Intelligent Replay Sampling for Lifelong Object Recognition

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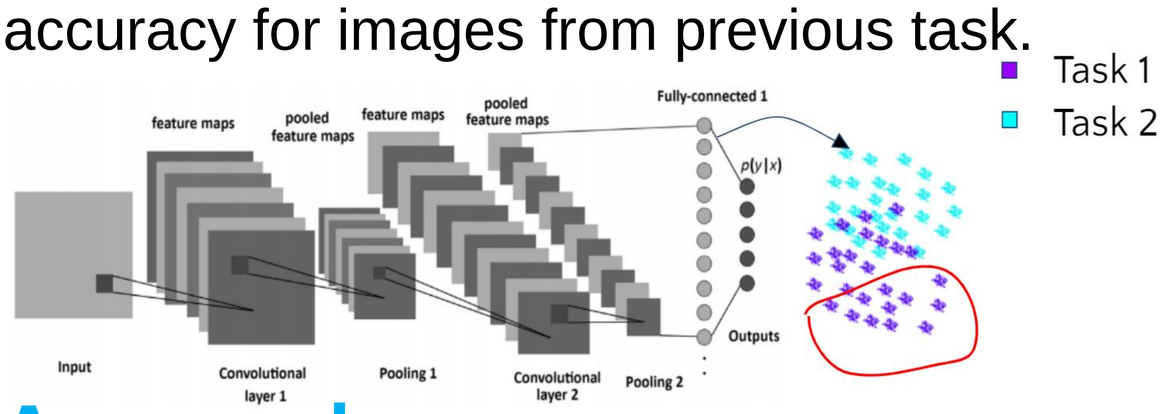
Introduction

Image recognition has been a research problem for a long time in computer vision.. In lifelong object recognition we have to continually learn[1] to recognize objects. In this problem statement the number of objects remain same across the tasks but the distribution of data shifts gradually due to changes in illumination, clutter, occlusion and angle of view. Various method such as regularization methods[2], replay based methods[3] have been proposed. We propose a method based on replay memory.

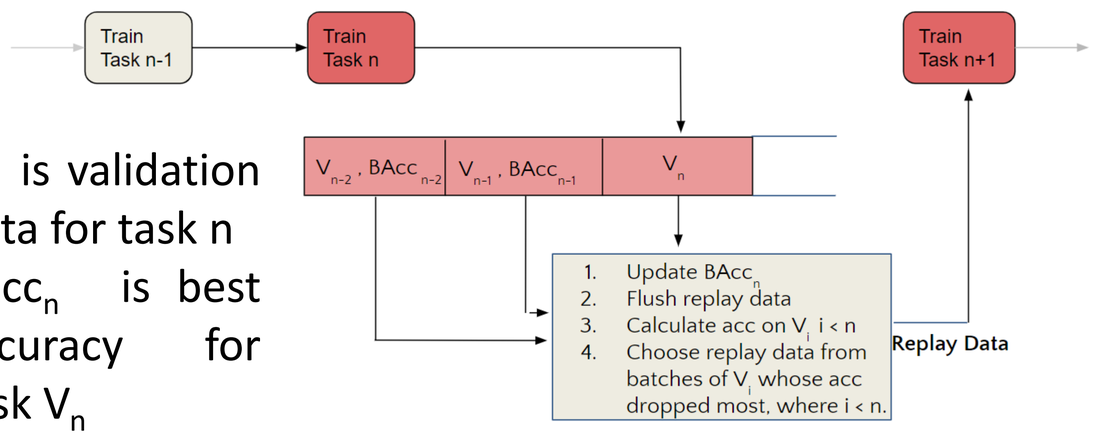
Motivation

CNNs map input images to high dimensional feature space. Features belonging to same object are near by and that of different are far away. These high dimensional features form a distribution which is dependent on distribution of dataset. As new tasks come distribution of dataset changes and hence the distribution of features(in feature space) of images changes, resulting in drop in accuracy for images from previous task.



Approach

We sample the replay data from the validation data of all the previous task such that they are an efficient representation of previous tasks data whose information is lost. MobileNetV2 is used as classifier.



- V_n is validation data for task n
- $Bacc_n$ is best accuracy for task V_n

Results

All the results shown are for OpenLORIS-Object dataset. After training on all the tasks we achieved a mean accuracy of 97.05%. Accuracy after training on different tasks in shown in fig1. Final accuracies are shown in table 1.

Fig 1: Validation accuracy on all tasks after training on task 1, 5, 9, 12

Task	1	2	3	4	5	6
Acc	98.94	99.52	80.04	98.94	98.85	96.44
Task	7	8	9	10	11	12
Acc	98.56	98.94	97.27	99.16	97.95	100

Table 1: Accuracy on all the tasks after training for task 12.

References

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