Pyramid Hierarchies for Multi-scale Temporal Action Detection

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Introduction

Temporal action detection is a main task in visual content understanding which is aimed at detecting human action instances from untrimmed video clips, classifying the instance into one of several action classes, and precisely predicting starting and ending time points of the action instance.

In this paper, we introduce Feature Pyramid Convolutional 3D Networks, named FPC3D. The network is designed to enhance the ability of detecting actions across a large range of temporal scales.

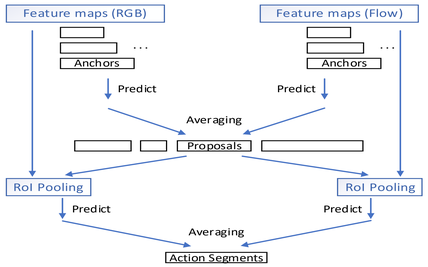
Purpose

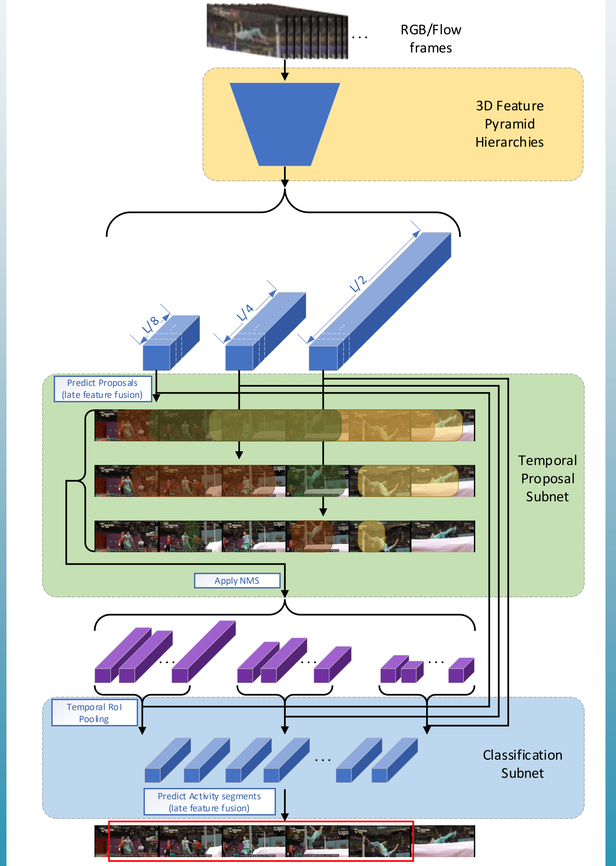
In practical application, most of the videos which need to be detected are untrimmed, long-lasting videos with multiple different action segments. For example, we might need to monitor the behaviors of prisoners held in prisons by detecting surveillance videos in real time, or we need to filter videos with nasty clips on YouTube. And these videos are exactly long-lasting and they always contain complicated action segments.

In this paper we propose Feature Pyramid Convolutional 3D Networks (FPC3D), an end-to-end framework which consists of three subnets. The network aims to improve its ability to detect actions of different temporal lengths.

Methods

The network is designed to enhance the ability of detecting actions across a large range of temporal scales. In our work, we built a 3D feature pyramid hierarchical feature to get multi-scale semantic information. Specifically, input RGB/optical flow frames of a certain video are scale-invariant, these frames are encoded through a finetuned C3D network and output a base feature map. After this, the base feature map would go through the top-down pathway and generate three novel feature maps of different temporal scale. These feature maps are higher-resolution feature maps combined with high-level semantic feature which will be shared by the following two subnets. Temporal proposing subnet is aimed to generate proposals via anchor mechanism. Feature maps utilized in this subnet are used to set positive or negative label to anchors and initially adjust the boundaries of anchors. Prediction results of RGB and optical flow features are averaged for the first time in this subnet, and it is a late fusion scheme. Then as its name says, the classification





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Acknowledgment

This study was funded by National Natural Dcience Foundation of China (Grant No: 61806215) and National Natural Dcience Foundation of China (Grant No: 71673293).