



## Review article

# On the role and the importance of features for background modeling and foreground detection



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## ABSTRACT

Background modeling has emerged as a popular foreground detection technique for various applications in video surveillance. Background modeling methods have become increasingly efficient in robustly modeling the background and hence detecting moving objects in any visual scene. Although several background subtraction and foreground detection have been proposed recently, no traditional algorithm today still seems to be able to simultaneously address all the key challenges of illumination variation, dynamic camera motion, cluttered background and occlusion. This limitation can be attributed to the lack of systematic investigation concerning the role and importance of features within background modeling and foreground detection. With the availability of a rather large set of invariant features, the challenge is in determining the best combination of features that would improve accuracy and robustness in detection. The purpose of this study is to initiate a rigorous and comprehensive survey of features used within background modeling and foreground detection. Further, this paper presents a systematic experimental and statistical analysis of techniques that provide valuable insight on the trends in background modeling and use it to draw meaningful recommendations for practitioners. In this paper, a preliminary review of the key characteristics of features based on the types and sizes is provided in addition to investigating their intrinsic spectral, spatial and temporal properties. Furthermore, improvements using statistical and fuzzy tools are examined and techniques based on multiple features are benchmarked against reliability and selection criterion. Finally, a description of the different resources available such as datasets and codes is provided.

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