Intelligent Upgrading and Application of Bridge Video Surveillance System Based on Computer Vision

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Abstract

The rapid development of computer vision provides a foundation for the intelligent upgrading of bridge video surveillance systems. In this paper, two intelligent upgrading methods were developed and deployed. The first method uses edge computing equipment as the core, to quickly identify and locate vehicles across the large-span bridge by YOLOv5, which was trained by synthesized vehicle dataset, and then a large-span bridge vehicle digital twin system was built and deployed in Baijusi Yangtze River Bridge, which is suitable for scenarios with high real-time requirements. The another one is based on cloud computing, relying on ShuffleNetV2 to build a waterlogging recognition model and early warning system, which is suitable for scenarios with low real-time requirements. The results show that the constructed intelligent system upgrades the traditional passive access system to an early warning system with active recognition, which improves the intelligence of the system and meets the needs of engineering applications.

Keywords: video surveillance; deep learning; intelligent upgrading; early warning.

1 Introduction

With the advance of civil engineering information construction, video surveillance has been widely used in bridge construction and maintenance phases. Video surveillance is conducive to real-time, remote to master the actual situation on site, and in case of special events, it can also be replayed for evidence. However, the existing monitoring system lack of automatic identification of the special tasks of bridge, the command center needs to view the monitoring screen in real time and determine the anomaly, which is time-consuming and easy to miss detection.

Intelligent upgrading of video surveillance refers to the use of the latest computer vision technology to actively identify useful information in the video stream and timely warning, the whole process does not require manual participation and there is also no need to reinstall any surveillance equipment, which can improve the utilization of the existing video resource.

To achieve the intelligence of video surveillance system, intelligent image processing technology has attracted a lot of attention from academia and

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