

# Computer Vision Module - Session 5

## Computer Vision

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**Online Training & Certification Course on Artificial Intelligence  
& Machine Learning**

**Defence Institute of Advanced Technology (DU), Pune.**

Computer Vision: Interest Point Detection



# Computer Vision

## Dr Sunita Dhavale Interest Point Detection

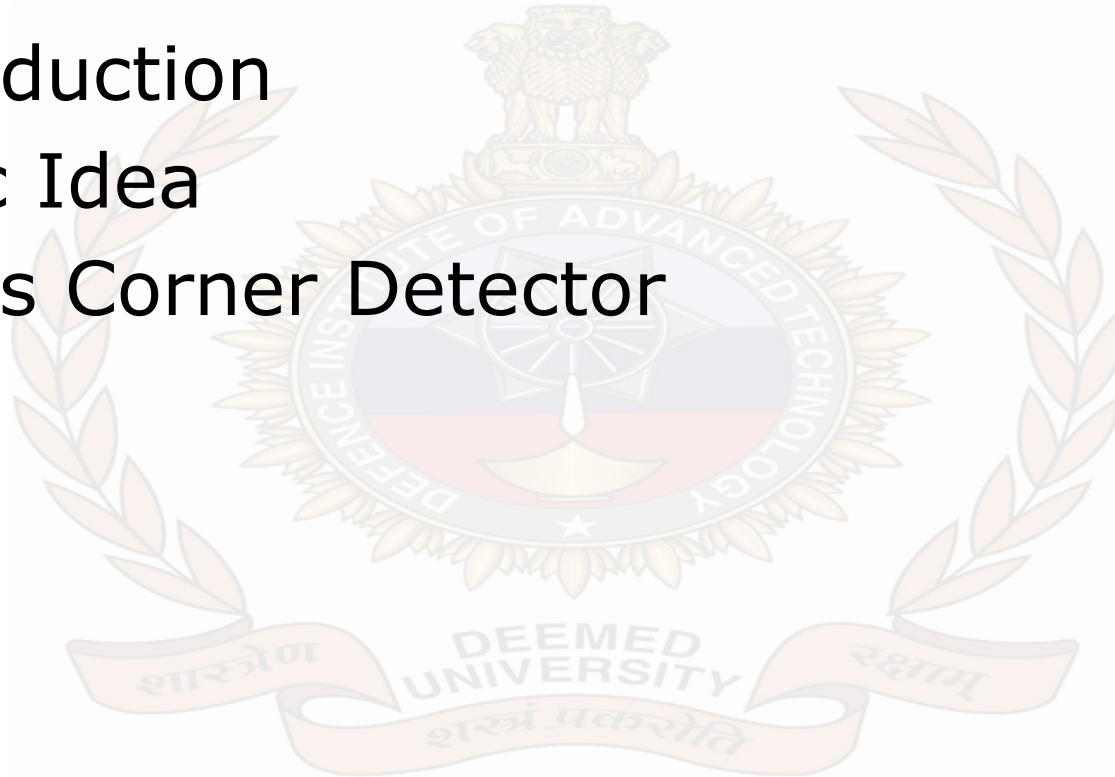


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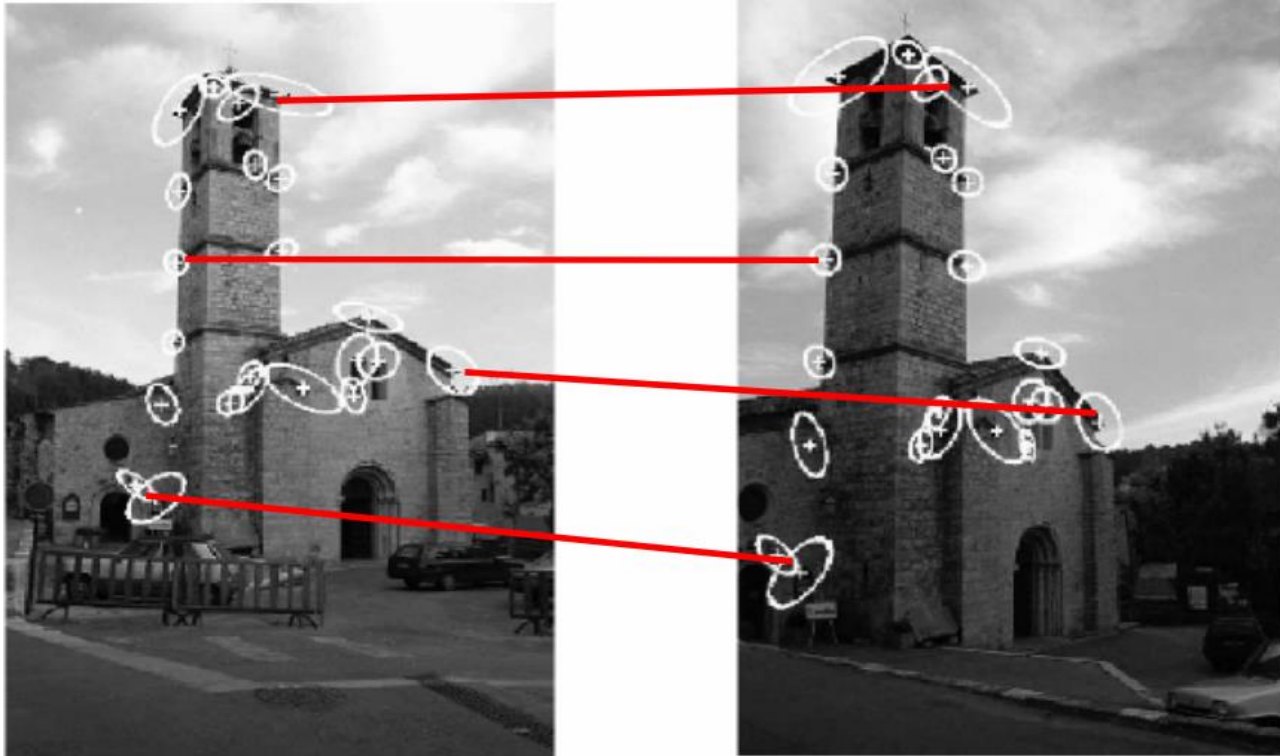


# Outline of Presentation

- Introduction
- Basic Idea
- Harris Corner Detector



# Introduction





# Properties of good features

**Local:** features are local, robust to occlusion and clutter

**Accurate:** precise localization.

**Invariant(or covariant)**

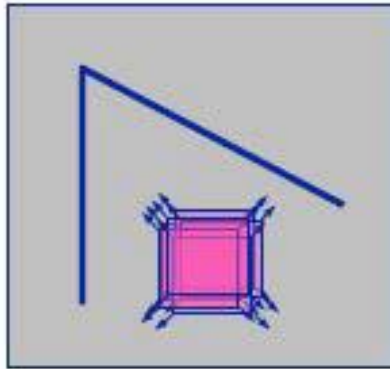
**Robust:** noise, blur, compression, etc.

**Distinctive:** individual features can be matched to a large database of objects.

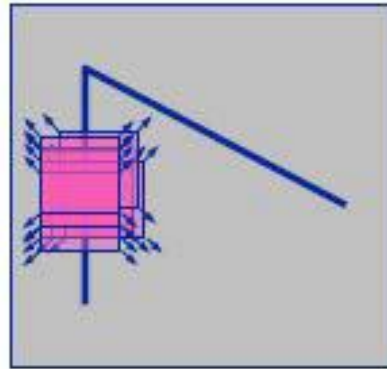
**Efficient:** close to real-time performance.



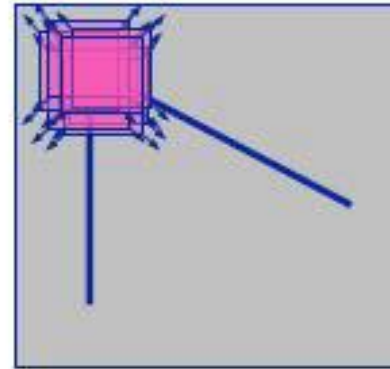
# Basic Concept



“flat” region:  
no change in  
all directions



“edge”:  
no change along  
the edge direction



“corner”:  
significant change  
in all directions

# Harris Corner Detector

Change of intensity for the shift  $[u, v]$ :

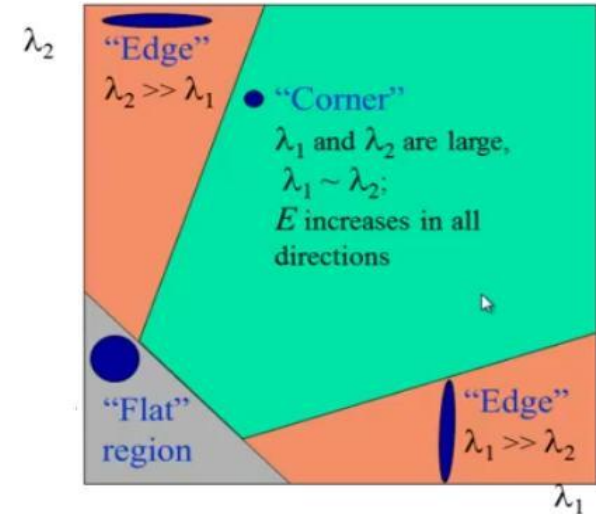
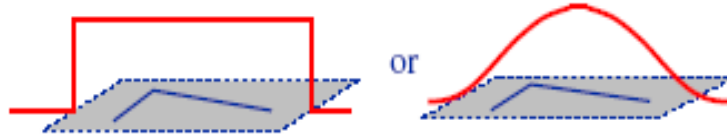
$$E(u, v) = \sum_{x, y} w(x, y) [I(x+u, y+v) - I(x, y)]^2$$

Window  
function

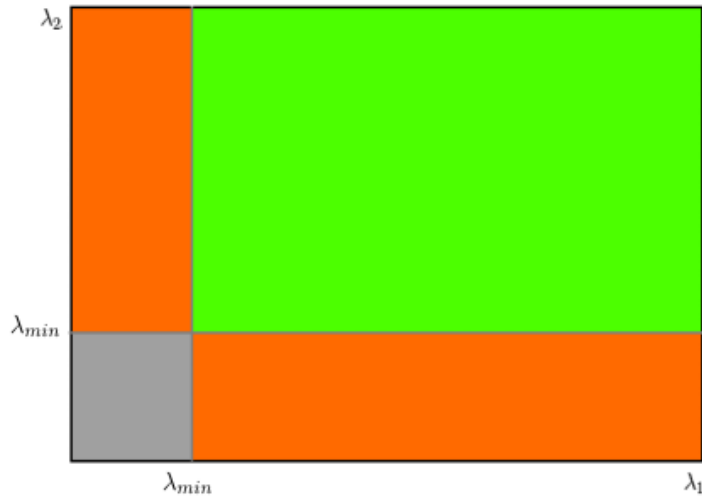
Shifted  
intensity

Intensity

Window function  $w(x, y) =$



# Shi-Tomasi Corner Detector



$$R = \min(\lambda_1, \lambda_2)$$





# Reference Material

- 1. E. R. Davies, "Computer & Machine Vision", Fourth Edition, Academic Press, 2012.
- 2. R. Szeliski, "Computer Vision: Algorithms and Applications", Springer 2011.
- 3. Simon J. D. Prince, "Computer Vision: Models, Learning, and Inference", Cambridge University Press, 2012.
- 4. Mark Nixon and Alberto S. Aquado, "Feature Extraction & Image Processing for Computer Vision", Third Edition, Academic Press, 2012.
- 5. Sunita Dhavale, "Advanced Image-Based Spam Detection and Filtering Techniques", Book Published by CyberTech: An Imprint of MKP Technologies, Hershey, PA, USA IGI Global, March 2017, ISBN13: 9781683180135|ISBN10: 1683180135|EISBN13: 9781683180142|DOI: 10.4018/978-1-68318-013-5.



# <<Epilogue>>

- We will meet in next scheduled lecture.
- Try to implement the algorithms in python.
- Feel free to ask your questions.
- Email: [sunitadhavale@diat.ac.in](mailto:sunitadhavale@diat.ac.in)



**Thank You!**

