning and representation learning;
➢ Improved the robot target-driven navigation task by abstracting its planning procedure into a bandit problem with the proposed reasoning method based on structured prior knowledge, expecting to realize an intelligent reasoning exploration;
➢ Built a representation graph rendering the observed scenes and exploited it as an environment model; Adopted this method to replace the explicit SLAM mapping and simple function approximation, delivering better generalization, robustness and flexibility for scene updates;
➢ The research article will be submitted to the ICRA2021 conference for review.

02/2020-present   Intelligent Robot Lab of SJTU   **Shanghai, CN**
Project leader
➢ Led the research project in collaboration with Shanghai Ruijin Hospital, exploring the efficient reinforcement learning (RL) control for continuum robots based on inexplicit prior knowledge;
➢ Proposed a new and data-efficient model-based RL framework that integrates inexplicit prior knowledge (IPK) using Kalman filter and can be directly deployed to the robot without simulation;
➢ The research article will be submitted to the ICRA2021 conference for review.

01/07/2019-31/08/2019   Deecamp 2019 - Deep Learning Summer Camp   **Shanghai, CN**
Team leader
➢ Led the team and applied the concept of multi-agent reinforcement learning in building an intelligent traffic control system;
➢ Developed, combined with Attention Mechanism, a scalable multi-agent coordination by spatial differentiation for traffic signal control, managing to relieve the congestion and make decisions based on the analysis of comprehensive traffic conditions.
➢ Rewarded the Best Technology Award in Deecamp and published the research article in EAAI journal.

07/2019-12/2019   Intelligent Robot Lab of SJTU   **Shanghai, CN**
Research member
➢ Developed a novel cRes-GAN algorithm for detecting and classifying thyroid nodes.
➢ Designed the cRes-GAN algorithm based on 1501 original samples in the DICOM format, significantly expanding the data conditions and increasing the diagnosis accuracy to 92.2%;
➢ The proposed method was adopted by Shanghai Ruijin Hospital in clinical treatment as an auxiliary diagnosis method; the research article was published in *Mechanical Engineering and Technology*.

06/2019-03/2020   Autonomous Vehicle Lab of SJTU   **Shanghai, CN**
Research member
➢ Proposed a multi-modal vehicle description and dilated social pooling based vehicle trajectory prediction, helping the autonomous vehicles judge the coming cars' intention of changing lanes;
➢ Achieved better accuracy in public data set than that of the SOTA algorithms;

➢ The research article was published in *SAE International Conference*.

01/2019-07/2019   RoboMaster 2019   **Shanghai, CN**
Member of Electronic Control Group of SJTU Jiaolong Team
➢ Participated in the competition and worked with the teammates on designing, assembling and controlling four kinds of robots;
➢ The designed robots were tested for their electronic control level in dual meet; obtained the Silver Medal Winner in the national finals.

09/2018-01/2019   Intelligent Robot Lab of SJTU   **Shanghai, CN**
Project participant
➢ Designed a DDPG control for an automatic transmission robot for Pan Asia Technical Automotive Center (PATAC);
➢ Developed an autopilot for tracking the vehicle's speed using robotics techniques, aiming to meet the WLTC standards implemented by automakers in the emission test;
➢ Utilized Reinforcement Learning's deep deterministic policy gradient (DDPG) to assist the robot to control the speed of a real-world vehicle following the WLTC curve.

RELEVANT SKILLS
➢ Languages: native in Chinese and proficient in English (IELTS: 7.0).

➢ Certificates: Computer Level 3: network technology;

    Computer Level 2: MySQL database;

    Computer Level 2: C language.

➢ Programming Language:

    Python (advanced level, AI programming);

    C language (intermediate, Robot Hardware Control, like STM32);

    C# language (intermediate, Robot Software Development);

    MATLAB (intermediate, scientific computing).

➢ Deep Learning Framework:

    PyTorch, Tensorflow, Keras, Ray.

➢ Robot Design:

    STM32, Solidworks, Auto CAD.

➢ Software and Network:

    PyQt, Socket, HTML.