IEEE JOURNAL OF

BIOMEDICAL AND HEALTH INFORMATICS

J-BHI Special Issue on "Foundation Models in Medical Imaging"

Foundation Models (FMs), such as Diffusion models, Transformer, BERT, DALL-E, GPT, etc., are based on deep neural networks and transfer learning, and are often referred as pre-trained or self-supervised models. Typically, these models are trained on large-scale, diverse datasets and can be adapted to a wide range of downstream tasks through transfer learning. Transfer learning is used to make foundation models possible, while the scale is established to make them powerful. In computer vision, FMs have been developed for various image processing tasks, such as natural image reconstruction, detection, segmentation, and classification. FMs also show promise in the processing of medical imaging data. Those are suitable for the variety of imaging modalities used in medical imaging, such as X-rays, MRI, CT, etc. By training FMs on medical data from diverse sources/modalities, the models can serve as a repository of medical knowledge, making them highly adaptable to various downstream tasks in medical imaging.

To further explore the methodology developments of FMs, this special issue will specifically focus on two aspects: first, investigating feature-level and semantic-level fusion strategies in FMs training to effectively learn cross-modal information from multimodal medical data. Second, developing advanced transfer learning methodologies based on the FMs to improve the models' explainability and generalizability for a variety of individual tasks, such as disease diagnosis, lesion delineation, image denoising.

Topics of interest include, but are not limited to, the following:

- Advanced FMs in medical imaging acquisition, reconstruction, and analysis.
- Efficient and large-scale Foundation architectures/pre-trained benchmarks design.
- Medical image/video analysis and understanding: segmentation, registration, classification, disease diagnosis or grading, clinical parameter estimation, pre- and postoperative assessment, etc.
- Semi-supervised, unsupervised, weakly supervised, and self-supervised learning with FMs for medical imaging.
- Efficient FM designs for zero/one/few-shot learning in medical imaging.
- Novel applications of federated, distributed learning, and other collaborative learning in medical imaging.
- Explainable FMs, reliable learning, domain adaptation, and domain generalization techniques in FMs.
- Multi-modal learning in FMs.
- New evaluation and benchmark for utilizing the FM in medical imaging.

Guest Editors

Jiong Zhang, NIMTE, Chinese Academy of Science (CAS), Ningbo, China, jiong.zhang@ieee.org
Huazhu Fu, Institute of High Performance Computing (IHPC), A*STAR, Singapore, hzfu@ieee.org
Caroline Petitjean, Universite de Rouen Normandie (URN), France, caroline.petitjean@univ-rouen.fr
Xiaoxiao Li, University of British Columbia (UBC), Canada, xiaoxiao.li@ece.ubc.ca
Julia Schnabel, Technical University of Munich (TUM), Germany, julia.schnabel@tum.de

Key Dates

Deadline for Submission:	15 March, 2024
First Reviews Due:	15 May, 2024
Revised Manuscript Due:	15 July, 2024
Final Decision:	15 September, 2024

IEEE EMB