PhD in Data Science Assignment
Deep Generative View on Continual Learning

The assignment aims to create a generative replay method for continual learning. You can implement the project from scratch or modify the code developed during our lab sessions. We recommend using either GANs [1] or VAEs [2] for the generative model. However, other generative approaches are also acceptable. You should evaluate the method in the class-incremental scenario with five splits of two classes each. Due to the computational considerations, we recommend using MNIST [3] or Fashion-MNIST [4] datasets.

You should evaluate the method's effectiveness using the average accuracy, forward transfer, and backward transfer metrics. You can find the implementation of these metrics in the code from the 1st lab session. Additionally, the memory and computational complexity of the method should be analyzed and included in the environment. For more details about metrics, see slides 41- 45.

Include answers to the following questions in your report:
1) Measure the memory and (estimate) computational requirements for generative and vanilla replay with raw samples. Is it comparable in memory requirements?
2) How would that solution scale with n tasks? Is it linear, quadratic, or something else?
3) What are the downsides of your approach?
4) What are your ideas for making this solution more memory- and computationally-efficient?

Answers to these questions should be included in the report along with a paragraph justifying the choice of hyperparameters such as learning rate, number of generated samples per task, or training epochs.

Add the link to the GitHub repository with your solution (code & report).

References

[1] https://arxiv.org/abs/1406.2661

[2] https://arxiv.org/abs/1312.6114

[3] http://yann.lecun.com/exdb/mnist/

[4] https://github.com/zalandoresearch/fashion-mnist