

# MINGXUAN LI

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## EDUCATION

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### Brown University

*Sept 2019 - June 2021(Expected)*

ScM in Computer Science, GPA: 4.0/4.0

Core Courses: Learning and Sequential Decision Making, Introduction to Robotics, Reintegrating AI

### Hong Kong University of Science and Technology(HKUST)

*Feb 2018 - June 2018*

Exchange Student in Computer Science, Major GPA: 4.0/4.3

Core Courses: Intro to Bayesian Networks, Data Visualisation, Database Management System

### Beihang University

*Sept 2015 - June 2019*

B.S in Computer Science and Technology, Overall GPA: 3.7/4.0

Core Courses: Compiler Theory, Operating System, Image Processing and Pattern Recognition

## RESEARCH INTEREST

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Reinforcement Learning, Efficient Planning, Adversarial Defense.

## PUBLICATIONS

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- **Interpretability is a Kind of Safety: An Interpreter-based Ensemble for Adversary Defense - KDD 2020 (Accepted)** *Jingyuan Wang, Yufan Wu, Mingxuan Li, Xin Lin, Junjie Wu, Chao Li*
- **Replication of “When to Trust Your Model: Model-Based Policy Optimization” - Preprint** *Mingxuan Li\*, Xiaoyu Jiang\*, Qiuxuan Chen\*, Shiyi Han\*, Jingyan Dong\*, Ruochen Zhang\**
- **Detecting and Recovering Adversarial Examples: An Input Sensitivity Guided Method - Preprint** *Mingxuan Li, Jingyuan Wang, Yufan Wu, Shuchang Zhou, Chao Li*

## SELECTED RESEARCH EXPERIENCE

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### Learning to Control with the Explainable Latent Dynamics Graph

Mar. 2020 - Current

*Advisor: Prof. Michael L. Littman*

*RLab, Brown University*

- Proposed the Latent Local Planning Network, a world model that explicitly learns the latent dynamics purely from pixel inputs without reconstruction;
- Model interpretability emerges as an intrinsic property of explicit model of the latent dynamics;
- Proposed soft lambda return actor-critic learning behaviours from purely simulated trajectories generated by world model.

### Planning with Hierarchical State Partitions

Feb. 2020 - Current

*Advisor: Prof. Michael L. Littman*

*RLab, Brown University*

- Designed a hierarchical planning framework based on state partitions enabling fast value propagation and guaranteed optimal convergent policy;
- Proved that the problem of finding planning amenable state partition is in general NP-complete;
- Proposed a hierarchical state partition algorithm with near-optimal partition quality.

### Towards Sample Efficient Agents through Algorithmic Alignment

Mar. 2020 - May 2020

*Advisor: Prof. Michael L. Littman*

*RLab, Brown University*

- Designed the Deep Graph Value Networks (DeepGVs) to show the potential of GNNs to support sample efficient learning agent;
- DeepGVs efficiently solved MDPs and outperformed unstructured baseline by a large margin;
- Found that neural networks with structured computation procedures can be trained more efficiently because of algorithmic alignment;
- Poster accepted by DLRLSS 2020.

### **Robust Adversaries Detection and Recovery**

Mar. 2019 - Nov. 2019

*Advisor: Prof. Jingyuan Wang, Dr. Shuchang Zhou*

*Megvii CV Group, Beihang U*

- Proposed an input sensitivity based adversarial examples detection and recovery pipeline with an average of 96% detection accuracy and high robust classification accuracy against famous adversaries;
- Provided an optimization view of adversarial examples' intrinsic properties that can differentiate them from normal inputs;
- Significantly increased attacking cost and decreased attacking success rate when combining the detector and the rectifier together;
- Formed two research papers as first author and second student author, respectively, one of which is accepted by KDD 2020.

### **On Neural Network Interpretability**

Aug. 2017 - Jun. 2018

*Advisor: Prof. Jingyuan Wang*

*Big Data Intelligence Group on SmartCity, Beihang U*

- Proposed an algorithm called Tree2Net extracting rules from decision trees to initialize a neural network (tree to network) and reverse the procedure to find out what the network has learnt (network to tree);
- Independently built the self-defined network structure with the most basic operator;

### **Unsupervised Multi-Modal Neural Image Style Transfer**

May 2018 - Aug. 2018

*Advisor: Dr. Xinlei Pan*

*Berkeley Artificial Intelligence Research Lab, UC Berkeley*

- Proposed a model in combined use of Bayesian GAN and Cycle GAN;
- Achieved multi-modal image generation and unsupervised leaning simultaneously;
- Attempted to apply Stochastic Hamiltonian Gradient Monte Carlo sampling to the network parameters.

### **”BDCI & Alibaba Cloud Cup” Data Mining Competition**

Sept. 2017 - Nov. 2017

*Advisor: Prof. Jingyuan Wang*

*Big Data Intelligence Group on SmartCity, Beihang U*

- Worked on mobile phone user localisation in a shopping mall using shop ID and WIFI information;
- Gained a 30+ ranking improvement after combining a modified neural-network architecture proposed in a paper entitled Deep Neural Networks for wireless localization in indoor and outdoor environments published in Neurocomputing, Vol. 194, June 2016;
- Led a 4-member team and achieved the national rank of 130/2845 (4%).

## **INTERNSHIP EXPERIENCE**

### **Turing Microbe Co.,Ltd**

Mar. 2019 - Jul. 2019

*Advisor: Prof. Wei Xu(IIIS, Tsinghua U)*

*Computer Vision Research Intern, R&D Department*

- Analysed over 30,000 cases of gynaecological diseases data with T-SNE and unsupervised deep clustering techniques to give doctors insights on new taxonomy for Bacterial Vaginal(BV) diagnosis;
- Used StyleGAN to generate realistic and highly diverse BV images for training young doctors;
- Highly recognised by Prof. Qiping Liao, the chairman of Chinese Medical Doctor Association, gynaecology branch, for insightful data analyse and practical application value of the image generation pipeline.

**Wealth Engine Technology Co., Ltd**

Aug. 2017 - Jan. 2018

*Advisor: Prof. Changle Lin(IIIS, Tsinghua U)**Machine Learning Engineer, R&D Department*

- Analyzed real-world stock and fund investment log to construct better investment strategy;
- Used random forest/Xgboost to build a customer churn prediction system, which is still in use;
- Used linear regression and regression tree to price financial products for different customer group.

**SELECTED PROJECTS**

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**PiDrone: An autonomous drone using Raspberry Pi**

Sept. 2019 - Dec. 2019

*Course Project**Brown University*

- Built a drone equipped with Raspberry Pi from scratch under the guidance of online manuals;
- Implemented core algorithms to enable the drone to fly, including PID controller, speed control with optical flow, state estimation with unscented Kalman Filter and position control with SLAM;
- Got a solid grasp of foundations of robotics and probabilistic control theory.

**JPEG-2000 Standard Image I/O Pipeline**

May 2019 - Jun. 2019

*Personal Side Project**Beihang U*

- Implemented 2D-FastDCT and 2D-FFT in JAVA;
- Analysed JPEG-2000 ISO standard and implemented the whole I/O process including image header information extraction without using any external JAVA image processing packages;
- Provided a visual interface for previewing the processed image along with its grey scale distribution.

**SELECTED COURSES**

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**Mathematical Analysis for Engineering(I)**

98 (Top 1%)

**Discrete Mathematics(I)**

99 (1/218)

**Advanced Algebra for Engineering**

95 (Top 5%)

**Introduction to Machine Learning**

100 (1/162)

**Data Visualisation**

A+ (1/86)

**Introduction to Bayesian Networks**

A- (Graduate Level)

**Image Processing and Pattern Recognition**

100 (1/65)