

摘要

儘管深度學習近期在語意分割 (semantic segmentation) 已發展成熟，但當一個訓練好的模型遇到真實情況下的測資，因實際資料的特徵分布與訓練集有偏差將造成測試效果不如預期。近年來一些域適應學習 (Domain Adaptation) 與主動學習 (Active Learning) 被提出用來解決上述問題。然而極少的研究強調利用影片的資訊來輔助解決模型跨域表現不佳的情況。

在這篇論文中，我們提出一個一個弱監督式主動學習的方法來改善人體目標分割 (human segmentation)，並利用影片中容易取得的移動資訊 (motion prior)。在我們固定攝影機的情況下，使用光流 (Optical Flow) 得到影片中像素移動的資訊，可將之轉換為前景與背景的分割區塊，前景相當於人體目標的分割區。我們提出以強化學習訓練得到一個基於記憶網路的決策模型，去挑選較佳的前景分割塊。被挑選出的分割塊通常代表有較正確的分割邊界，將被當成訓練目標並直接用來微調模型參數。在評估模型方面，我們蒐集了一個監視攝影機畫面的資料庫，以及在現有公開的資料庫-UrbanStreet 做測試。我們提出的方法改善模型在跨域 (含多場景與多攝影光模態) 的表現。最後，我們的方法可與現有的域適應學習算法結合，協同訓練後達到更好的跨域表現。

Abstract

Despite many advances in deep-learning based semantic segmentation, performance drop due to distribution mismatch is often encountered in the real world. Recently, a few domain adaptation and active learning approaches have been proposed to mitigate the performance drop. However, very little attention has been made toward leveraging information in videos which are naturally captured in most camera systems.

In this work, we propose to leverage “motion prior” in videos for improving human segmentation in a weakly-supervised active learning setting. By extracting motion information using optical flow in videos, we can extract candidate foreground motion segments (referred to as motion prior) potentially corresponding to human segments. We propose to learn a memory-network-based policy model to select *strong* candidate segments (referred to as *strong* motion prior) through reinforcement learning. The selected segments have high precision and are directly used to finetune the model. In a newly collected surveillance camera dataset and a publicly available UrbanStreet dataset, our proposed method improves the performance of human segmentation across multiple scenes and modalities (i.e., RGB to Infrared (IR)). Last but not least, our method is empirically complementary to existing domain adaptation approaches such that additional performance gain is achieved by combining our weakly-supervised active learning approach with domain adaptation approaches.