# ZS-IL: Looking Back on Learned Experiences
# For Zero-Shot Incremental Learning

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## Abstract

Classical deep neural networks are limited in their ability to learn from emerging streams of training data. When trained sequentially on new or evolving tasks, their performance degrades sharply, making them inappropriate in real-world use cases. Existing methods tackle it by either storing old data samples or only updating a parameter set of DNNs, which, however, demands a large memory bud- get or spoils the flexibility of models to learn the incremented class distribution. In this paper, we shed light on an on-call transfer set to provide past experiences when- ever a new class arises in the data stream. In particular, we propose a Zero-Shot Incremental Learning not only to replay past experiences the model has learned but also to perform this in a zero-shot manner. Towards this end, we introduced a memory recovery paradigm in which we query the network to synthesize past exemplars whenever a new task (class) emerges. Thus, our method needs no fixed- sized memory, besides calls the proposed memory recovery paradigm to provide past exemplars, named a transfer set in order to mitigate catastrophically forgetting the former classes. Moreover, in contrast with recently proposed methods, the suggested paradigm does not desire a parallel architecture since it only relies on the learner network. Com- pared to the state-of-the-art data techniques without buffering past data samples, ZS-IL demonstrates significantly better performance on the well-known datasets (CIFAR-10, Tiny-ImageNet) in both Task-IL and Class-IL settings.

## Biography

Mozhgan pourkeshavarz is a research assistant at IPM. Her interests include modern aspects of machine learning such as Incremental learning, explainable AI and the intersection of computer vision and, natural language processing like image captioning. She earned her master's degree from Shahid Beheshti University and began her career as an AI researcher at IPM recently.

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