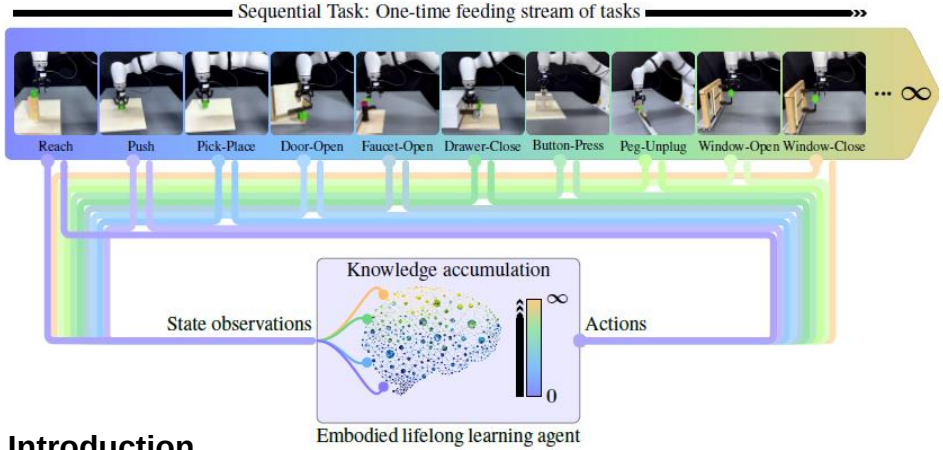
# BA/MA-Proposal: Robotic Lifelong Reinforcement Learning




## Introduction

Humans possess a remarkable ability for lifelong learning, continuously acquiring knowledge and developing complex behaviors throughout their lives. This lifelong learning capability is considered an essential mechanism that makes up generalized intelligence. However, recent artificial intelligence, despite excelling in narrow domains, often lacks this crucial capability. We address this limitation by developing a knowledge space inspired from non-parametric Bayesian domain [1] and enhancing the agent's semantic understanding through the integration of language embeddings. Meanwhile, we aim to leverage the recent advances in deep learning domain that addresses catastrophic forgetting issue of full connection layers via Kolmogorov-Arnold representation theorem based neural networks [2].


[1] Bing, Zhenshan, et al. "Context-Based Meta-Reinforcement Learning with Bayesian Nonparametric Models." *IEEE Transactions on Pattern Analysis and Machine Intelligence* (2024).
[2] Liu, Ziming, et al. "Kan: Kolmogorov-arnold networks." arXiv preprint arXiv: 2404.19756 (2024).


## Methodology

1. **Literature Review:** Familiarize yourself with the basics of reinforcement learning and understand the latest advancements in lifelong deep reinforcement learning methods in the field of robotics.
2. **Framework Integration:** Replicate KAN-related code, attempt to integrate it with existing algorithm frameworks, and use techniques such as regularization and knowledge replay to address shortcomings in current algorithms, aiming to improve their performance on benchmark datasets.
3. **Deployment:** Try deploying the pre-trained framework on physical robots to complete tasks in real-world physical scenarios.
4. **Thesis Writing:** Independently complete the writing of your bachelor/master thesis.

## Requirements

1. Bachelor/Master thesis with at least six months full time.
2. Solid Python coding skills for deep learning, e.g., PyTorch.
3. High self-motivation and passion on academic research.
4. Knowledge in robotic deep reinforcement learning will be a plus.
5. Outstanding/competitive transcripts score (≤2.3) will be a plus.

## Contact

If you are interested in the topic, please send your resume, transcripts and/or recent publications/awards as well as a brief introduction about yourself to my email address: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