

DS863PE: VIDEO ANALYTICS (Professional Elective –VI)**B.Tech. IV Year II Sem.**

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Course Objectives:

- To know the fundamental concepts of big data and analytics
- To learn various techniques for mining data streams
- To acquire the knowledge of extracting information from surveillance videos.
- To learn Event Modelling for different applications.
- To understand the models used for recognition of objects in videos.

Course Outcomes:

- Understand the basics of video- signals and systems.
- Estimate motion in a video
- Detect the objects and track them
- Recognize activity and analyze behavior
- Evaluate face recognition technologies

UNIT - I**Introduction**

Multi-dimensional signals and systems: signals, transforms, systems, sampling theorem. Digital Images and Video: human visual system and color, digital video, 3D video, digital-video applications, image and video quality.

UNIT - II**Motion Estimation**

Image formation, motion models, 2D apparent motion estimation, differential methods, matching methods, non-linear optimization methods, transform domain methods, 3D motion and structure estimation.

UNIT - III**Video Analytics**

Introduction- Video Basics - Fundamentals for Video Surveillance- Scene Artifacts- Object Detection and Tracking: Adaptive Background Modelling and Subtraction- Pedestrian Detection and Tracking Vehicle Detection and Tracking- Articulated Human Motion Tracking in Low-Dimensional Latent Spaces.

UNIT - IV**Behavioural Analysis & Activity Recognition**

Event Modelling- Behavioural Analysis- Human Activity Recognition-Complex Activity Recognition Activity modelling using 3D shape, Video summarization, shape-based activity models- Suspicious Activity Detection.

UNIT - V**Human Face Recognition & Gait Analysis**

Introduction: Overview of Recognition algorithms – Human Recognition using Face: Face Recognition from still images, Face Recognition from video, Evaluation of Face Recognition Technologies- Human Recognition using gait: HMM Framework for Gait Recognition, View Invariant Gait Recognition, Role of Shape and Dynamics in Gait Recognition

TEXT BOOKS:

1. A. Murat Tekalp, "Digital Video Processing", second edition, Pearson, 2015

2. Rama Chellappa, Amit K. Roy-Chowdhury, Kevin Zhou. S, "Recognition of Humans and their Activities using Video", Morgan & Claypool Publishers, 2005.
3. Yunqian Ma, Gang Qian, "Intelligent Video Surveillance: Systems and Technology", CRC Press (Taylor and Francis Group), 2009.

REFERENCE BOOKS:

1. Richard Szeliski, "Computer Vision: Algorithms and Applications", Springer, 2011.
2. Yao Wang, Jorn Ostermann and Ya-Qin Zhang, "Video Processing and Communications", Prentice Hall, 2001.
3. Thierry Bouwmans, Fatih Porikli, Benjamin Höferlin and Antoine Vacavant, "Background Modeling and Foreground Detection for Video Surveillance: Traditional and Recent Approaches, Implementations, Benchmarking and Evaluation", CRC Press, Taylor and Francis Group, 2014.
4. Md. Atiqur Rahman Ahad, "Computer Vision and Action Recognition-A Guide for Image Processing and Computer Vision Community for Action Understanding", Atlantis Press, 2011.