Energy-Efficient Deep CNN for Smoke Detection in Foggy IoT Environment

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Abstract— Smoke detection in IoT environment is a primary component of early disaster-related event detection in smart cities. Recently, several smoke and fire detection methods are presented with reasonable accuracy and running time for normal IoT environment. However, these methods are unable to detect smoke in foggy IoT environment, which is a challenging task. In this article, we propose an energy-efficient system based on deep convolutional neural networks (CNN) for early smoke detection in both normal and foggy IoT environments. Our method takes advantage of VGG-16 architecture, considering its sensible stability between the accuracy and time efficiency for smoke detection compared to the other computationally expensive networks such as GoogleNet and AlexNet. Experiments performed on benchmark smoke detection datasets and their results in terms of accuracy, false alarms rate and efficiency reveal the better performance of our technique compared to state-of-the-art and verifies its applicability in smart cities for early detection of smoke in normal and foggy IoT environments.

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