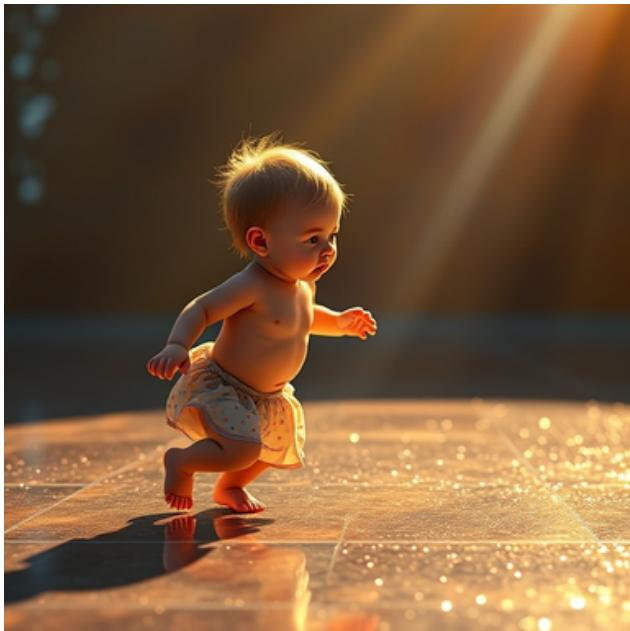


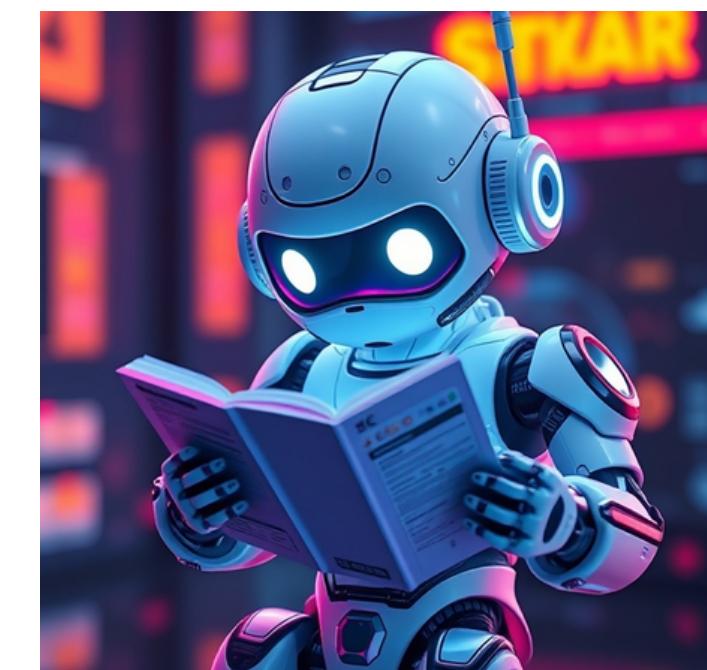
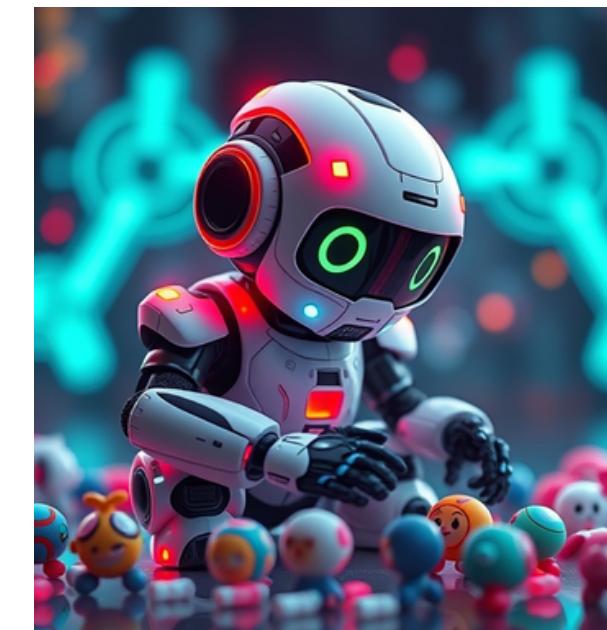
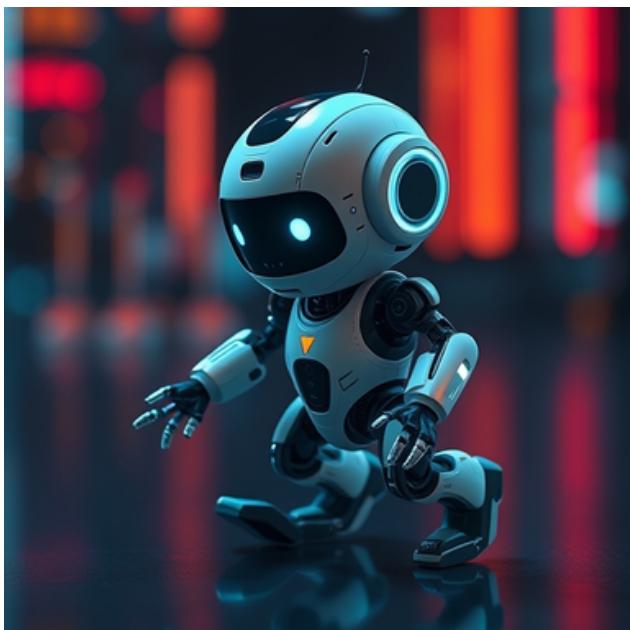
ERA IN AI: LEARN AND REMEMBER

HOW CAN WE TEACH MACHINES TO LEARN LIKE HUMANS?

WHY CONTINUAL LEARNING MATTERS

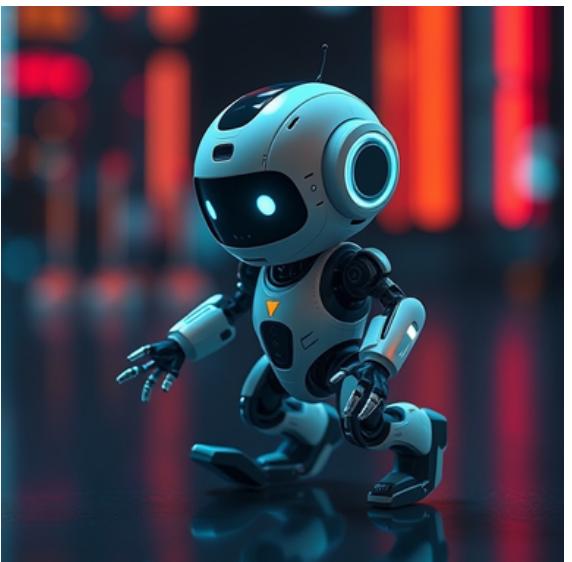


We learn sequentially!



Machines **should** learn sequentially!

WHY CONTINUAL LEARNING MATTERS



walk



play



read



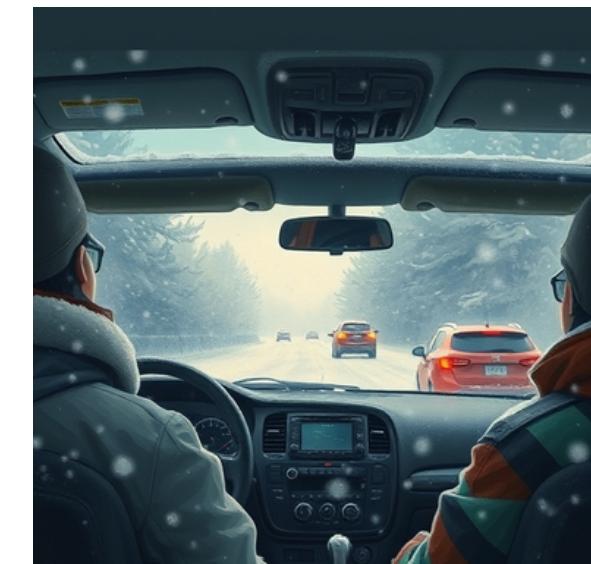
walk ?



drive in sunny weather



drive in rainy weather



drive in snowy weather



remember to drive in
sunny weather ?

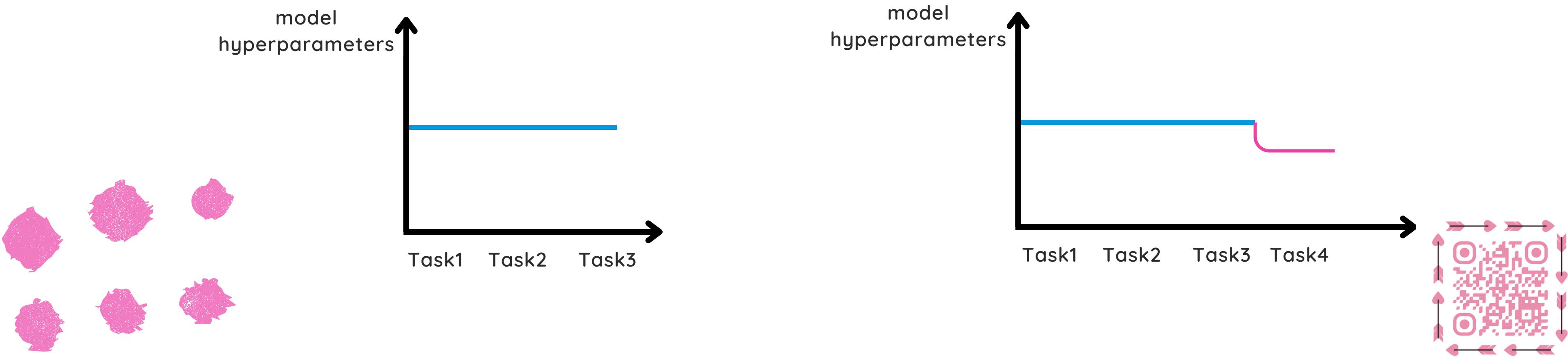
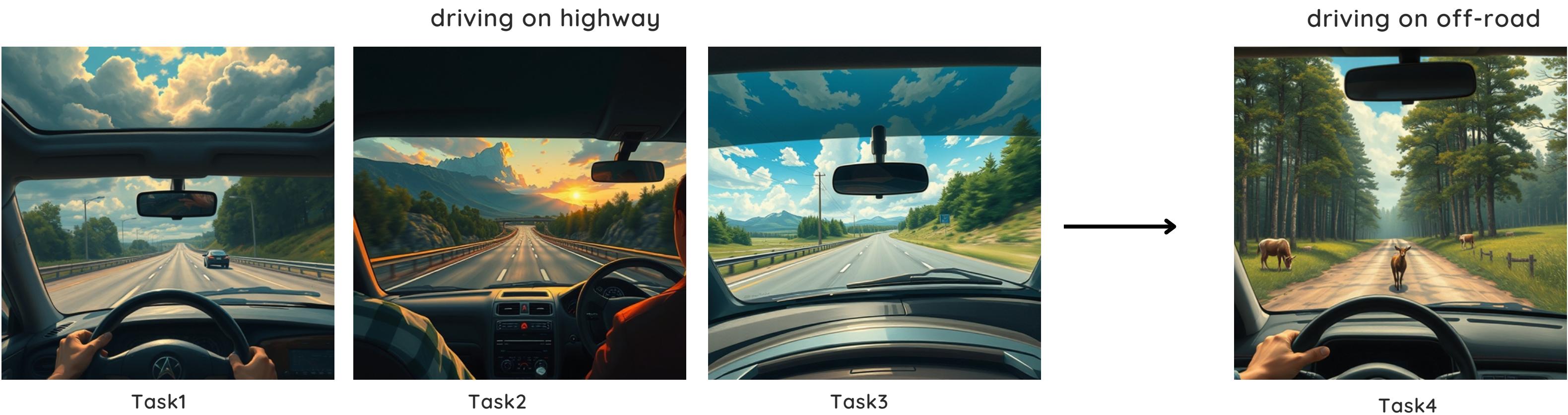
RESEARCH QUESTIONS

Does adaptivity is necessary for CL? [1*,2,3,4,5]

Does focusing on important knowledge benefit to CL? [6*,7,8]

Does dynamically balancing general and task-specific knowledge improve CL ? [9]

DOES ADAPTIVITY IS NECESSARY FOR CL?



DOES FOCUSING ON IMPORTANT KNOWLEDGE BENEFIT TO CL?



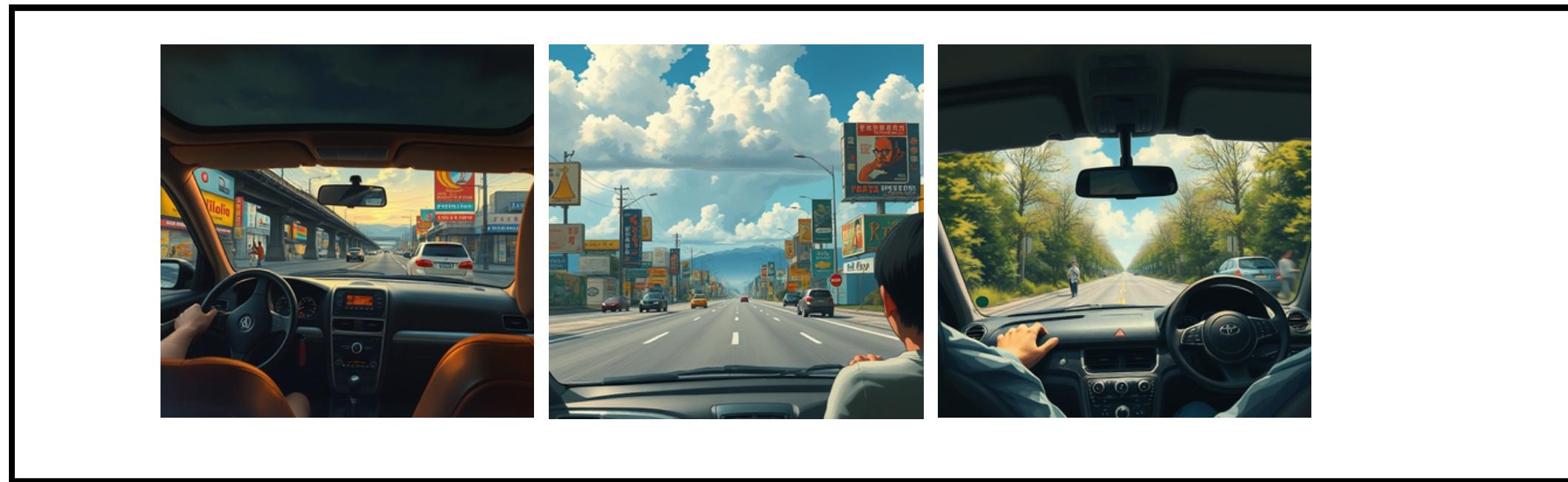
Learning from all samples



Focusing on **selected** samples



DOES DYNAMICALLY BALANCING GENERAL AND TASK-SPECIFIC KNOWLEDGE IMPROVE CL ?



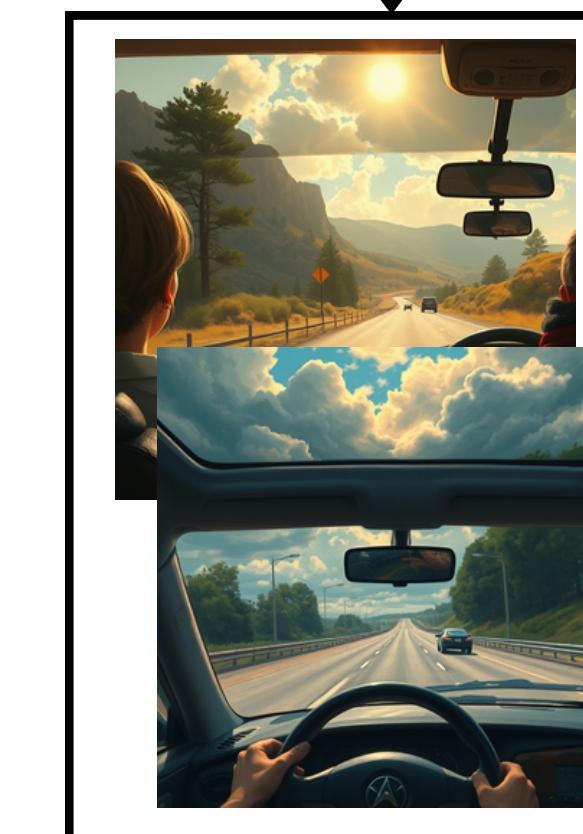
General knowledge of
how to drive a car



Learning to drive in snow



Learning to drive in fog



Learning to drive in sun

WHAT IS NEXT ?

Hebbian Learning for Lifelong Adaptation

Use Hebbian principles (“**cells that fire together, wire together**”) to design learning systems that naturally evolve connections based on usage patterns.

Role of the Prefrontal Cortex in Context-Switching

Understand task changes (e.g: switching from image classification to object detection) and adjust internal configurations to adaptively keep learning.

Structured Forgetting

Designing systems that selectively forget irrelevant information to make room for new, critical knowledge, similar to how humans prioritize memories based on relevance.

**THANK YOU
EVERY MUCH**

LET'S CONNECT

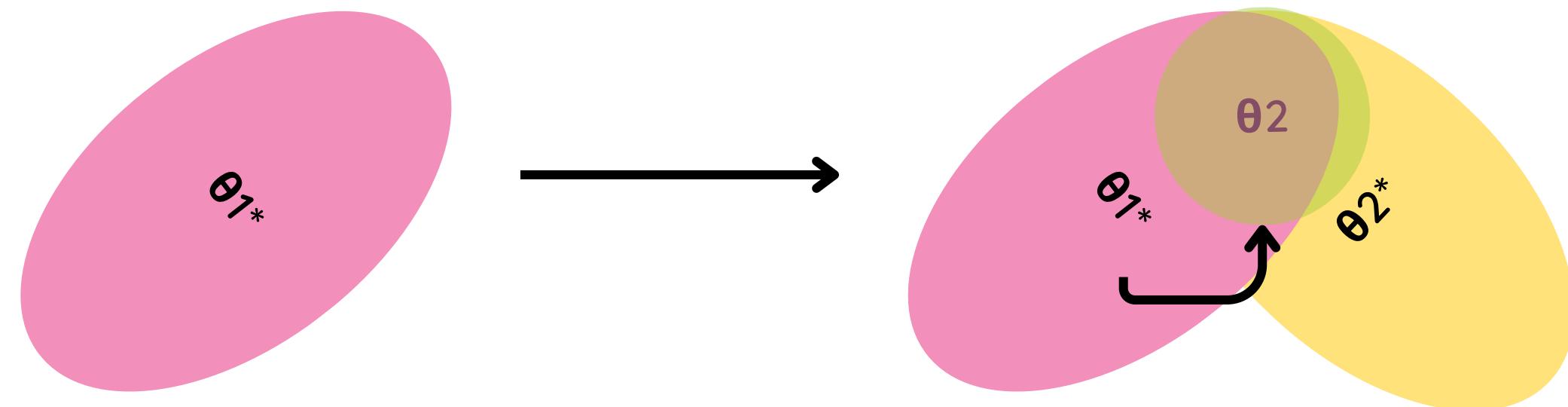


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- [5] Cools, R., & Robbins, T. W. (2004). Chemistry of the adaptive mind. *Philosophical Transactions of the Royal Society of London. Series A: Mathematical, Physical and Engineering Sciences*.
- [6] **Yildirim, E. C. G., Yildirim, M. O., & Vanschoren, J. (2024). Continual Learning on a Data Diet. arXiv preprint.**
- [7] Pagnotta, M. F., Pascucci, D., & Plomp, G. (2022). Selective attention involves a feature-specific sequential release from inhibitory gating. *Neuroimage*.
- [8] Jones, L. A., Hills, P. J., Dick, K. M., Jones, S. P., & Bright, P. (2016). Cognitive mechanisms associated with auditory sensory gating. *Brain and cognition*.
- [9] Mack, M. L., Love, B. C., & Preston, A. R. (2024). Distinct hippocampal mechanisms support concept formation and updating. *bioRxiv*.

COMMON APPROACHES IN CL

Regularization Approach



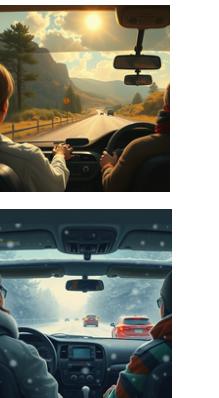
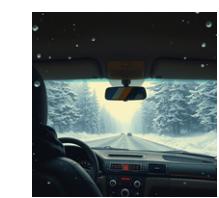
COMMON APPROACHES IN CL

Memory Approach

New classes



New classes

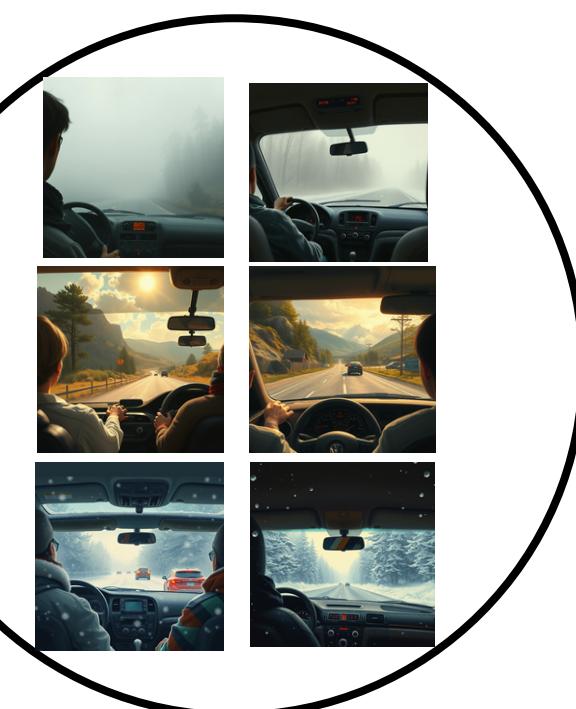
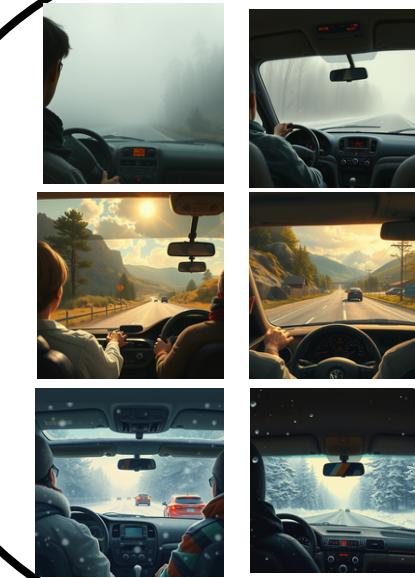


Model 1

Model 0

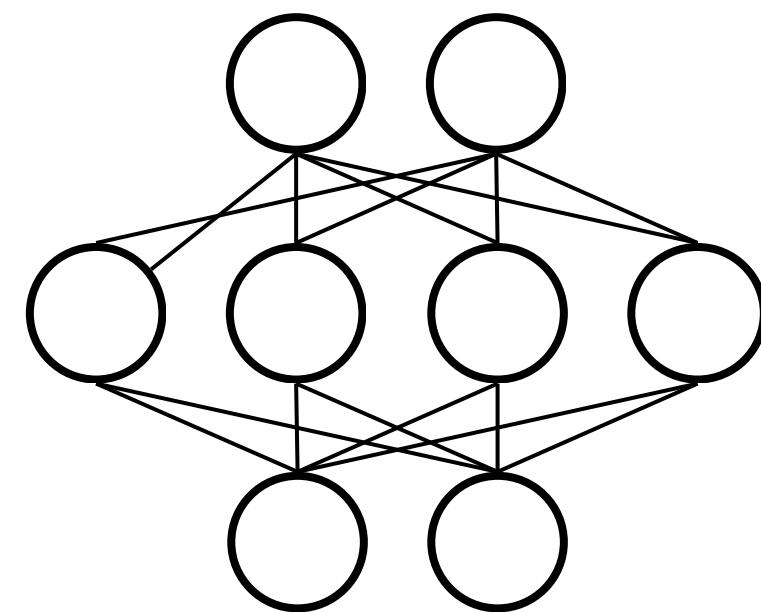


Model 2

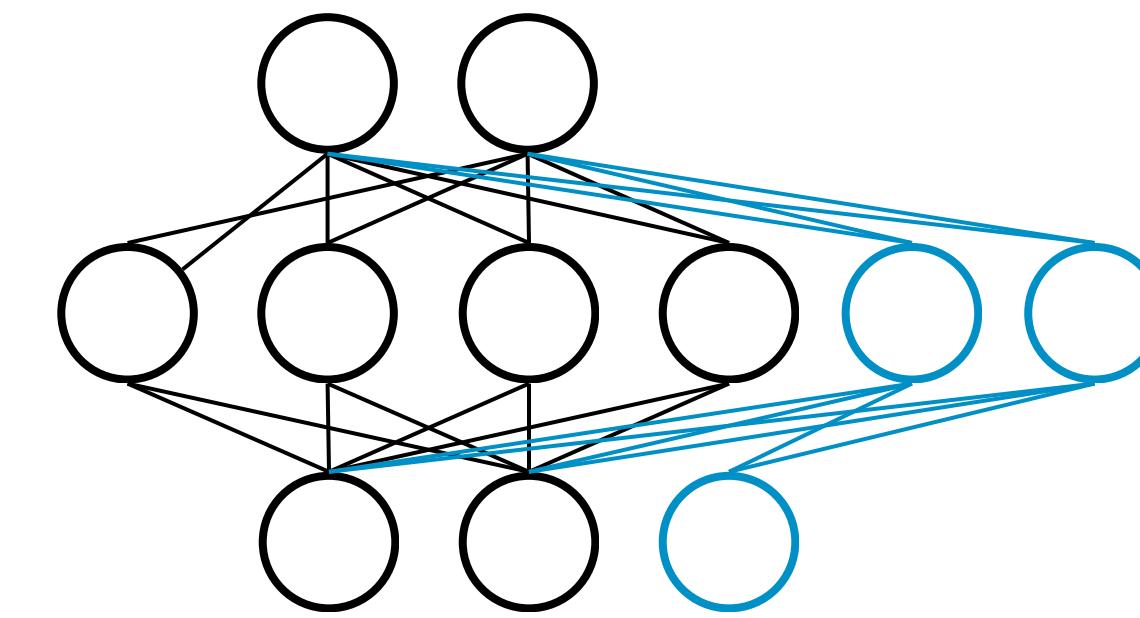


COMMON APPROACHES IN CL

Architecture Approach



Model 0



Model 1