

Traffic Incident Detection System Based on Video Analysis

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Problem Statement

This paper aims at tackling challenges associated with real-time video analysis in complex traffic scenes. The proposed system is to detect traffic events through videos so well that even under difficult circumstances like night time still achieves its aim. This mode of operation is achieved through overcoming conventional limitations such as joint detection and tracking frameworks, neural network pruning techniques for acceleration, and specifically designed segments to detect vehicles during the night time.

Analysis

Throughout this paper, there are many modules used where each has its own functionality. Some of the used module systems are video stream processing module, image processing module, a video analysis module, data calibration module and network acceleration module.

Video analysis of the urban traffic is mainly done by the video stream processing module, which is also responsible for docking the remote cameras with given input camera parameters, accountable for camera connection and disconnection.

The interesting thing to note here is, they use separate running models for daytime traffic videos and nighttime traffic videos. The object detection task of nighttime scenes is more complicated than the daytime scenes.

Proposed Solution

Sangnoree and some others came up with a solution for this problem. Their solution uses infrared cameras to analyze the heat map to achieve vehicle classification and identification. Since infrared cameras are very costly, it is not practical to use in day-to-day life. Hence researchers look for alternative solutions.

Traffic analysis using all of the above mentioned modules has more resource overhead. The system overhead is reduced by frame-hopping-based tracking optimization methods.

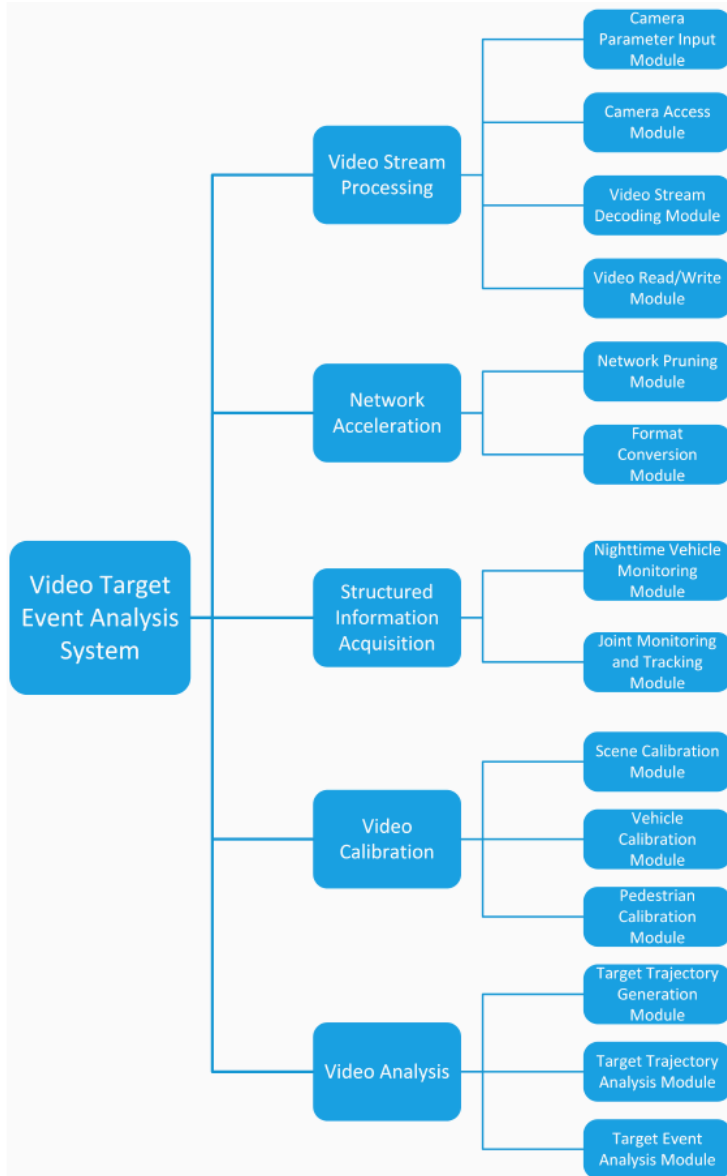


Fig. Structure Chart of Video Analysis based Traffic Incident Detection System

Conclusion and Result

- This system uses many modules to detect targeted objects and its projection and fine tunes the accuracy of the object detection in urban traffic scenes.
- Among the modules, the main components are image processing module and video stream processing module.
- Sometimes, it is possible to get low accuracy for nighttime analysis as it is a complicated task.
- This system is suitable for all weather types.
- This system has been used online in many places in China and has achieved extraordinary results.

References

- [1] Zhang G, Navimipour N J. A comprehensive and systematic review of the IoT-based medical management systems: Applications, techniques, trends and open issues[J]. Sustainable Cities and Society, 2022: 103914.
- [2] Yang X, Yang X, Liu M Y, et al. Step: Spatio-temporal progressive learning for video action detection[C]//Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition. 2019: 264-272.
- [3] Zhu L, Deng R, Maire M, et al. Sparsely aggregated convolutional networks[C]//Proceedings of the European Conference on Computer Vision (ECCV). 2018: 186-201.
- [4] Gupta D K, Arya D, Gavves E. Rotation equivariant siamese networks for tracking[C]//Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition. 2021: 12362-12371.
- [5] Tsai Y H H, Bai S, Liang P P, et al. Multimodal transformer for unaligned multimodal language sequences[C]//Proceedings of the conference. Association for Computational Linguistics. Meeting. NIH Public Access, 2019, 2019: 6558.