

**CS623**

**Multimedia Surveillance  
Systems**

**2-0-2-5-3**

# What is surveillance?

- "sur" means "from above"  
and "veiller" means "to watch"
- Closely monitoring/observing data for taking some actions.

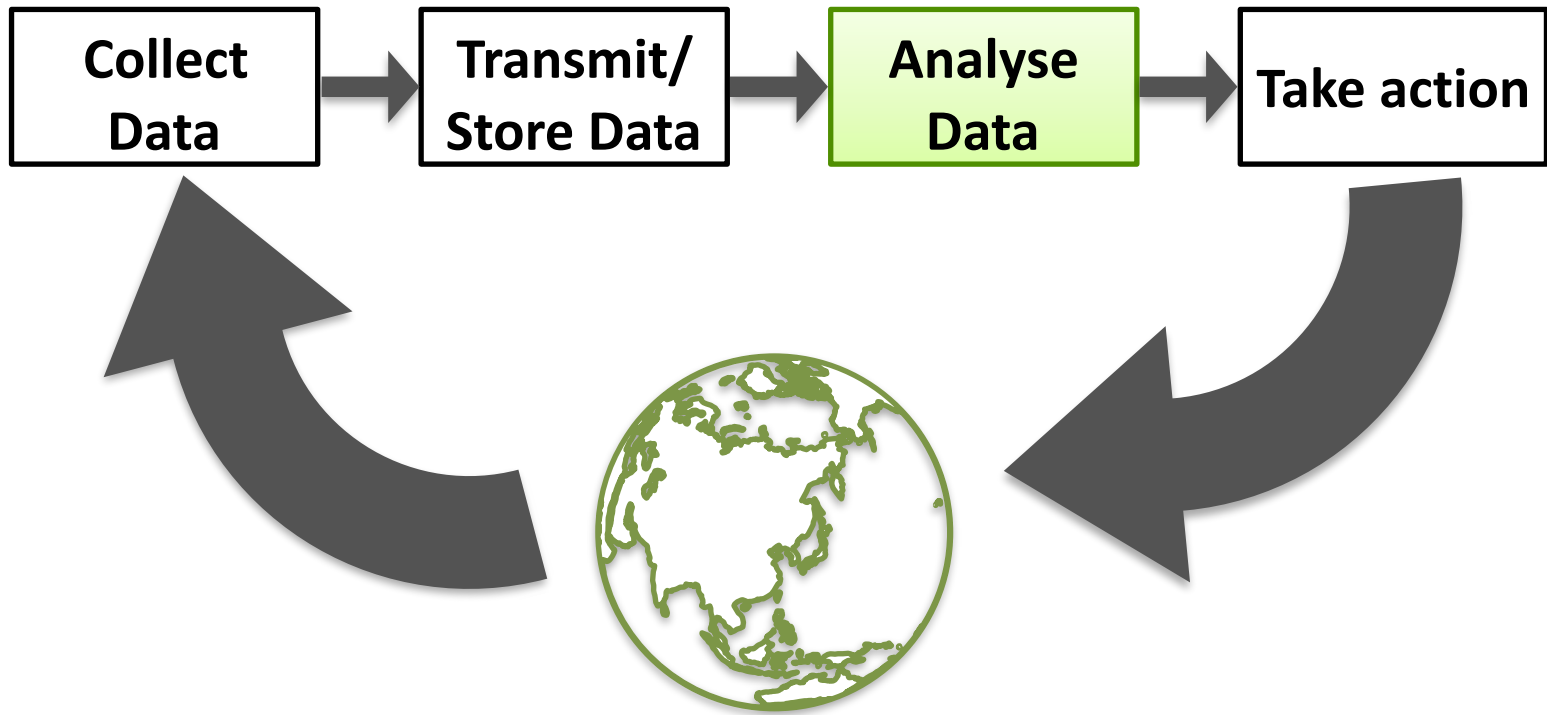
# WHO Definition

- “Systematic ongoing collection, collation, and analysis of data and the timely dissemination of information to those who need to know so that action can be taken”.

# Why Surveillance?

- **Early warning system**
- **Resource management and policy making**

# Typical Surveillance System



# A Few Examples

# Health Surveillance

- **Data: weight, sugar level, heart beat, EEG, ECG, Video, Audio**
- **Tasks: Certain disease pattern, anomaly**
- **Decision: Treatment, changing dose**

# Disease Surveillance

- **Data:** Patient demography and disease statistics (e.g. number of patients)
- **Task:** Early epidemic detection, anomaly
- **Actions:** Disease preventive measures, facility management



# Public Safety

- **Data: CCTV, Audio, Motion Sensors**
- **Task: Suspicious person, behaviour, anomaly**
- **Actions: Send security force**

# More Examples

- **Traffic Surveillance**
- **Internet surveillance**
- **Social network surveillance**
- **Infrastructure surveillance**
- **Border surveillance**
- **Process surveillance**
- **Crowd surveillance**

# Surveillance~observing for

Defined

- Terrorists - Osama
- Intruders
- Abandoned baggage
- Objects (e.g. Red ferrari)
- Wrong way driving

Undefined

- Anomaly
- Abnormality
- Unexpected
- Unusual
- Deviant

# Surveillance Tasks

- **May be defined or undefined**
- **The defined tasks are accomplished with pattern recognition**
- **Undefined task is anomaly detection which is common to most surveillance applications**

# Data Collection

- Voluntary - Fitbit
- Involuntary - CCTV
- Also known as active and passive surveillance

**When the data is coming from  
multimedia sensors, we call it  
Multimedia Surveillance!**

# Advanced Issues

- **Is the data authentic?**
- **Is it legal to collect data?**
- **How to transmit and store data?**
- **How to ensure real-time warning?**

# Topics

- Anomaly modeling
- Statistical models (probabilistic models)
- Deep learning models - GANs, Autoencoders, LSTMs
- User defined (supervised) anomaly models
- Advanced topics: Forgery detection, Privacy issues
- Case studies



# **Mukesh Saini**

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**Consulting: Wed 12 PM – 2 PM**

# Teaching Assistants

Pratibha Kumari

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# Lectures

Thu–9:00 to 9:50 AM

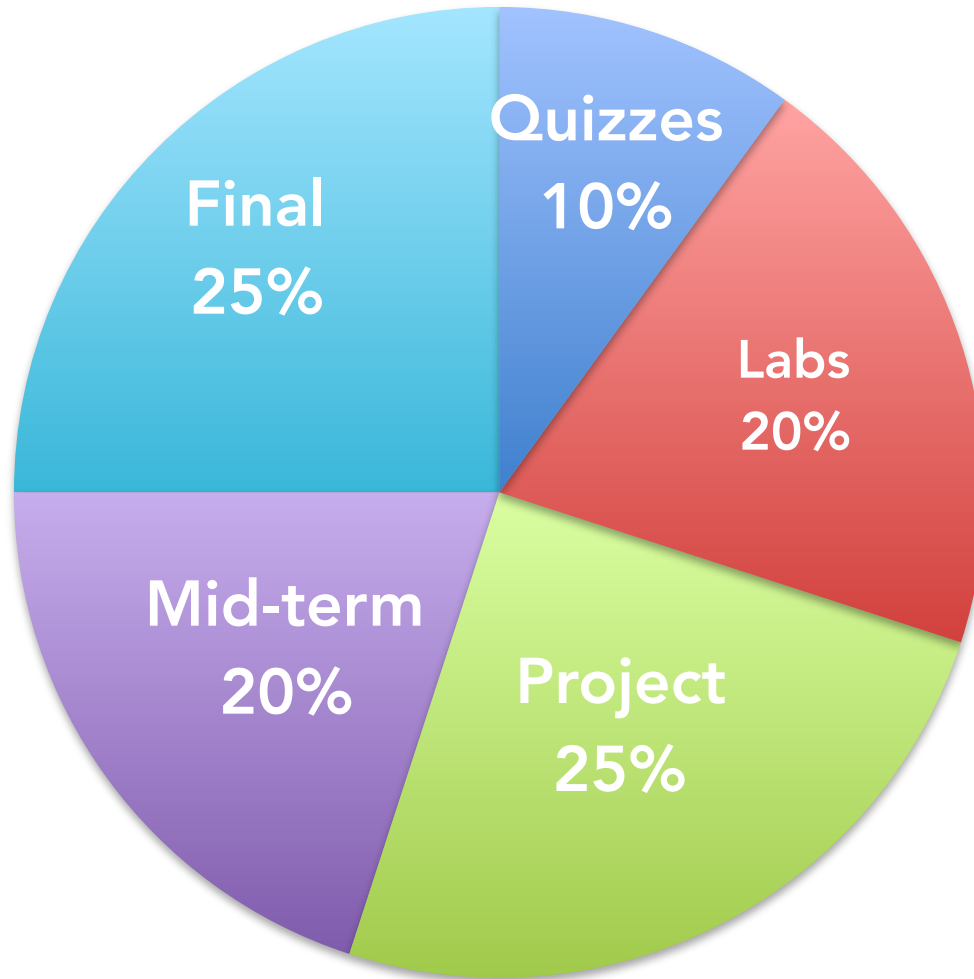
Fri–9:00 to 9:50 AM

Venue: CS2, S Ramanujan Block

# **Extra Activities**

**Mon–5:00 to 5:50 PM**

# Pass > 40%



# Lab Exercises

- Tuesday TBA
- Platform: **Python**
- Alternate graded and practice labs

# Project

- Project Proposal-due march first week
- Max two students per group
- Multiple evaluations
- Final Exhibition/Demo

# **Three Quizzes**

**-Top 2 will be considered**



# Exams

Minor: Feb 22– Mar 1

Major: May 3 – May 10



Charu C. Aggarwal

# Outlier Analysis

*Second Edition*

 Springer

# Prerequisite:

Multimedia Systems (CS507) OR

Digital Image Processing and Analysis (CS517) OR

Computer Vision (CS517) OR

Image processing and pattern recognition (EE484)

# Attendance

- 75% attendance is mandatory in labs and lectures separately
- Students with more than 90% attendance will get 1 bonus mark

# Outcomes

- Time-series data analysis
- You will get familiar with various statistical anomaly models
- GANs and Auto-encoders
- Advanced topics

# **Code of Ethics & Professional Responsibility**

- **Discussions are encouraged**
- **Give proper credit with reference**
- **No plagiarism/copying**

- slides will be posted on website**
- students should check the  
schedule regularly**

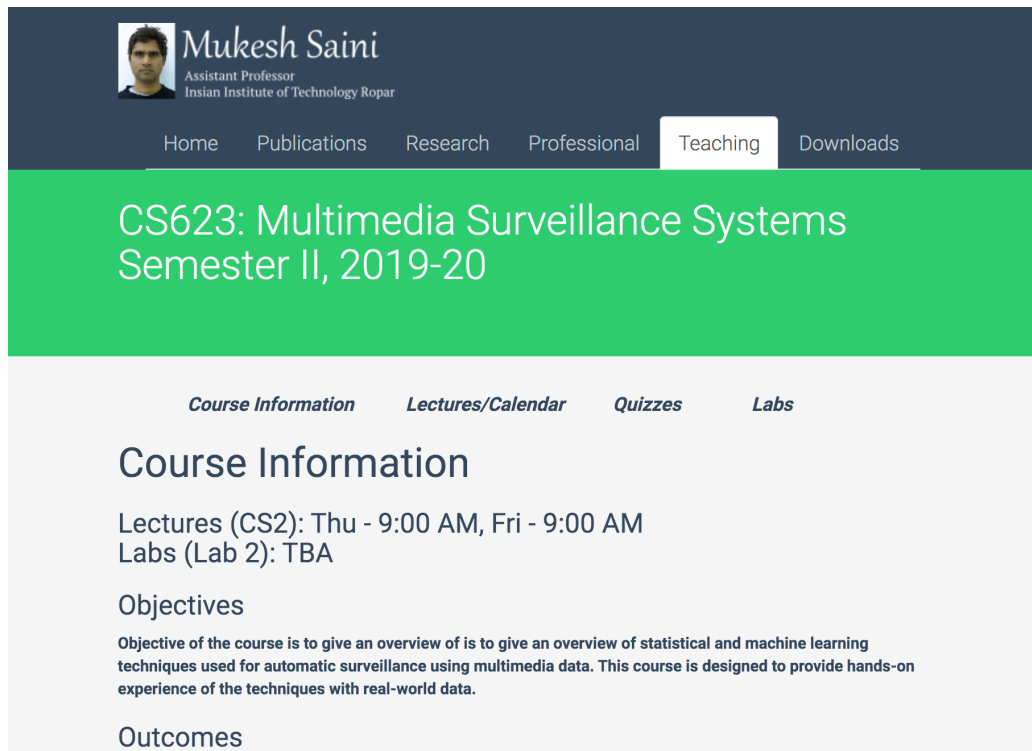
**-take notes in the class**

**-interact with me**



# Course Webpage

<http://www.iitrpr.ac.in/mukesh/CS623-SII-Y1920.html>



The screenshot shows a course webpage for Mukesh Saini, Assistant Professor at Indian Institute of Technology Ropar. The page features a dark blue header with a navigation menu (Home, Publications, Research, Professional, Teaching, Downloads) and a green banner for the course title. Below the banner is a navigation menu with links for Course Information, Lectures/Calendar, Quizzes, and Labs. The main content area displays the course title, lecture and lab schedules, objectives, and outcomes.

**Mukesh Saini**  
Assistant Professor  
Indian Institute of Technology Ropar

Home Publications Research Professional **Teaching** Downloads

**CS623: Multimedia Surveillance Systems**  
Semester II, 2019-20

*Course Information* *Lectures/Calendar* *Quizzes* *Labs*

## Course Information

Lectures (CS2): Thu - 9:00 AM, Fri - 9:00 AM  
Labs (Lab 2): TBA

### Objectives

Objective of the course is to give an overview of is to give an overview of statistical and machine learning techniques used for automatic surveillance using multimedia data. This course is designed to provide hands-on experience of the techniques with real-world data.

### Outcomes