Efficient Self-Supervised Contrastive Learning with Representation Mixing

Supplementary Material

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1 Ablation Study

We had conducted three experiments as ablation study to investigate whether how our particular approach fared against other mixing combinations. None of these performed close to our proposed method.

- **Experiment - 1** : We took normalized and augmented view of an image and its random counterpart. Our objective to get perform the contrastive learning between similarity of a combined view and counterpart augmentation. loss function for this objective is as follows :

$$l(i,j) = -log\frac{exp(sim((h_{n(A)} + h_{aug(R)}), h_{aug(R)}))}{\sum_{k=1}^{N} 1_{k\neq i} exp(sim((h_{aug(R)}), h_{aug(A)}))} \tag{1}$$

  Result is in Fig. ??
- **Experiment - 2** : Similarity between a combined view and normalized view of an image and its counterpart is considered to perform the contrastive learning task.

$$l(i,j) = -log\frac{exp(sim((h_{n(A)} + h_{aug(R)}), h_{n(A)}))}{\sum_{k=1}^{N} 1_{k\neq i} exp(sim((h_{n(R)}), h_{n(A)}))} \tag{2}$$

  Result is in Fig. ??
- **Experiment - 3** : In this experiment, we took k_a number of augmented images with respect to one normalized image. Our intuition is to check how more number of image with one image improves the learning.

$$l(i,j) = \sum_{K_a=1}^{N_a} \{-log\frac{exp(sim(h_{aug_{N_a}(R)}, h_{n(A)}))}{\sum_{k=1}^{N} 1_{k\neq i} exp(sim(h_{aug_{N_a}(R)}, h_{n(A)}))}\} \tag{3}$$

  Result is in Fig. ??

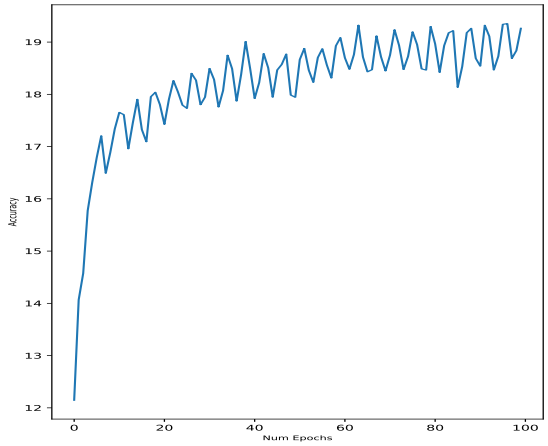

Fig. 1: Linear evaluation result for Experiment 1 for Resnet20 and CIFAR-10

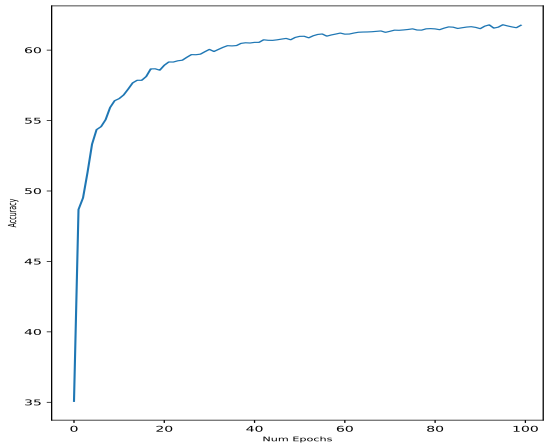

Fig. 2: Linear evaluation result for Experiment 2 for Resnet20 and CIFAR-10

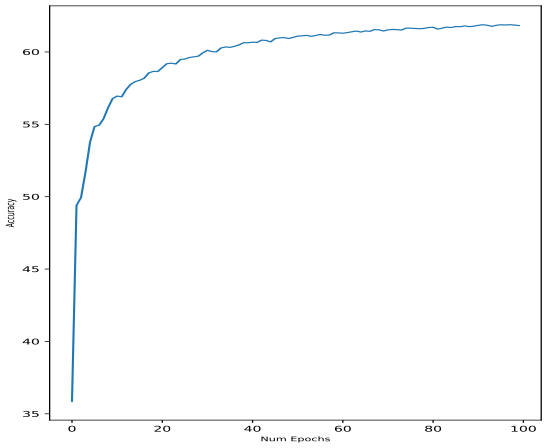

Fig. 3: Linear evaluation result for Experiment 3 for Resnet20 and CIFAR-10