Significant paper

https://arxiv.org/pdf/2004.05993.pdf

A Survey of Single-Scene Video Anomaly Detection

Video anomalies can be thought of as the occurrence of unusual appearance or motion attributes or the occurrence of usual appearance or motion attributes in unusual locations or times. The video anomalies are not scene-dependent, an event occurs in one scene might be completely normal, whereas abnormal on some other place. The system is trained with bunch of normal scenes and tested with new videos in the same scene and extract features. Currently, few high-volume datasets are available in this research area. One can imagine a model for a single scene being able to handle camera motion when the majority of each frame overlaps with neighboring frames by keeping track of global location in each frame. Such a formulation would still be considered single-scene. This survey paper covers the various datasets, types of anomalies, traditional approach, recent criteria in anomaly detection and various approaches to anomaly detection problem. In traditional approach, researchers have used frame-level and pixel-level AUC to evaluate the performance. As traditional approach is saturated and has flaws, which leads to future approach on Dual pixel level criteria where atleast 10% of the pixels should match with the labeled data along with anamoly pixel detection. Broadly, there are two classes of representations used by video anomaly detection approaches, hand-crafted features and deep features from a CNN. Hand-crafted features include spatio-temporal gradients, dynamic textures, histogram of gradients, histogram of flows, flow fields, dense trajectories and foreground masks. The deep features are further either extracted as-is from a pre-trained or are learned while optimizing for a particular task related to anomaly detection, such as with auto-encoders optimizing for low reconstruction error. These are three main focus in these 2 approaches – frame-level localization, per video normalization and location based anomalies. This survey aims in the evolution of the field in terms of overarching trends in representation and modeling as they relate to the increasing size of datasets and increasing compute power of devices.