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Lab Exercise 6

COMP6248
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1 Transfer Learning

1.1 Finetuning

According to the method provided in Lab6, the last two layers are modified. Average Adaptive Pooling layer are used to replace Average Pooling layer in order to deal with different image size. The output number of Fully Connected layer is replaced by the number of classes in Boat dataset. Considering that the Boat dataset is a relatively small and different dataset compared with ImageNet dataset, we only updated the weights of parameters of the FC layer and froze other layers, which is a method mentioned in Standford CS231n course pages.
The Loss and Accuracy curve are shown respectively in **Figure 1** and **Figure 2**, the overfitting could be witnessed since early epochs.

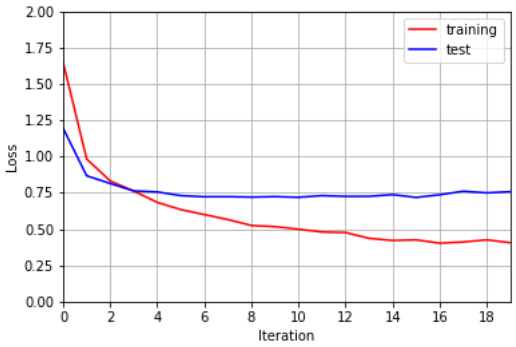

Figure 1: Loss

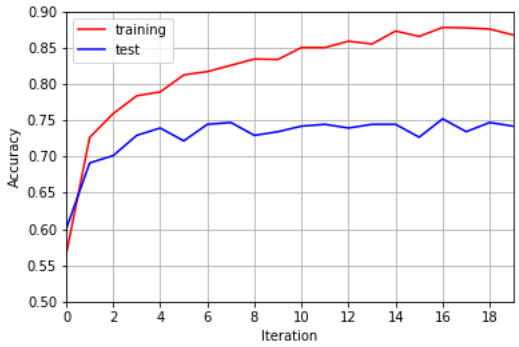

Figure 2: Accuracy

1.2 Reflect on the two different approaches

After training and evaluating the SVM classifier, a table which compares the performance of finetuned classifier and SVM classifier is presented. SVM performs way better and faster(87% accuracy on test set, only takes 22 seconds) than finetuned classifier(76% and 19 minutes instead). It proves again that SVM is one of the best choice when we are dealing with small dataset.

Finetuning	support	precision	recall	f1-score	**SVM**	precision	recall	f1-score
Alilaguna	19	0.46	0.63	0.53		0.90	1.00	0.95
Ambulanza	22	0.41	0.55	0.47		0.81	0.81	0.81
Barchino	51	0.29	0.18	0.22		0.76	0.25	0.38
Gondola	3	0.00	0.00	0.00		1.00	0.66	0.80
Lanciafino10m	7	0.00	0.00	0.00		0.00	0.00	0.00
Motobarca	59	0.07	0.03	0.05		0.81	0.30	0.44
Motopont...	3	0.50	0.67	0.57		1.00	1.00	1.00
MotoscafoACTV	1	0.00	0.00	0.00		0.00	0.00	0.00
Mototopo	274	0.71	0.79	0.75		0.81	0.98	0.89
Patanella	74	0.32	0.65	0.43		0.41	0.83	0.55
Polizia	15	0.18	0.13	0.15		0.66	0.13	0.22
Raccoltarifiuti	19	0.46	0.58	0.51		1.00	0.73	0.84
Sandoloaremi	3	0.00	0.00	0.00		0.00	0.00	0.00
Topa	29	0.25	0.03	0.06		0.00	0.00	0.00
VaporettoACTV	325	0.98	0.99	0.99		0.99	1.00	0.99
Water	420	0.97	0.88	0.92		0.99	0.97	0.98
Accuracy	1324	**0.76**	0.76	0.76		**0.87**	0.87	0.87
Macro avg	1324	**0.35**	0.38	0.35		**0.63**	0.54	0.55
Weighted avg	1324	**0.76**	0.76	0.75		**0.86**	0.87	0.85