

Motivation Letter

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Dear Professor

I am writing to apply to your PhD program: Robotics and Artificial Intelligence. My ambition is to be a researcher on Artificial Intelligence with specific expertise in robot learning.

In 2014, I entered Tongji University to pursue my master's degree in software engineering. I took the Machine Learning course on Coursera and I was fascinated by how a very simple equation will describe extremely complex phenomena and how we can squeeze nature into a formula. But more importantly, ML provided an implementing approach for AI and gave me an insight of problem solving in the real world. In early 2016, the school of software engineering held the First Tech Challenge 2016 robot contest(FTC), and I volunteered as a final match referee out of curiosity. I watched the robots built, designed, programed and operated to complete specified tasks, suddenly it occurred to me that if we would combine these robots with machine learning or other approaches aiming to implement AI. Specifically, let these robots autonomously move to assigned areas based on image data from its camera sensor and actively practice grasping balls instead of a human controlling them. This interesting thinking really intrigued and excited me for few days, but gradually faded from my mind by other projects and researches.

In early 2017, due to my curiosity about how the applications of AI can solve real-world problems, I took the special offer from Tencent, a global leading internet company, where I worked as an associate researcher in Advertising Engine & Data Algorithm Center. One year later, we built an online large scale advertising system called Walrus, in which we designed multilevel caching strategies based on Presto and its query efficiency increased by five to ten times. More importantly, we applied a factorization machine based Neural Network, namely DeepFM, to enhance the CTR (Click Through Rate) prediction, and this model beat all models that we built before such as Logistic Regression, CNN and RNN. During this year, I noticed most of the applications of Machine Learning were confined to a form of web service and interacted with the world solely in the form of web applications, cloud services and so on. Consequently, I kept asking myself, is there an agent with AI to interact with the world directly and learn from its own experience instead of a human feeding it training data. One day I watched the video in Ted by Marc Raibert, the founder of Boston Dynamics, in which he showed the SpotMini robot can run, hop and even open doors and I knew these robots are exactly perfect carriers of the AI and this thinking coincided with my idea one year ago in the FTC. Therefore, this particular momentum drove my desire to master Robotics and AI, and develop my career in this area of expertise.

I am a highly self-motivated person focusing on pursuing excellence. During my first year of graduate school, resolutely working on academic courses gave me the honor of The Excellent Student of Tongji University. In the following year, considering my excellent research performance on Criminal

Network Analysis, I won the China National Scholarship (top 0.2% nationwide). In the last year, I graduated with the honor of The Outstanding Graduate of Tongji University due to the excellence of my entire graduate study and my graduation thesis on Source Code Mining with Topic Modeling. Complementing my academic performance are my strong skills in teamwork and communication. 2017 is the 110th anniversary of Tongji University and one part of the schedule was to guide foreign friends to visit our campus. As the vice-president of Graduate Entrepreneurs Club, I coordinated the Graduate Student Union to design the tour route and I volunteered to present some incubation projects to them in the Tongji Venture Valley. With adequate preparation, the presentation finally won their admiration and Christian Thomsen, the President of TU Berlin, also spoke highly of our valley.

I really enjoy inspiration from learning new things. In the project of criminal communication data analysis, the network analysis method came to my mind at first sight of its data structure. When analyzing the network structure, I realized my work could borrow some classical metrics from Social Network Analysis and also could visualize the criminal network with certain force layouts. All of this is because I just finished the course of Social Network Analysis and Data Visualization on Coursera. Finally, our works was accepted by the International Conference on Software Engineering and Knowledge Engineering (SEKE2016) and Jerry Gao, PC chair of SEKE2016, invited us to submit this work to IJSEKE Special Issue as being one of the best papers. In my resume you can see that I took lots of AI related courses on Coursera out of interest. Even if for now, I am still make full use of time to learn "Practical Reinforcement Learning" course on Coursera and read reinforcement learning: An Introduction. Recently I have done a project of Behavior Cloning with End to End network in a car simulator after reading NVIDIAs End to End Learning for Self-Driving Cars paper. Now this network managed to drive on both known and unseen tracks endlessly. Not only that, I started to build a robot.

I want to study at your University because of your outstanding educational system, focus on gathering relevant work experience, and your excellent facilities. From speaking with students and professors from your university and other universities, I am confident of my decision. With many distinguished scientists as professors, I know that I will gain expert knowledge at the forefront of discovery. Further supporting professors lectures are your universitys use of advanced equipment and cooperation with top AI research centers. All these strong positives allow me to to research cutting-edge technologies, such as robot learning, and to pursue my dreams and ambitions.

The recommendation letters as follows :

- **Dr. Yan Liu** - yanliu.sse@tongji.edu.cn
- **Dr. Buyang Cao** - caobuyang@tongji.edu.cn

I look forward to hearing from you. Please feel free to contact me if you need any additional information.

Sincerely,

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