MINGHAO SUN (ALEXANDER SUEN)

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Prof. Liu
Mila - Quebec AI Institute
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Dear Prof. Liu,

I hope this message finds you well. My name is Minghao Sun (Alexander Suen). Currently, I am a final-year undergraduate student at Zhejiang University (ZJU) in Hangzhou, China, where I major in Veterinary Medicine & Statistics and minor in Computer Science. As I approach the end of my undergraduate program, I find myself deeply drawn to the field of Biologically Inspired AI. Your lab at NUS, particularly the work on "Developing AI Inspired by Cognitive Science," has captured my interest. I firmly believe that understanding and replicating biological cognitive processes will lead to the next breakthrough in AI. With this letter, I wish to express my earnest desire to join your lab as a Research Assistant, with an aspiration to eventually pursue a Ph.D. Now I would like to take this opportunity to provide an overview of my research interests and educational background.

1. Research Interests

As I delved into medicine, I observed that our understanding remains elusive for many diseases, with conditions like Alzheimer's and certain cancers lacking effective cures. The emergence of advanced computational methods and AI introduced me to the possibility of addressing these medical enigmas. Projects I undertook in bioinformatics and AI led me to a vision of AI models that possess human-like reasoning capabilities.

Several years ago CNNs and attention mechanism brought a big revolution to the field of AI. I was particularly excited by these developments because they seemed to draw inspiration from certain biological principles. For instance, the hierarchical structure of CNNs, where initial layers detect simple patterns like edges and later layers recognize more complex structures, mirrors the way our brains process visual information. These groundbreaking ideas have fueled my eagerness to incorporate more biological principles into AI. Cognitively inspired AI holds immense potential for revolutionizing AI models, enabling them to emulate human cognitive processes and exhibit stronger generalization abilities. I am particularly enthusiastic about leveraging these mechanisms to enhance the generalization capabilities of AI models so that they behave more like human beings. What's more, numerous intricate biological mechanisms, such as neuroevolution, spiking neural networks, RLHF, and episodic memory, hold great promise for enhancing our AI models.

Moreover, the study and implementation of these biological mechanisms not only advances AI but also deepens our comprehension of the human brains, potentially shedding light on cognitive disorders. My fascination with the intricate workings of the brain has led me to have a big AI dream, albeit ambitious and challenging : to construct biological intel-

ligence from scratch. Such an endeavor would not only bring to life the intelligent robots depicted in science fictions but also provide answers to an important question: "What is Life?"

Your remarkable accomplishments, especially in enhancement of model architecture generalizations, multi-agent reinforcement learning and AI-assisted medicine have profoundly inspired me. I am excited by the prospect of quantifying cognitive mechanisms in AI models and believe that with my medical background and computational experience, I can contribute to the COGAI4SCI research.

2. Educational & Research Experience

I started on my undergraduate journey in 2018 with a major in Veterinary Medicine at ZJU. During the initial two years of my program, I dedicated my extracurricular hours to wet lab work under the guidance of Prof. Jin He. However, as my academic research progressed, I developed a growing interest in leveraging computational methods to address medical challenges. I believed that advanced computational approaches held the potential to revolutionize medical research.

During my clinical rotations, I couldn't help but notice the abundance of diagnostic data that could be harnessed and analyzed by computers, potentially supplementing or even surpassing the capabilities of clinical doctors. This realization inspired me to embark on two significant projects in 2020. The first involved developing a Convolutional Neural Network (CNN)-based system for grading kidney disease from CT-PET scan images, while the second focused on conducting a molecular evolutionary phylogenetic analysis of a gene family linked to cardiovascular diseases. In fact, my research experience in molecular evolution further ignited my fascination with simulating natural selection and evolution for AI models. This endeavor parallels the quest to understand the origins and emergence of biological intelligence.

Through these research experiences, I came to realize the paramount importance of a robust mathematical skills in delving deeper into these fields. In 2020, I made the decision to learn more about statistics and pursue a double degree program at Zhejiang University. In my fourth year, I successfully completed my veterinary medicine studies and chose to dedicate additional years to honing my knowledge of computer science and statistics. By my fifth year, I had completed all core computer science courses and further enhanced my mathematics expertise through statistics courses such as multivariate data analysis, statistical learning, and optimization algorithms.

Now, as I embark on my sixth and final year at ZJU, I am eager to immerse myself in the realm of cognitively inspired AI research, gaining some research experience for further study in that field.

3. Motivation

"When something is important enough, you do it even if the odds are not in your favor." As you can see, my path of pursuing my big AI dream is not smooth. I didn't start with a AI-related degree and I struggled a lot in so many courses and research projects. Through persistent effort, I've managed to surmount these obstacles. Today, I have embraced actively mathematics, programming, as well as research, and I am diligently working to transform my AI dream into reality. The joy derived from continuously acquiring new knowledge and employing cutting-edge technology to improve both medicine and everyday life has intensified my passion for AI and solidified my commitment to this field.

I am confident in my capacity to help expand the boundaries of what our models can accomplish, particularly in adaptability and generalization.

Considering my limited experience in cognitively inspired AI, I am highly enthusiastic about applying for the Research Assistant position in your lab, with the potential interest in pursuing a Ph.D. degree based on performance. For more information about me, you're welcomed to check my personal website here or contact me at mhsun29@zju.edu.cn. Please let me know if you require any additional information about my background or qualifications. Thanks a lot for your attention and time!

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Best Regards,

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Applicant

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