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Project Title: Self-Supervised Knowledge Distillation and Neural Architecture Search for Video Classification and Detection

Abstract:

This project develops a multi-task Knowledge Distillation (KD) framework in the regime of self-supervised representation learning.

In existing KD methods, a set of trained models such as Convolutional Neural Networks (CNNs) are treated as “teacher” networks, their predictions on images are used as supervisions to train a “student” network. Existing KDs have two major drawbacks. (1) Both the teachers and student are trained on large-scale manually-labeled data for the same task (e.g. training from millions images of the same scene categories). (2) The network architecture of the student is designed by hand.

In contrast, this project addresses the above drawbacks by proposing a few self-supervised multi-task KD and Neural Architecture Search (NAS) algorithms, which have benefits that previous works didn't have. (1) Multi-tasks. The learned visual representation of the teachers trained on different tasks (e.g. different scene categories) can improve representation learning of the student. (2) Semi-/Self-supervised. The student can be trained on a small number of labeled images but large amount of unlabeled images. (3) NAS. The architecture of the student is automatically learned to reduce memory and computations in order to execute on portable devices. The developed algorithms will be evaluated on real applications such as scene, object, and face recognition, detection and segmentation by delivering software prototypes, publications, and datasets.