南方科技大学 SOUTHERN UNIVERSITY OF SCIENCE AND TECHNOLOGY | 电子与电气工程系 DEPARTMENT OF ELECTRONIC AND ELECTRICAL ENGINEERING

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Dear USCIS Officer,

Mr. Ling Tong, an expert in biomedical informatics, has achieved remarkable accomplishments in his field, which is of particular import with regard to the development of deep learning-based techniques for the detection of malignant bone tumors. Whereas bone tumors account for less than 1% of cancers in adults, they account for between 3% and 5% of all cancer in children, with the most commonly diagnosed primary malignant bone tumor being osteosarcoma. While the five-year survival rate for osteosarcoma that is diagnosed at the localized stage is 74%, it drops to 66% once the cancer has spread to surrounding organs or tissues, and to 27% once it has spread to distant parts of the body. Thus, early detection of osteosarcoma is essential is vital for improving patient outcomes through the provision of timely and effective interventions. Because of the high importance of his advancements to biomedical informatics in general, and osteosarcoma detection in particular, I recommend Mr. Tong to continue his outstanding research in the United States.

I am in a position to confirm the value of Mr. Tong's work in view of my in-depth background in the field of biomedical informatics, even though we have not had the opportunity to work together. I have earned both my Bachelor of Science and my Master of Philosophy in electronic engineering from Nanjing University. In 2005, I completed my Doctor of Philosophy in electronic engineering at the Chinese University of Hong Kong. After holding research appointments at the University of Texas at Dallas and the University of Hong Kong, I joined the faculty at Southern University of Science and Technology in 2014. I currently hold the rank of full professor in the Department of Electrical and Electronic Engineering at the latter institution. My research interests include brain-computer interface, biomedical signal processing, and speech communication and assistive hearing technologies. Although I have invited Mr. Tong to conduct peer review in my capacity as associate editor of *Biomedical Signal Processing and Control*, that is the extent of our relationship. Accordingly, this recommendation is based solely on his published works and *curriculum vitae*.

Mr. Tong's background is likewise impressive. In 2017, he earned his Bachelor of Science in computer science from the University of South China. Since then, he has been conducting research in the Department of Health Informatics and Administration at the University of Wisconsin–Milwaukee, where his research is driving improvements in machine learning clinical diagnostic models. These impressive experiences indicate that Mr. Tong is a top researcher in the field of biomedical informatics.

I am most familiar with Mr. Tong's research on a deep learning model for the detection of osteosarcoma from histological images. Utilizing transfer learning techniques, he adapted pre-trained convolutional neural networks to a public dataset of osteosarcoma histological images in order to differentiate between necrotic, non-necrotic, and healthy tissues. He began by preprocessing the dataset, applying various classifications to the images. Next, to improve the accuracy of the outputs, he trained transfer learning models, such as VGG19 and Inception V3, on whole slide images with no patches. Lastly, he evaluated the performance of the pretrained models by applying them to a variety of classification problems. He found that the VGG19 model achieved the highest performance metrics on binary and multi-class classification problems, with an accuracy of 96%. With these results, Mr. Tong furnished researchers and clinical practitioners with an invaluable, state-of-the-art model for the detection of primary malignant bone tumors.

What is more, I am able to reliably attest to the beneficial implementation of Mr. Tong's work on osteosarcoma detection, the results of which were published in *Biomedical Signal Processing and Control*, a highly authoritative biomedical informatics journal with a two-year Impact Factor of 5.076 from Clarivate Analytics. For example, in their (2022) article presenting a novel binary arithmetic

optimization algorithm for the automated detection of osteosarcoma, Bansal et al. employed Mr. Tong's osteosarcoma detection model as a foundational framework for the development of their own. In their (2022) article proposing a noise-reducing, cross fusion learning-based framework to automate the classification of osteosarcoma histological images, Pan et al. used Mr. Tong's comparative data on the performance of deep learning models for osteosarcoma classification applications to explain and support the design of their network. This sampling of uses of Mr. Tong's work is illustrative of the profound and far-reaching impact he is having on the field at large.

In addition to publishing his own research, Mr. Tong provides service to the field through peer review. Peer review is an essential step in the scientific publication process, and is indispensable to the academic community at large. To ensure the high standards of their publications, journals only request the assistance of the most informed members of a given field. Mr. Tong has used his expertise in biomedical informatics to complete peer review for journals such as the *IEEE Journal of Biomedical and Health Informatics*, *Computers in Biology and Medicine*, and the *Health Informatics Journal*, as well as conferences such as the American Medical Informatics Association Annual Symposium. With such well-known journals and conferences relying on Mr. Tong's knowledge and skill, he is undeniably one of the top researchers in this subject.

Best regards,

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