Machine Learning in Intelligent Video and Automated Monitoring

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Abstract

The primary goal of this special issue is to showcase cutting-edge research on tracking and identifying objects, analyzing motion, and extracting interesting frames from analog or digital video streams automatically. At the same time, we particularly focus on the efficiency of video surveillance systems and machine learning methods which can be used to analyze video and control the machine automatically. Our aim is to unify the machine learning techniques as an integral concept and to highlight the trends in advanced video intelligence and automated monitoring.

1 Contributions and Results

With the developments of computer science, communication technology and internet engineering, intelligent video surveillance systems have become more and more importance in today's life. They can be seen everywhere. Intelligent video surveillance is digital, network-based video surveillance, but is different from the general network video surveillance–it is higher-end video surveillance applications. Intelligent video surveillance system can automatically recognize different objects, find anomalies in the monitor screen. Thus, it potentially provides fastest

and best way to alert and provide useful information, which can help security personnel more effectively deal with the crisisMoreover, intelligent video surveillance system can maximally reduce false positives and false negative phenomena.

The basic information framework can be found in the following illustrated figure 1.
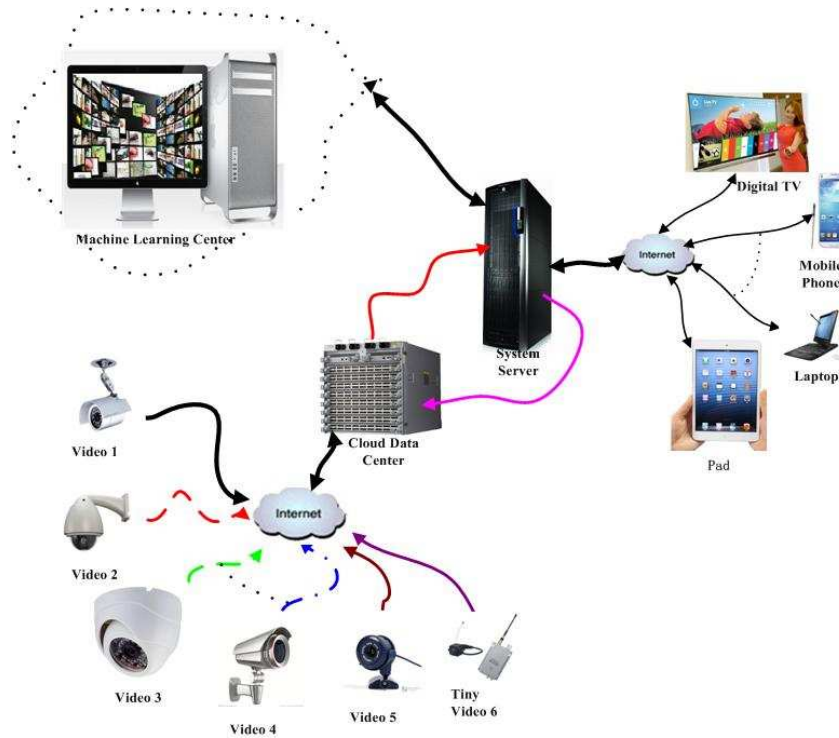

Figure 1: Basic information framework of intelligent video and automated monitoring. More video sources can be collected from video 1 to video 5. In special case, tiny videos are also employed to get video records. The data sets(usually there are big) are submitted to the cloud data center. The services system to handle the videos is the central and important unity. The machine learning system is set up and to learn the knowledge or pattern from the special videos according to the users needs or conditions. In this system, many popular technologies can be employed, such as data mining, manifold learning, kernel learning, image and video processing, optimization methods and algorithm and so on. In some cases, the machine learning system can transfer the information to users with emails from internet, short messages by mobile communication system or other dedicated devices(example digital TV sets).

In this special issue, there were 51 submissions from more than 16 countries including China, United States, Canada, Germany, France, Australia, Japan, Pak-

istan, Bangladesh, Korea, Malaysia, South Africa, Romania and so on. Contributions of the accepted papers are summarized as follows.

Based on the studies on the video data sets, innovative results are reported in eleven papers. Yaser Daanial Khan et al proposed a sufficiently accurate method while computationally inexpensive solution to recognize human actions from videos; Heng Fan et al proposed a novel part-based tracking algorithm using online weighted P-N learning; Joko Hariyono et al presented a good pedestrian detection method from a moving vehicle using optical flows and histogram of oriented gradients (HOG); Olasimbo Ayodeji Arigbabu et al presented an effective approach for estimating body related soft biometrics and propose a novel approach based on body measurement and artificial neural network for predicting body weight of subjects and incorporate the existing technique on single view metrology for height estimation in videos with low frame rate; Xing Hu et al proposed a novel local nearest neighbor distance (LNND) descriptor for anomaly detection in crowded scenes; Rashed Mustafa et al presented a novel method for detecting nipples from pornographic image contents; Jing Zhang et al set up a new image multi-label annotation method based on double-layer probabilistic latent semantic analysis (PLSA); Zhihui Wang et al constructed an accurate pedestrian detection system after combining cascade AdaBoost detector and random vector functional-link net; Hai Wang et al proposed a novel vehicle detection algorithm from 2D deep belief network (2D-DBN) by deep learning framework; Jing Li et al proposed a human action recognition scheme to detect distinct motion patterns and to distinguish the normal status from the abnormal status of epileptic patients after learning video recordings of the movement of the patients with epilepsy, this work is very interesting in the field of health care sysytem of epileptic patients; Shaoping Zhu proposed a new approach to automatically recognize the pain expression from video sequences, which categorize pain as 4 levels: no pain, slight pain, moderate pain, and severe pain.

Four great contributions are devoted to the field of biometrics. Zhihua Chen et al presented a novel real-time method for hand gesture recognition using the finger segmentation; Dongdong Li et al introduced a cost-sensitive learning technology to re-weight the probability of test affective utterances in the pitch envelop level and enhanced the robustness in emotion-dependent speaker recognition effectively; Hong-Min Zhu et al proposed an adaptive and robust super-pixel based hand gesture tracking system and hand gestures drawn in free air had been recognized from their motion trajectories; Yaser Daanial Khan et al proposed a biometric technique for identification of a person using the iris image.

There are four novel contributions from knowledge management and services selection in the cloud computing. Yuyi Jiang et al proposed a tuple molecular structure-based chemical reaction optimization (TMSCRO) method for DAG schedul-

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ing on heterogeneous computing systems; Yi Guo et al proposed a comprehensive causality extraction system (CL-CIS) integrated with the means of category-learning; Jie Zhai et al proposed a novel cost function and improved the discrete group search optimizer (D-GSO) algorithm; Haiteng Zhang et al proposed a novel web reputation evaluation method quality of with service (QoS) information.

Acknowledgements