

PERSONAL STATEMENT

Huayu Chen

chenhuay17@mails.tsinghua.edu.cn

My research interests lie primarily in the area of computer vision (espeacially 3D vision and graphics), and its deployment and application on a robot. I am fortunate to conduct relative research and participate in various competitions at Tsinghua University for the past two years and find myself fascinated by the goal to make AI practically useful in daily life, and would be very excited to assist with research in related fields.

I believe my strong academic background can help me to make contributions to your group. As a major in the Department of Automation at Tsinghua University, I have established a solid mathematical and programming background. I now have a cumulative GPA of 3.87/4.0, ranking top3 in our department which has 166 students. Among all courses I have taken in mathematics and programming, I received 4.0 in all of them. In addition to my grade, I was awarded a National Scholarship (highest scholarship given by the government of China) and the 129 Scholarship (an annual honor reserved for the most top student in every Department of Tsinghua University).

With a keen interest in working with 3d computer vision task, when I was in my sophomore year, I joined the laboratory of Prof. Yebin Liu in the field of 3d human reconstruction. My first research was conducted with a Ph.D. student, about designing a video based virtual try-on system. At first we were only thinking about conducting temporal optimization based on already proposed image-based virtual try-on algorithms. In this process, however, I discovered that in a image-based virtual try-on system, much of information about the clothing is lost, among which are dynamic details of clothing. Being aware of this problem, I turned my target to designing a video to video try-on system and eventually proposed a lightweight method which leverages both parametric 3d human model (SMPL) representations as well as reconstruction and a learned deep refinement network to synthesis near video-realistic try-on results. To the best of our knowledge, our approach is the first one to consider the transfer of video-based dynamic details of clothing in virtual try-on system in 2d manner and the final result are quite promising.

Deep learning has prevailed in various areas, but the increasing performance comes at the cost of larger computational complexity and bigger model size, which raises serious challenges. I came to realise this when I was conducting my first research. So this semester I begin to delve neural network compression tasks. To be specific, I am trying to use evolutionary algorithm to search for topologies of pure logic neural networks similar to BNN(binary neural networks) for object classification. Such networks will not have any trainable "weights", and their outputs will only be determined by inputs and network structure. This surely is going to be a very challenging task because it can be proved in theory as a NP-hard problem. Inspired by NEAT, which is an established topology search algorithm notable for its ability to optimize the weights and structure of neural networks simultaneously, I rewrite the NEAT python library so that the algorithm can be used to search for binary network structures instead of classical ones, resulting in bNEAT (binary NEAT algorithm). Although the curriculum burden is really heavy at Tsinghua, I managed to squeeze in time to demonstrate my work on MNIST dataset. The research is still in progress and I look forward to continuing to work on it.

Due to my personal interests, the deployment and application of 3d computer vision algorithm on a robot such as SLAM or other robotics topics are also the domains that attract me a lot. Although I have not conducted much formal academic research in the field of robotics, I have learned concerning theories and engineering skills by myself and participated in several competitions. This summer, I was invited as 1 out of 8 students from mainland China to go to MIT to take part in the International Design Contest(IDC ROBOCON 2019, MIT) and finally won the championship. Also, I am the caption of the champion team in Tsinghua's most well-known electronic design competition, beating other 95 teams from Tsinghua. I won the first prize in both National Physics Olympiad and China Regional College Students Physics Competition. Having conducting research on 3d computer vision problem and network compression, I have polished my problem-solving skills by means of mathematics and programming. Consequently, I feel confident to adapt to new topics quickly.

I believe my research abilities and problem-solving skills can make meaningful contributions to the group, and I am looking forward to working for your group this coming summer!