Efficient Recognition and Classification of Objects of Interest in Video Streams

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Motivation

As we know 3D convolution model is computationally expensive model. We want to find more efficient ways to process the videos for downstream tasks. The tasks like video recognition, detection or classification. We explore the application for scene representation learning in videos from different data sets.

Task Description

In this work we are conducting a literature study to find different approaches of efficient video processing and comparing them with based on same data set. These papers are based on different data sets with literature criteria explained in bluets point to understand the task.

- Find out the research literature for object recognition and classification.
- Use only 2D neural network study for further consideration, no 3D convolution model.
- Looking in to the comparison of different techniques with same data sets.

Relevant literature

Our focus of this study is based on the following literature.

- AdaFocus V2: End-to-End Training of Spatial Dynamic Networks for Video Recognition In this paper they show the end-to-end training of adaptive focus video recognition networks[1]. First, they proposed a differentiable interpolation-based operation for selecting patches. That allows the gradient back-propagation throughout the whole model. Then explained three tailored training techniques. Which addresses the optimization problems during end- to-end training. Sth-Sth V2 data set is used in this.

- VidConv: "A modernized 2D ConvNet for Efficient Video Recognition"[2] The main objective of this paper they explain, how 2D Convolution neural network is inferior to 3D ConvNet is not true in all case with respect to action recognition. Afterward, this study selects a minimal design of the 2D ConvNet and proves that its performance is still very competitive while preserving efficiency. Also using Sth-Sth V2 data set.
- GabriellaV2: "Towards better generalization in surveillance videos for Action Detection"[3]. This paper focused on a system based on tracklist generation using an object detector with a tracker. where this study shows how to resolve overlapping actor problems with a good explanation of tracklet action classification and post-processing units. The data set in this study was AVA-kinetics.
- "Exploiting Instance-based Mixed Sampling via Auxiliary Source Domain Supervision for Domain-adaptive Action Detection"[4]. This study proposed DA-AIM, a novel algorithm tai- lored for unsupervised domain adaptive action detection. DA-AIM considers the inherent characteristics of action detection and mixes 3D video clips. AVA-kinetics data set is used here.
- "A practitioner's guide to improve the logistics of spatiotemporal deep neural networks for animal behavior analysis"[5]. This publication is focused on exploring a suite of optimization techniques for representative neural network architecture. The I3D is trained to perform action classification on freely behaving mice in a home-cage setup. This use HMDB51 data set, to find the suggested result that simple optimizations in data loading protocols and network specification yield significant reductions with model the run-time and system's overall accuracy without any scarify

Time Schedule

Week	Tasks
1-4	Literature survey
5-10	Preparation of the results
10-20	Writing of the report

References

1 Y. Wang et al., "AdaFocus V2: End-to-End Training of Spatial Dynamic Networks for Video Recognition," 2022 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2022, pp. 20030-20040, doi: 10.1109/CVPR52688.2022.01943.

2 Ishandave, zaccy, akash k, sarah.shiraz@knights.ucf.edu, yogesh, shah@crcv.ucf.edu., "GabriellaV2 Towards better generalization in surveillance videos for Action Detection" The WACV workshop in IEEE computer vision foundation 2022.

3 Chuong H. Nguyen, Su Huynh, Vinh Nguyen, Ngoc Nguyen CyberCore AI, Ho Chi Minh, Viet Nam., VidConv: A modernized 2D ConvNet for Efficient Video Recognition., https://arxiv.org/abs/2207.03782v1 2022

4 Yifan Lu, Gurkirt Singh, Suman Saha, Luc Van Gool.,Exploiting Instance-based Mixed Sampling via Auxiliary Source Domain Supervision for Domain-adaptive Action Detection., https://arxiv.org/pdf/2209.15439.pdf.,2022

5 Lakshmi Narasimhan Govindarajan Rohit Kakodkar Thomas Serre lakshmi govindarajan, rohit kakodkar, thomas serre Brown University, Providence, RI, USA A practitioner's guide to improve the logistics of spatiotemporal deep neural networks for animal behavior analysis.https://serre-lab.clps.brown.edu/wp-content/upload/2022/09/VAIB22$_{C}ameraReady.pdf$., 2022