

# Chapter 6

## Dynamic SceneNet Spatio–Temporal Interactive Network for Dynamic Video Foreground Detection

**M. Naveen**

*Hindusthan College of Arts and  
Science, India*

**A. V. Senthil Kumar**

 <https://orcid.org/0000-0002-8587-7017>

*Hindusthan College of Arts and  
Science, India*

**Ismail Bin Musirin**

*Universiti Teknologi MARA, Malaysia*

**Amit Dutta**

*All India Council for Technical  
Education, India*

**L. Manjunatha Rao**

*National Assessment and Accreditation  
Council, India*

**N. Achyutha Prasad**

*East West Institute of Technology, India*

**Indrarini Dyah Irawati**

*Telkom University, Indonesia*

**Giridhar Akula Venkata Shesha**

*Sphoorthy Engineering College, India*

**S. K. Tiwari**

*Dr. C.V. Raman University, India*

**G. Sangeetha**

 <https://orcid.org/0000-0002-7138-8888>

*Christ University, India*

**Binod Kumar**

 <https://orcid.org/0000-0002-6172-7938>

*JSPM's Rajarshi Shahu College of  
Engineering, Indonesia*

**Ravisankar Malladi**

 <https://orcid.org/0000-0002-8250-6595>

*Koneru Lakshmaiah Education  
Foundation, India*

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## ABSTRACT

*This study introduces Dynamic SceneNet, a new Spatio-Temporal Interactive Network developed to tackle the issues of dynamic video foreground recognition. Proposed model uses sophisticated deep learning techniques to learn interactive spatiotemporal characteristics, resulting in a novel solution for accurate and adaptable foreground recognition in dynamic scenarios. Video foreground detection (VFD) is a crucial pre-processing step for accurate target tracking and recognition. Creating a reliable detection network is tough because to interference from shadows, changing backgrounds, and camera jitter. Convolution neural networks have shown to be reliable in several sectors due to their great feature extraction capabilities. This research proposes an interactive spatiotemporal feature learning network (ISFLN) for VFD.. CDnet2014, INO, and AICD datasets corroborate that the introduced ISFLN model surpasses state-of-the-art methodologies in video foreground detection, thanks to its prowess in feature enhancement, interactive multi-scale feature exploration, and deep learning techniques.*

## INTRODUCTION

Foreground recognition in videos, a fundamental aspect of computer vision, has emerged as a revolutionary technology with profound implications across diverse industries. This sophisticated discipline revolves around identifying and isolating foreground elements within video sequences, facilitating a more refined comprehension of visual data. As technology advances, video foreground recognition assumes a pivotal role in numerous applications, spanning from surveillance and security to augmented reality and content generation. Video foreground detection (VFD), a well-explored domain within computer vision, aims at discerning dynamic elements within video sequences and has garnered significant interest across applications such as autonomous driving, remote sensing, action recognition, and video surveillance. As a critical preprocessing step, the precision of foreground detection profoundly impacts the overall quality of subsequent tasks. However, challenges like varying illumination, dynamic backgrounds, shadows, and camera movements intricately complicate the detection process. Over recent decades, diverse methodologies for VFD have been proposed. These approaches can be broadly classified into two main categories: traditional machine learning-based and deep learning-based techniques. Traditional methods, such as pixel-based techniques exemplified by Gaussian Mixture Model (GMM) and Kernel Density Estimation (KDE), encounter notable hurdles in accuracy, especially in the face of illumination shifts and camera motion. Additionally, region-based approaches often lack motion information, while the heightened

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