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Motivation Letter

Dear Director,

This is a motivation letter of application for PhD (candidate) on Digital Twinning of the 6G network.

My name is Zhiheng Yang, I am currently a second-year Master's Computer Science student at the University of Amsterdam and Vrije University Amsterdam. I am highly interested in applying for a PhD position in the MNS research group at the IvI.

In my academic performance, I have 4.0/4.0 (US) GPAs in both undergraduate and postgraduate (until now). And my master's study progress is ahead of the university's study plan.
According to some reports from Ericsson, AI is one of the good solutions for Digital Twin. And there are already some successful cases in the 5G environment. My past research included several Artificial Intelligence-related content. I specialized in data mining as an undergraduate. In my graduation thesis, my research was on deep learning-based recommendation algorithms, and it was awarded an Outstanding Graduation Thesis award. Currently, I am working on a paper which is related to 3D medical imaging at UvA. We are currently conducting experiments on medical datasets, but we would like to eventually provide a general approach. The idea is gradual merging of 3D masks predicted from different frames into the complete 3D scene masks. Another study is on Open-Vocabulary segmentation of point clouds (LiDAR datasets). This research is the latest, and it has been possible to input a string of text prompts (such as "round bench near the window") and return specific parts of semantic objects in a 3D scene. For now, the performance is what we are pursuing. In addition to these large models, another one is GPT@VU, which was based on Open Pre-trained Transformers, and carried out at VU in the past. There are two main goals, one is to solve the problem of heterogeneous cluster training, and the other one is to reduce model parameters. Due to the rapid development of large models, our team did not make noticeable outputs. But this is indeed the first time I have gained experience in learning large language models and have benefited a lot.
The goal of these studies I am doing is to produce high-quality papers, which also allows me to learn the basic processes of scientific research and provide sufficient preparatory training for potential PhD studies.

In terms of work experience, I have multiple teaching assistant experiences in some master's courses. I served as the TA for the *Web Service and Cloud-based System* course at UvA before. In the following, I will also be the TA for *Machine Learning for the Quantified Self* and *Data Mining Techniques*. These experiences gave me knowledge of network systems and machine learning (including reinforcement learning).

I learned the digital twin concept before, and I read some examples and reports provided by Ericsson and Azure. This project really interests me. A lot of my past research was in the field of AI, which also helped me build connections with other research groups, and I think my knowledge of networks also supports me in conducting research on Digital Twining in 6G. Besides, I have completed teaching training in several components. And I also took some courses related to MNS, like HPC and WSCS. Through my TA experiences, I can actively devote myself to teaching activities and can help with those courses more smoothly. And I have been living in Amsterdam for more than a year, I have adapted pretty well, I can put myself into studying and research more sufficiently. Thus, I believe I match this program properly.

If I am honored to be admitted to this position, I will conduct extensive research on digital network twinning under the Dutch 6G national ecosystem, and build and optimize AI models to achieve high performance. For publications, in addition to conferences in the network and system fields, I can also work hard and hope to publish some related content at top conferences in the AI field.

Being a PhD has always been a dream of mine. UvA is always my first choice, as it provides me with a pleasant research environment and diversity. The professor I met is very patient and understanding. I truly hope that I can be one of this team.

Thank you in advance for your patience and consideration.

Sincerely,

Zhiheng

Zhiheng Yang z.yang@uva.nl