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Efficient Rehearsal Free Zero Forgetting Continual Learning Using Adaptive Weight Modulation

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Abstract : Artificial neural networks encounter a notable challenge known as continual learning, which involves acquiring knowledge of multiple tasks over an extended period. This challenge arises due to the tendency of previously learned weights to be adjusted to suit the objectives of new tasks, resulting in a phenomenon called catastrophic forgetting. Most approaches to this problem seek a balance between maximizing performance on the new tasks and minimizing the forgetting of previous tasks. In contrast, our approach attempts to maximize the performance of the new task, while ensuring zero forgetting. This is accomplished through the introduction of task-specific modulation parameters for each task, and only these parameters are learned for the new task, after a set of initial tasks have been learned. Through comprehensive experimental evaluations, our model demonstrates superior performance in acquiring and retaining novel tasks that pose difficulties for other multi-task models. This emphasizes the efficacy of our approach in preventing catastrophic forgetting while accommodating the acquisition of new tasks.

Keywords : continual learning, life-long learning, neural analogies, adaptive modulation
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