THE 13th INTERNATIONAL CONGRESS ON MRI &
30th ANNUAL SCIENTIFIC MEETING OF KSMRM &
7th ANNUAL MEETING OF ASMRM

ICMRI & ASMRM 2025

Illuminating the Invisible: Advances in MRI
OCTOBER 31 - NOVEMBER 1, 2025
Grand Walkerhill Seoul, Seoul, Korea
https://icmri.ksmrm.org/2025m/

KoSAIM-KSMRM

Joint05-2

How to Incorporate Guidance and Reference in AI for Medical Image

Kanghyun Ryu

Korea Institute of Science and Technology, Korea

Artificial intelligence (AI) has become an essential tool in medical imaging, providing automated and accurate solutions for various purposes including diagnosis, segmentation, registration, and prognosis. However, purely data-driven models often suffer from limited generalizability, lack of interpretability, and performance degradation when confronted with scarce, heterogeneous, or misaligned datasets. To address these limitations, researchers are currently exploring the incorporation of guidance and reference into AI frameworks, enabling models to leverage anatomical priors, multimodal information, and external exemplars for improved robustness and for future clinical reliability.

This lecture will introduce key principles and strategies for embedding guidance and reference mechanisms into medical image AI systems. Guidance can be integrated through explicit anatomical knowledge, such as segmentation masks, spatial priors that inform the model about organ boundaries and relative topology. Also, it can be integrated in the forms of text embedded by language encoder. Reference, on the other hand, involves the use of paired or unpaired images from other modalities or subjects, enabling cross-domain alignment and synthesis. For example, reference-augmented image registration allows MR-CT pairs to be aligned more accurately by generating pseudo-images conditioned on structural correspondence, while reference-based synthesis improves modality translation in scarce-data scenarios.

Keywords: *Guidance, Reference, AI, Medical AI*