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.

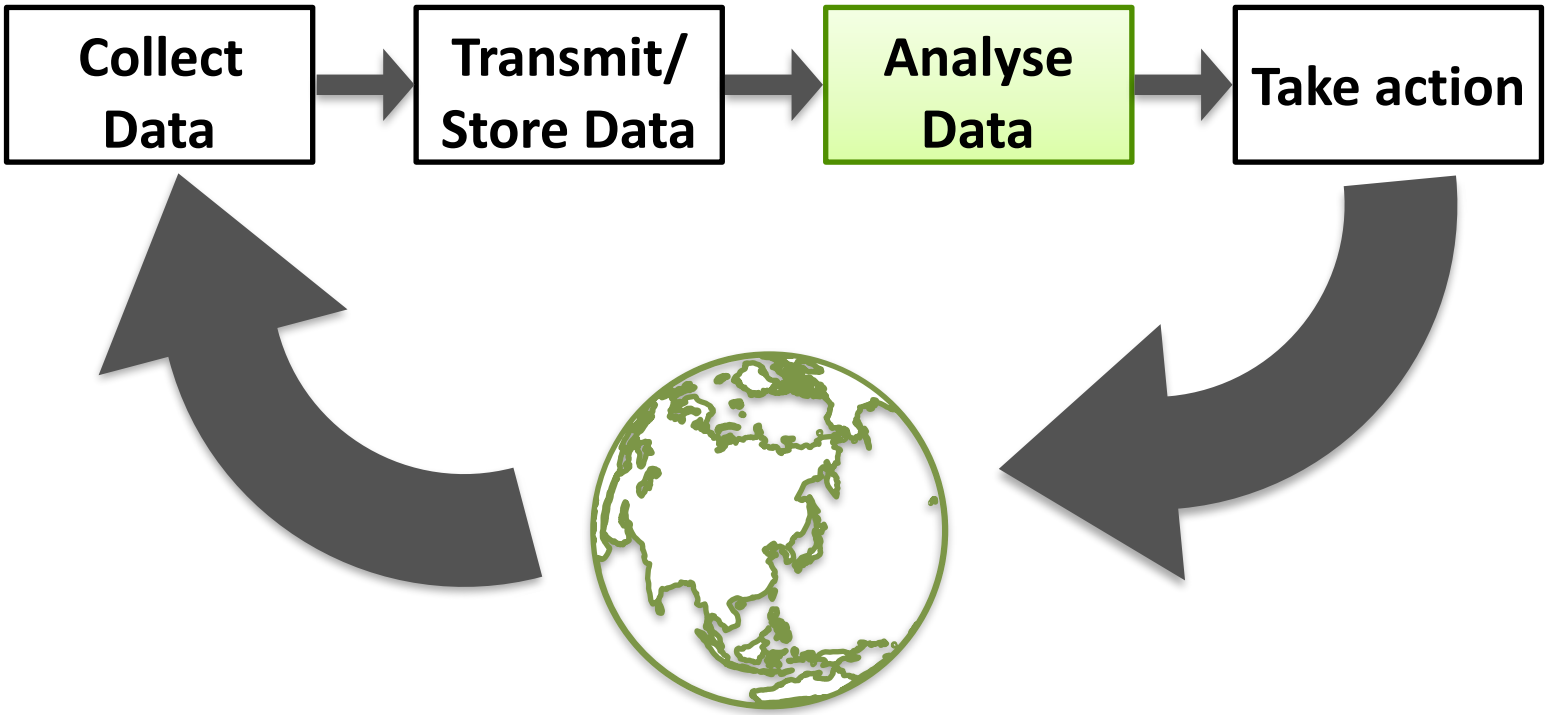
WHO Definition

- "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

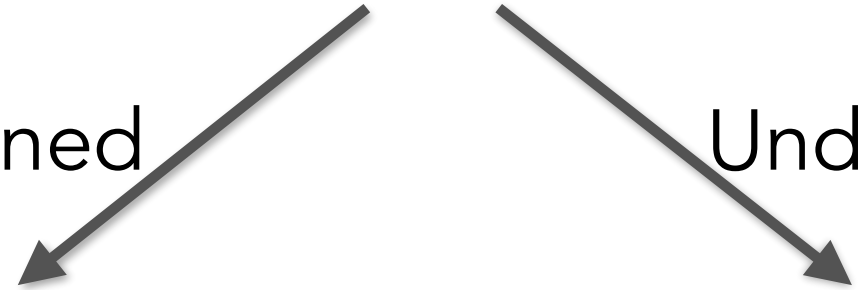
Public Safety

- 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



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

- 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 knows 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

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Consulting: Wed 12 PM – 2 PM

Teaching Assistants

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Lectures

Thu–9:00 to 9:50 AM

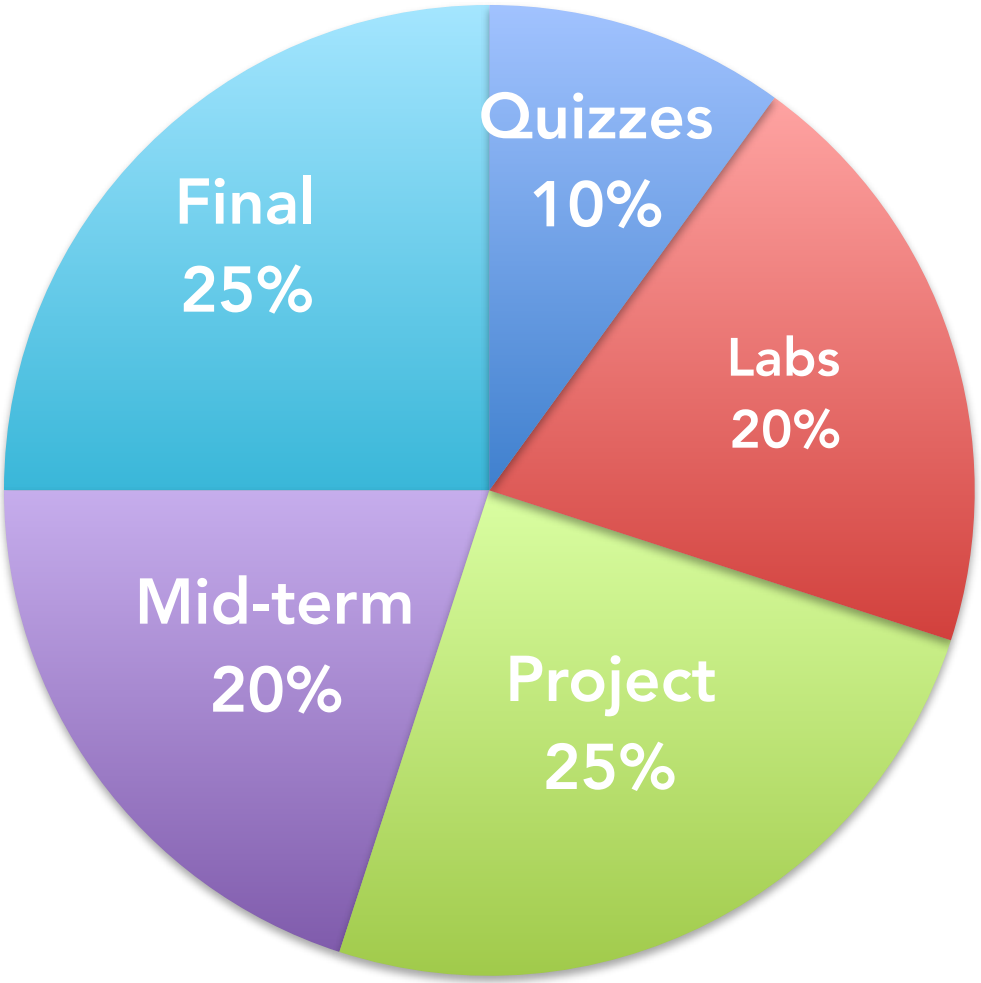
Fri–9:00 to 9:50 AM

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

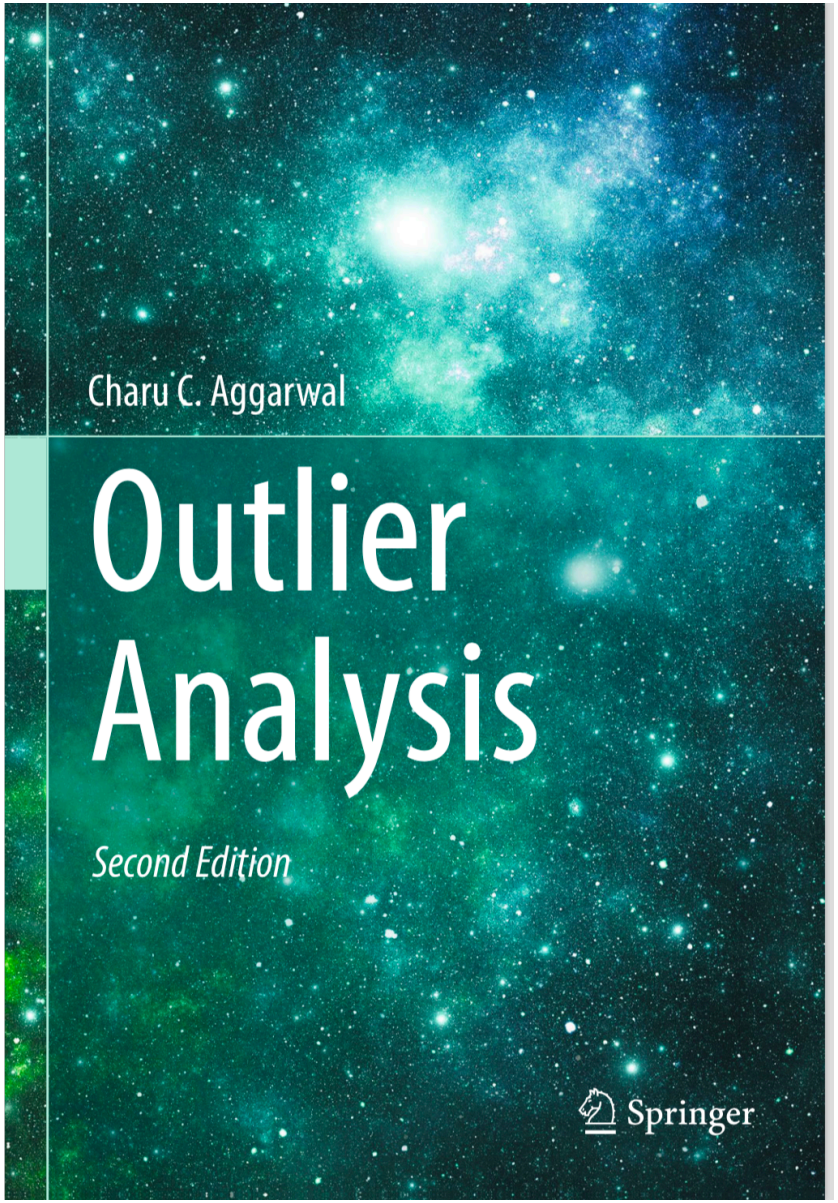
Three Quizzes

-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