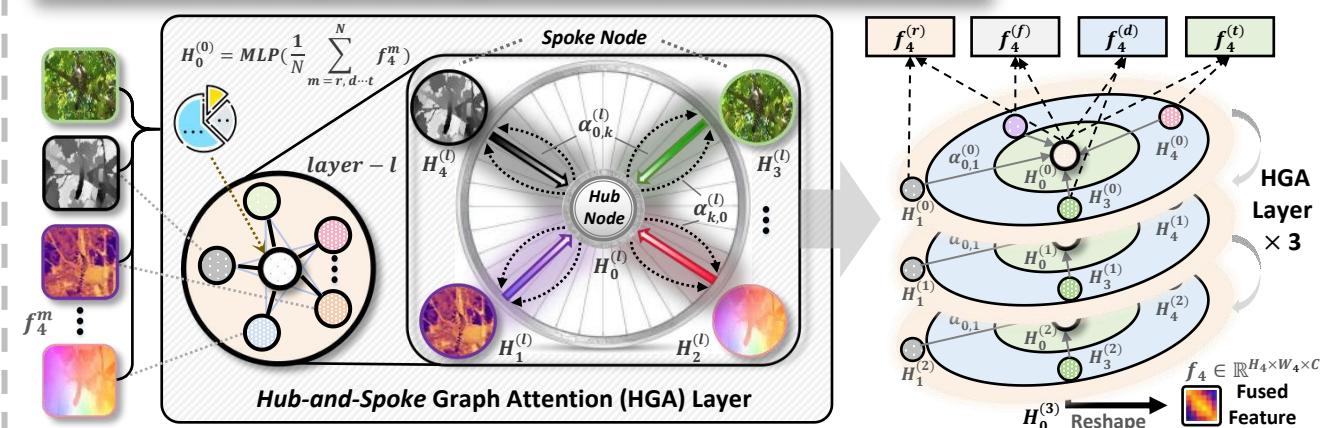
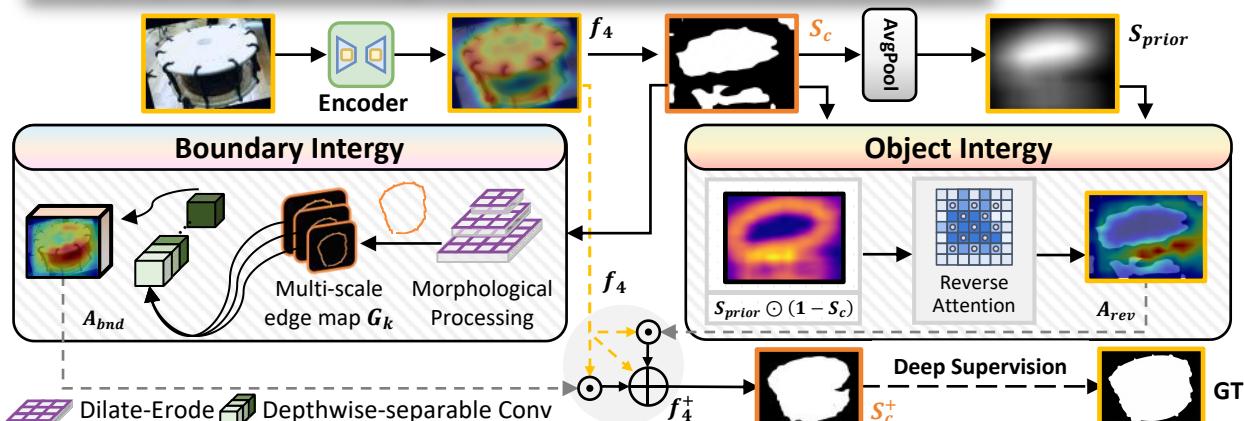


(a) Hub-and-Spoke Graph Attention Module (HGA)



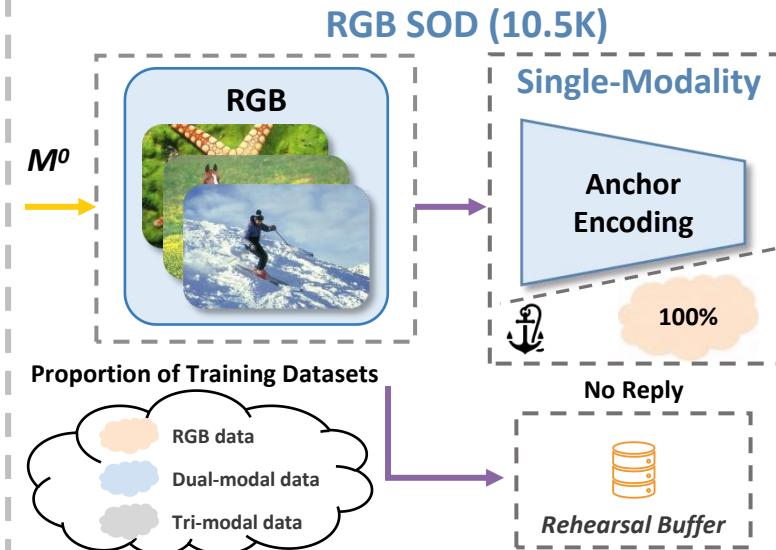
(c) Synergistic Integrity Refinement Module (SIR)



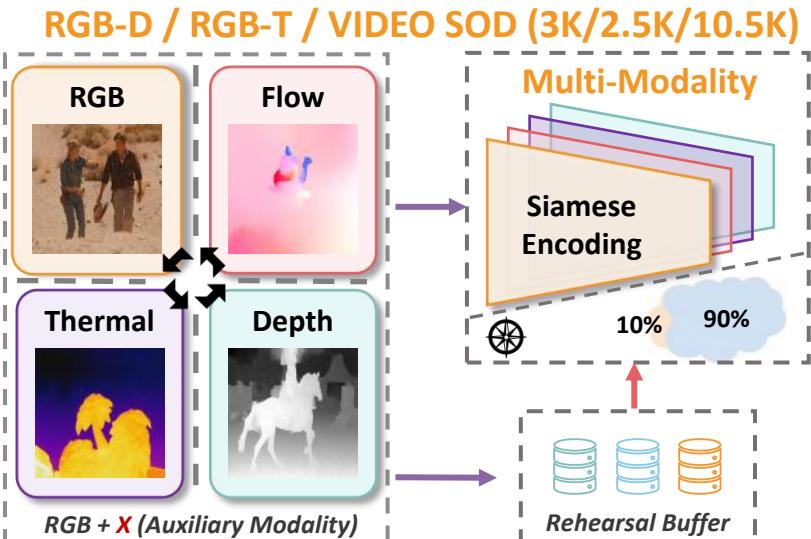
(b) Modality-Anchored Continual Learning Strategy (MACL)

Yellow arrow: Model Stream
Purple arrow: Current Data Stream
Red arrow: Buffer Data Stream

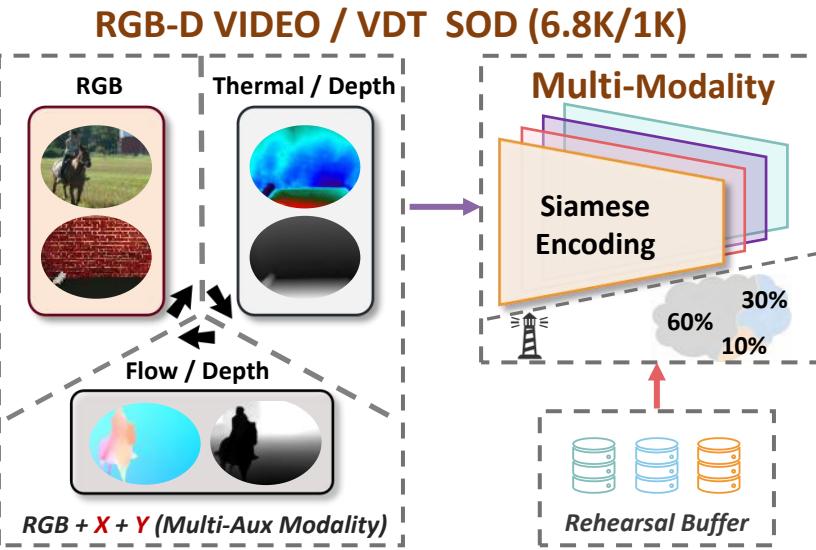
Stage 1: Anchor Modality Pretraining



Stage 2: Single-Auxiliary Modality Expansion



Stage 3: Multi-Auxiliary Modality Generalization



Proportion of Training Datasets

- RGB data
- Dual-modal data
- Tri-modal data