A Review Paper on Real-Time Video Analysis in Dense Environment for Surveillance System

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Dense environmental conditions such as snow, fog, lightning, heavy rain, and darkness drastically lower the quality of outdoor surveillance videos. The primary functions of video surveillance systems in crowded environments have received significant attention, particularly in detection, categorization, and event or object recognition. The methods and algorithms for real-time video analysis in various weather conditions have also significantly advanced with the advancement of technology. Examples include background extraction, the see-through algorithm, deep learning models, CNN for nighttime intrusions, the System for high-quality underwater Monitoring using optical-wireless video surveillance, the low-visibility enhancement network (LVENet), edge computing, and many others. Using various elements of these methodologies, the current research increased monitoring performance and avoided potential human failures. In-depth information about these video surveillance methods, systems, and supporting details is provided in this study. An overview of employed construction and architectural styles is given, and the critical assessments of these systems are then covered. Current surveillance systems and various methods for achieving accuracy in real-time video analysis in adverse weather circumstances are contrasted in terms of their features, benefits, and challenges, which are discussed in this paper, to provide a complete image and a broad view of the System. Future trends are also highlighted, pointing to the study that will be conducted in the future.

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Contents

Life has become more complicated in many ways, including ensuring that people are safe and secure due to the vast growth seen in recent years across many areas. Being protected is now necessary as a result. Therefore, installing security cameras in public and private spaces is a good idea to ensure safety. As a result, there's a need for a real-time system that relies on surveillance cameras to monitor events in various areas and adverse weather conditions like snow, fog, or severe rain. Installing a real-time surveillance video system is a workable approach. These kinds of systems' primary functions are to assist human resources in carrying out various surveillance activities, including traffic analysis, accident prediction, crime prevention, homeland security, anomaly detection, real-time motion detection, and additional applications that should be added, such as monitoring both indoor and outdoor locations like workplaces, stores, shopping malls, and airports. The primary goal is to complete all of these duties in poor weather that significantly lowers the image quality of outdoor surveillance videos, such as snow, mist, or heavy rain. The Security and surveillance systems that can deliver real-time video data analysis in a congested setting with little human resources are becoming increasingly popular. This branch of study has already experienced enormous advancement. [1]. Traditional information cannot be used in specific contexts, such as video surveillance and traffic monitoring. The most significant issue for the most recent computer vision technology is to analyze the information concealed in a video that is being taken in a dense environment for use in surveillance system research. Various techniques have been employed in this discipline, particularly for identifying, categorizing, and recognizing objects or events that highlight the primary purposes of video surveillance systems. [2]. The techniques and algorithms for real-time video evaluation in various weather conditions have also advanced significantly with technological advancements. Examples include background extraction, the see-through algorithm, deep learning models, CNN for nighttime intrusions, the low-visibility enhancement network (LVENet), edge computing, and optical-wireless video surveillance systems for high fidelity underwater monitoring, among many more. Video Sensor Networks have significantly improved due to the usage of image sensors in wireless sensor networking (VSNs). These networks' image sensors can record a lot of data about the video. These methods and strategies require greater data exploration to ensure effective surveillance in crowded environmental situations. The technology must better understand all the scenes for all public spaces, indoor or outdoor, and assess the audience and events [3]. The review of video surveillance systems, practices, and some of their characteristics for this use is provided in this article. Real-time video analysis related to better security and surveillance in adverse weather circumstances is introduced [4], and its future implications are also highlighted. The paper is composed of seven sections. In Section 1, "Introduction," problems and fundamental causes of the study and techniques used are mentioned. Section 2 summarizes the research and all related work

on this topic and identifies unresolved issues. Section 3, "Video Surveillance System," presents an overview of the video surveillance system. Section 4 gives the main problems for the surveillance system in bad weather conditions and different techniques to handle them. Section 5 presents all the challenges to the surveillance system. Section 6 discusses future trends and strategies for real-time video surveillance systems in dense weather conditions. Section 7 is the overall conclusion we made through this paper. It combines the issue of event recognition from video cameras gathered in crowded environmental circumstances, utilizing the chosen promising approaches and models for various difficulties.

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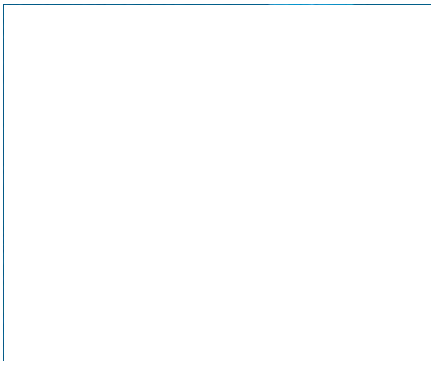

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