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Abstract

Thermal Activity Surveillance System: Measuring Mountain Bike Trail Use †

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We present a small system for counting and classifying bikers and pedestrians on nature trails. The system consists of a low-cost capture system based on the Raspberry Pi 2 and an embedded thermal camera. Besides the benefit of enabling both day- and night-time surveillance, thermal imaging also helps address the privacy concerns that usually plague surveillance systems. The camera is very low resolution, but it is able to provide sufficient information for a detector to locate and discriminate between bikers and pedestrians. The detector uses a typical sliding window-based approach and performs classification based on HoG features. Detections are collected in tracks from which a final decision is made on whether a biker or pedestrian has passed through the camera's view. The system is trained and evaluated on a challenging new dataset with more than 25 h of thermal imagery. Data was captured from varying view points and from multiple geographical locations. The purpose is to show the feasibility of using a collection of classic computer vision methods and low-cost components for a real-time thermal surveillance system that is capable of classifying the different actors that make use of nature trails.