

바이오횡 연구실 (Biointelligence Lab)

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학력

1992 Ph.D. Univ. of Bonn, Germany
1988 M.S. Seoul National University
1986 B.S. Seoul National University

경력

2019.8 – present Director, SNU AI Institute (AIIS)
2016 – present Chair Professor in Artificial Intelligence, POSCO
1997 – present Professor, Computer Science and Engineering and Adjunct Professor, Cognitive Science and Brain Science, Seoul National University (SNU)
2017 – 2021.12 Director, Video Intelligence Center (VIC)
2013 – 2014 Visiting Professor, Princeton Neuroscience Institute (PNI)
2003 – 2004 Visiting Professor, MIT AI Lab (CSAIL)
1992 – 1995 Research Fellow, German National Research Center for Information Technology (GMD, now Fraunhofer Institutes)



Our research focuses on “*biointelligence*” i.e. the study of artificial intelligence on the basis of biological and bio-inspired information technologies, and its application to real world problems.

PICA

(Perception, Imagination, Cognition, Action)

새로운 문제를 해결하는 자기주도 인공지능 기술

- 새로운 상황에 대해 ① 스스로 문제를 인지하고, 이를 해결하기 위한 ② 탐색 기반 가설 생성 및 평가와 ③ 필요한 데이터의 자동 탐색, 분석을 통하여 ④ 순차적 추론을 통한 문제 해결을 위해 스스로 학습하는 '자기주도 인공지능'

Perception: 멀티모달 센서 스트리밍 데이터 고급 표상학습 기술	Imagination: 가설 생성 및 순차적 의사결정 기술	Cognition: 자기반정적 학습 및 추론 기술	Action: 실제계 상호작용을 통한 데이터 생성 및 평생 능동 학습 기술
Real-World Data	Hypothesis Generation and Evaluation	Autonomous Learning	Data Generation by Doing
Multi-Sensory Stream	Causal Inference	Fully Recurrent Network	Self-supervised Learning
Cross-Model Grounding	Sequential Decision Making	Self-reflective Learning	Fast Adaptation for Dynamic Environment
Robust Perception in Unseen Environment	Counterfactual Reasoning	Brain-like Task-adaptive Hierarchical Architecture	Lifelong Active Learning

문제 설정: Personal Shopper Robot Scenario



LBA

(Learning By Asking)

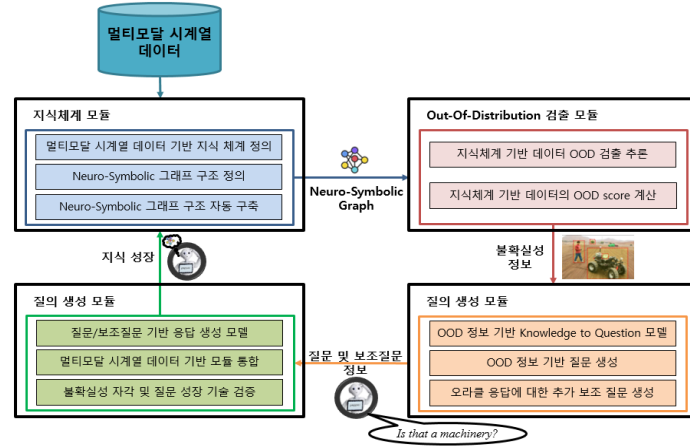
불확실한 환경 이해를 위한 능동적 질의 생성 기술

- 불확실성 최소화를 위한 질의 및 샘플 생성 기반의 환경 이해
- 능동적인 질의응답을 통해 에이전트의 불확실한 초기 지식을 성장시키는 기술 개발

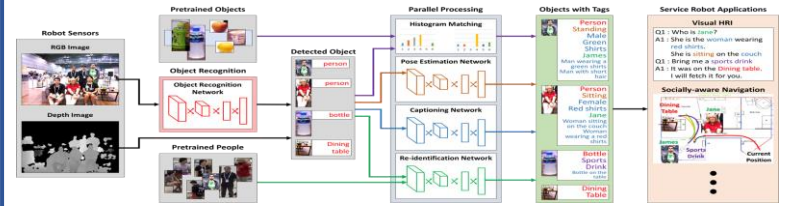


Visual Question Answering & Knowledge-based Graph Reasoning

- Multi-turn 대화를 위한 visual dialog 방법론 연구

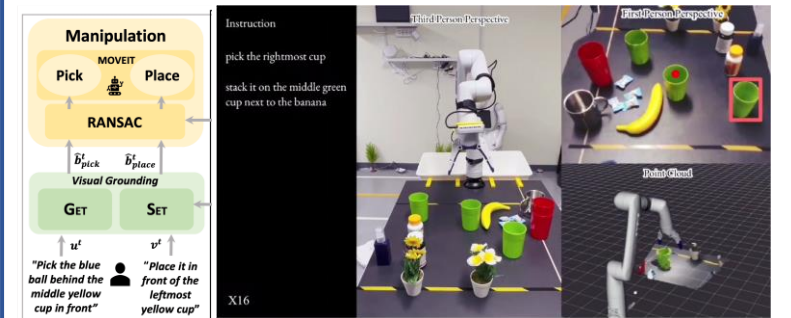


Embodied AI



Multimodal Perception of Mobile Robots

- Object detection, Multi-Agent Map Merging, Visual Grounding and Manipulation, 등 로봇 AI 기술 개발
- 다중 주행로봇의 2D Map 병합 기술 개발

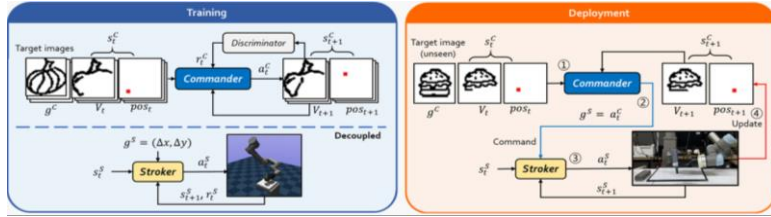


Arm Robot 조작 관련 체화된 AI 행동 기술

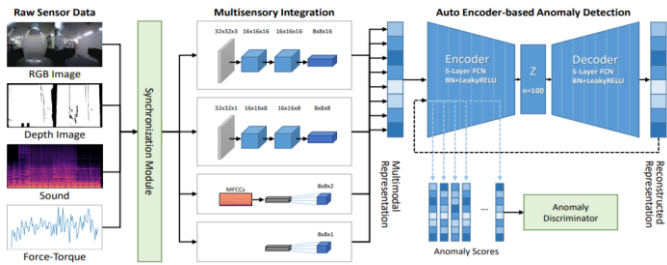
- ROS 기반 실세계 로봇 제어 시스템 개발
- 자연어 기반 로봇 평생 학습 기술 개발
- 필요한 물체 관측 가능여부를 인지하며 물체 위치를 추적하는 기술

Human Activity Learning by Home Robot

- Robotic sketching with decoupled hierarchical RL (ICRA 2022)

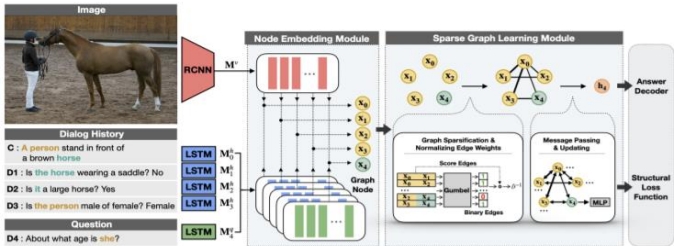


- Multimodal Anomaly Detection (ICRA 2021)

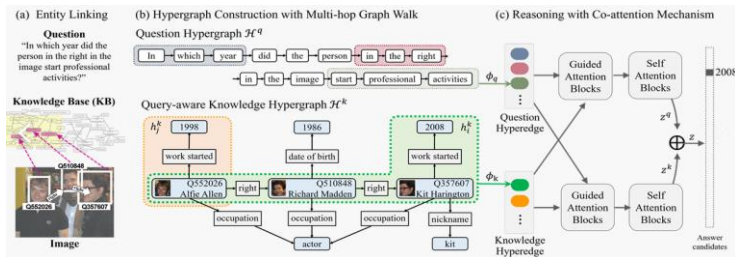


Compositional Structure Learning of Sequential Data

- Sparse Graph Learning for Visual Dialog (EMNLP 2021)

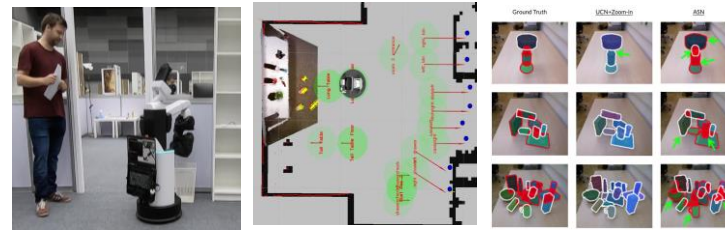


- Hypergraph Transformer for Knowledge-based Visual Question Answering (ACL 2022)



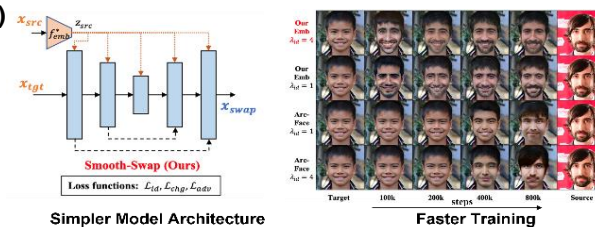
RoboCup@Home Competition

- Uncovering Everyday Life Activity by Home Robot (1st and 2nd place at Robocup@2017 and 2019, 2022)

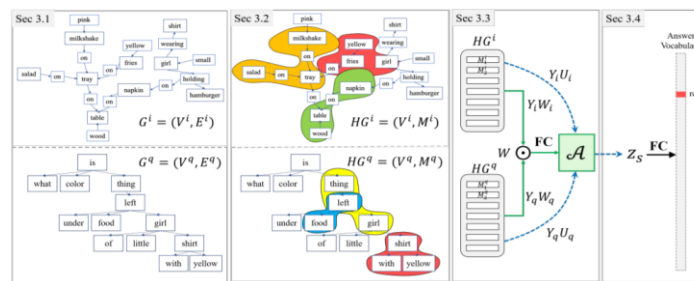


Multimodal Representation Learning

- Simpler and Faster Face-Swap Modeling with Smoothness (CVPR2022)

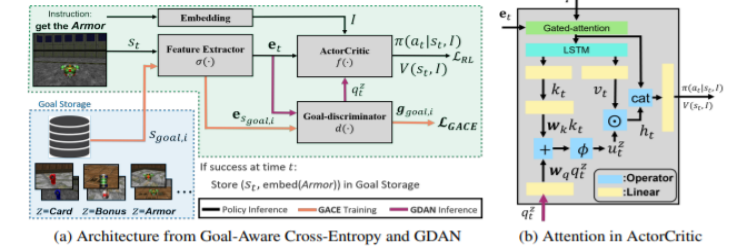


- Hypergraph Attention Networks (CVPR 2020)

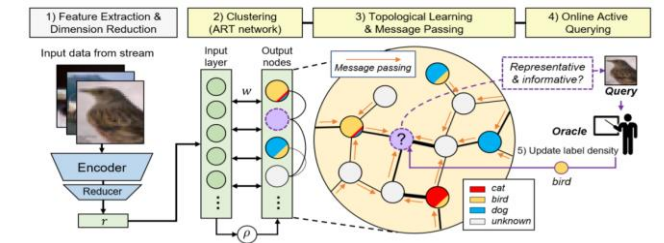


Self /Semi-Supervised Learning for Human-Level AI

- Multi-Target Reinforcement Learning (NeurIPS 2021)

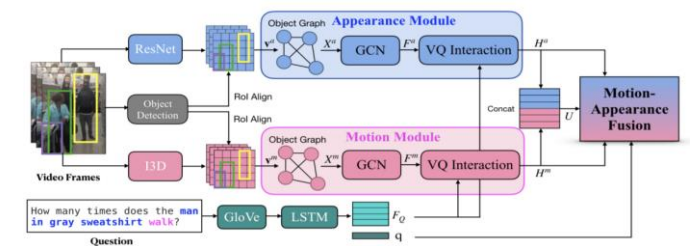


- Message Passing Adaptive Resonance Theory for Online Active Semi-supervised Learning (ICML 2021)



Video Turing Test using Dual Deep Memories

- Motion-Appearance Synergistic Networks (ACL 2021)



- Multi-level Context Matching model (AAAI 2021)

