

Theme: Machine Intelligence

- Sub theme: Multi-task Vision AI

Despite significant progress in deep learning, much of computer vision research focuses on tackling each task in isolation, meaning a separate neural network is trained for each scenario-specific, individual task. This puts a severe hurdle to AI applications and services because many real-world problems require solving a multitude of vision tasks simultaneously. For example, a scene recognition system for AR applications should be able to recognize objects in the scene, localize them, estimate their depths/distances, etc., to provide users with the best possible user experience.

Multi-task learning is a training paradigm in which neural network models are trained with data from multiple tasks concurrently, using shared representations to learn common knowledge among different sets of tasks. As such, Multi-task Vision AI research aims to develop a unified general vision model that can process different vision tasks simultaneously by leveraging the multi-task learning paradigm. We believe that such multi-task vision models can achieve better efficiency in computation and memory usage by layer sharing and potentially yield improved performance by joint learning between related tasks.

Learning concepts for multi-vision tasks bring difficulties that are not present in single task learning. As part of this program, various solutions related to multi-task vision models are of interest, including:

1. Disentangled, structured, and hierarchical representation learning
2. Optimization methods including joint loss design and joint task training
3. Unsupervised / Self-supervised / Semi-supervised learning
4. Transfer learning / Few-shot learning / Continual learning
/ Curriculum learning (task scheduling) / Domain adaptation
5. Architecture search and design

※ The tasks can be extended to include other modalities such as audio, language, and speech.

※ The topics are not limited to the above examples and the participants are encouraged to propose the original idea.

※ Funding: Up to USD 150,000 per year