

[12.1.2021]

[Multi-expert learning of adaptive legged locomotion]

Summary

This paper tries to integrate different task-specific neural networks into a bigger one. Use a gating network to give each network different weights to conduct a complex, unknown task.

Major Analysis and Comparison

- ◆ The whole picture of the network:

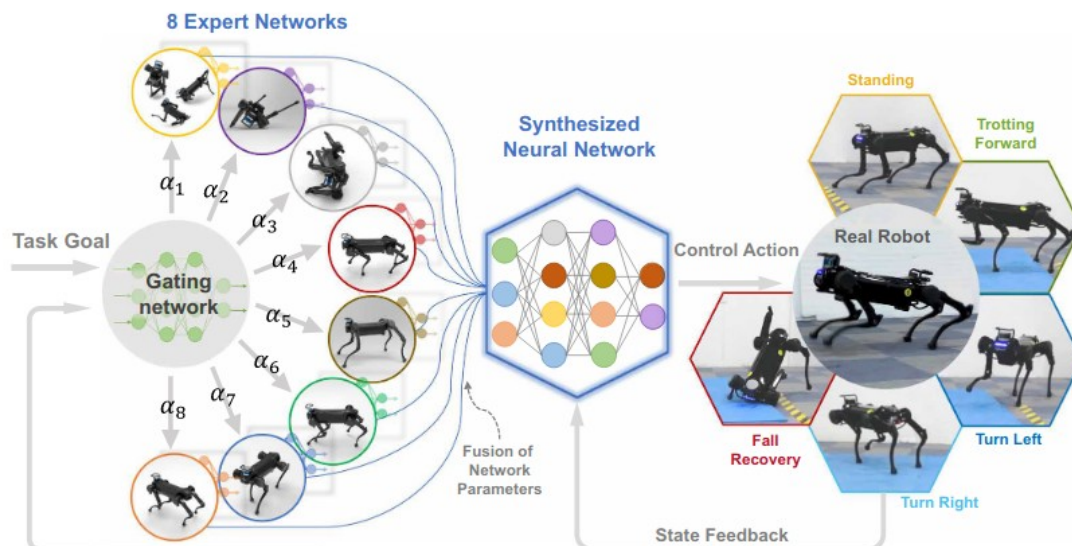
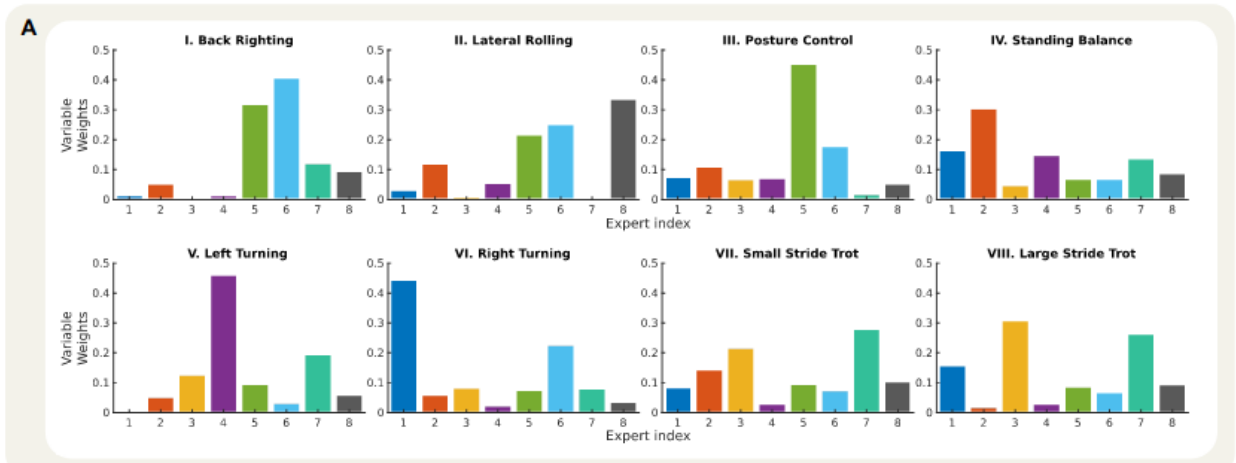


Fig. 2. MELA: A hierarchical DRL framework that generates adaptive behavior by combining multiple DNNs together to produce versatile locomotive skills. The GNN generates variable weights (α) to fuse the parameters of all eight expert networks (each expert is illustrated by its primary motor skill) such that newly synthesized motor skills are adapted to different locomotion modes by blending useful learned behaviors collectively from the consortium of experts.

- 8 expert network is simply a number in the neural network → we need to give each channel a name to make it look nice.
- Two networks are pretrained → recovery and trotting, because their dynamics are so different, each pretrained network consists of four experts, and those two pretrained network are copied into a bigger one, and go into the second stage of cotraining → we then have eight experts that ideally should have knowledge of all kinds of basic motions that can then build complex motions.

- For different expert, it has different weights for different skills.



○

Thoughts

- ◆ What is the adaptive motor skills here? Actuator dynamic?
 - Seems like this paper is aimed at handling detecting/preventing/recovering from falls of a robot → ANYmal paper also achieves that, but this paper integrate all possible policies into one → multi-expert
 - Motor skill: a feedback policy that generates coordinated actions to complete a specific task → can be understood a mapping from joint measurement (etc) to the actual torque?/target joint
 - expert: a combination of different skills → expert in one specific motion. In the level of output of neural network