"Knock! Knock! Who is it?"
Probabilistic Person Identification in TV Series

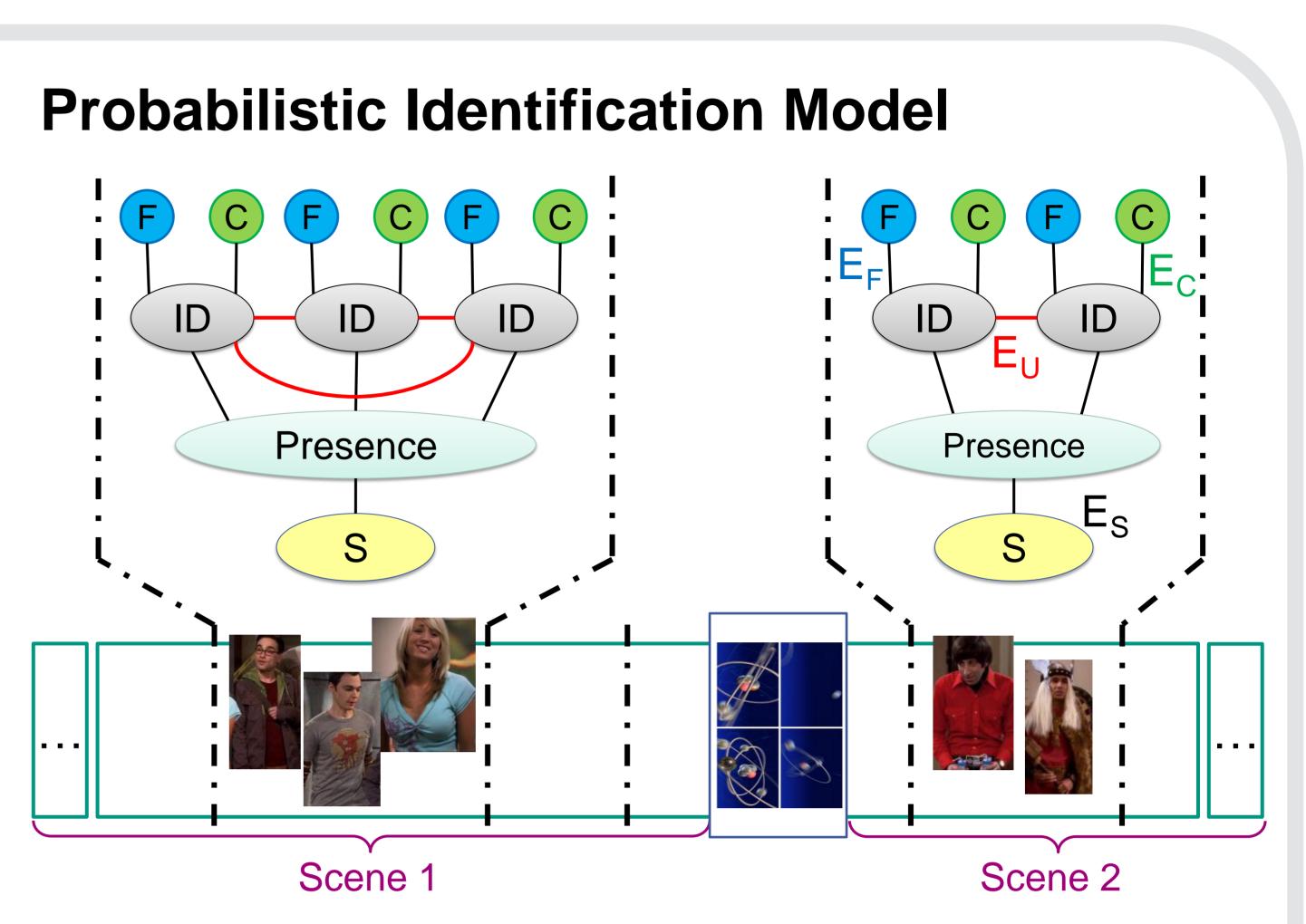## Makarand Tapaswi, Martin Bäuml, Rainer Stiefelhagen
Computer Vision for Human Computer Interaction, Karlsruhe Institute of Technology, Germany
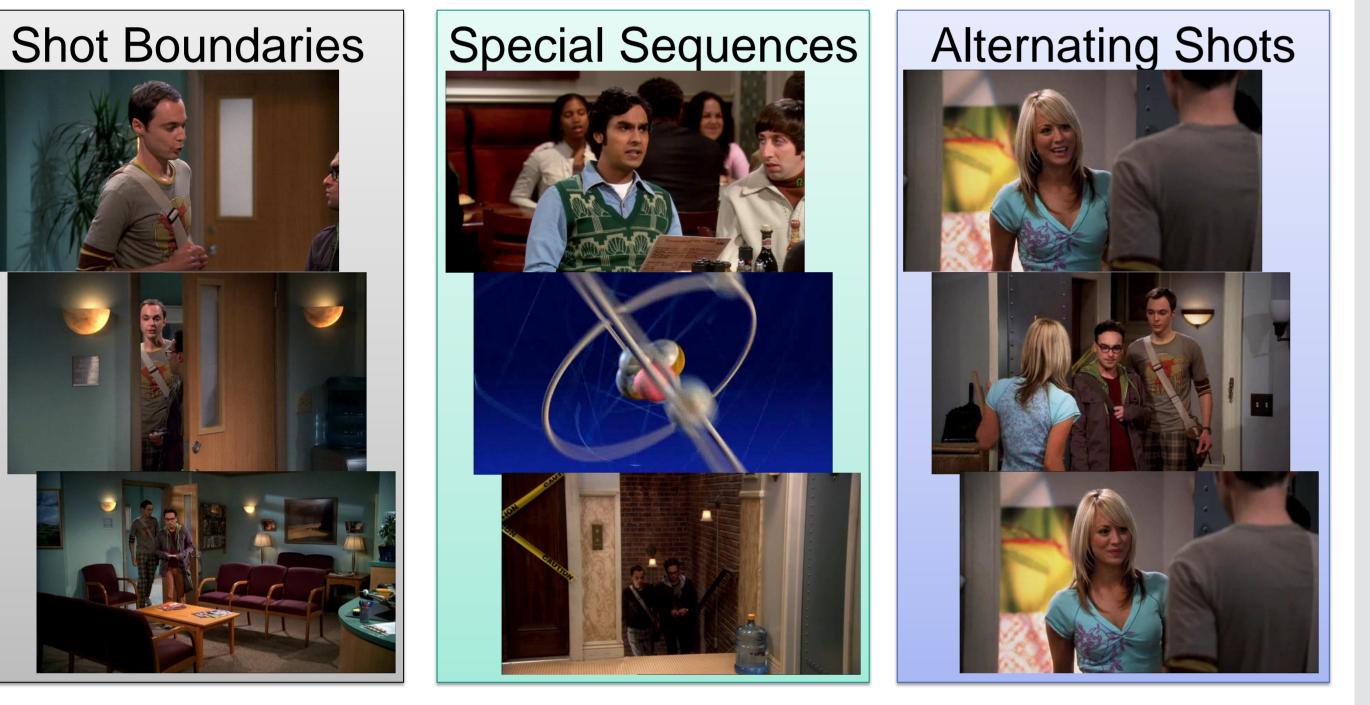
Major Contributions

➢ Shift focus from *face* tracks to *person* tracks, leverage the temporal structure of TV series episodes
➢ Automatically learn clothing models using face recognition results
➢ Model the person identification task using a Markov Random Field

Motivation

Person identification in multimedia data (movies / TV series) has many applications ranging from smart video browsing, video summarization, retrieval of favorite actor clips, etc. to building person-specific models for action recognition or character profiling.

Video Analysis

Shot Boundaries | Special Sequences | Alternating Shots

Face Tracking

- MCT-based multi-pose face detector
- Particle filter tracker

Face Recognition

- Block DCT features
- 1-vs-All SVM
- Output as confidence

Block DCT → 1vsAll SVM

Clothing Clustering and Identification

Tracking | Clustering | Assignment | Cluster Types

Leonard

Assigned Cluster
Face Match

Sheldon Sheldon
Clothing Match
Unassigned Cluster

- Person detection and tracking
- Color histogram, agglomerative clustering
- Assign face id to cluster when face majority exists
- Compare clothing for others to obtain identity

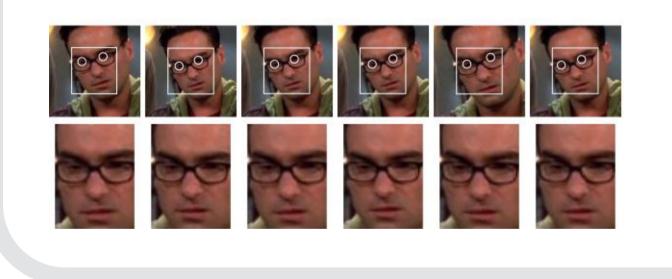## Probabilistic Identification Model

Scene 1 | Scene 2

- Divide the episode into scenes and shots
- In each shot, optimize node ID for each person track
- Associate clothing and face information
- Incorporate speaker through concept of presence
- Ensure identities of co-occurring people are unique
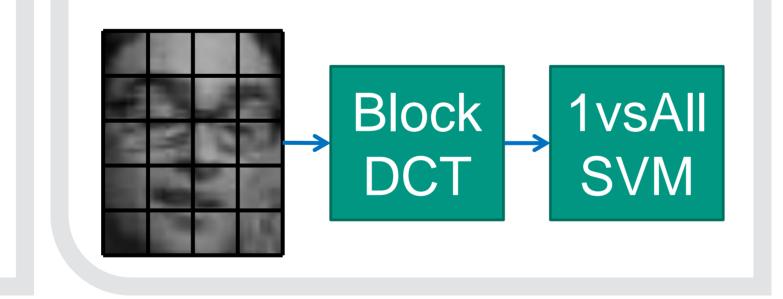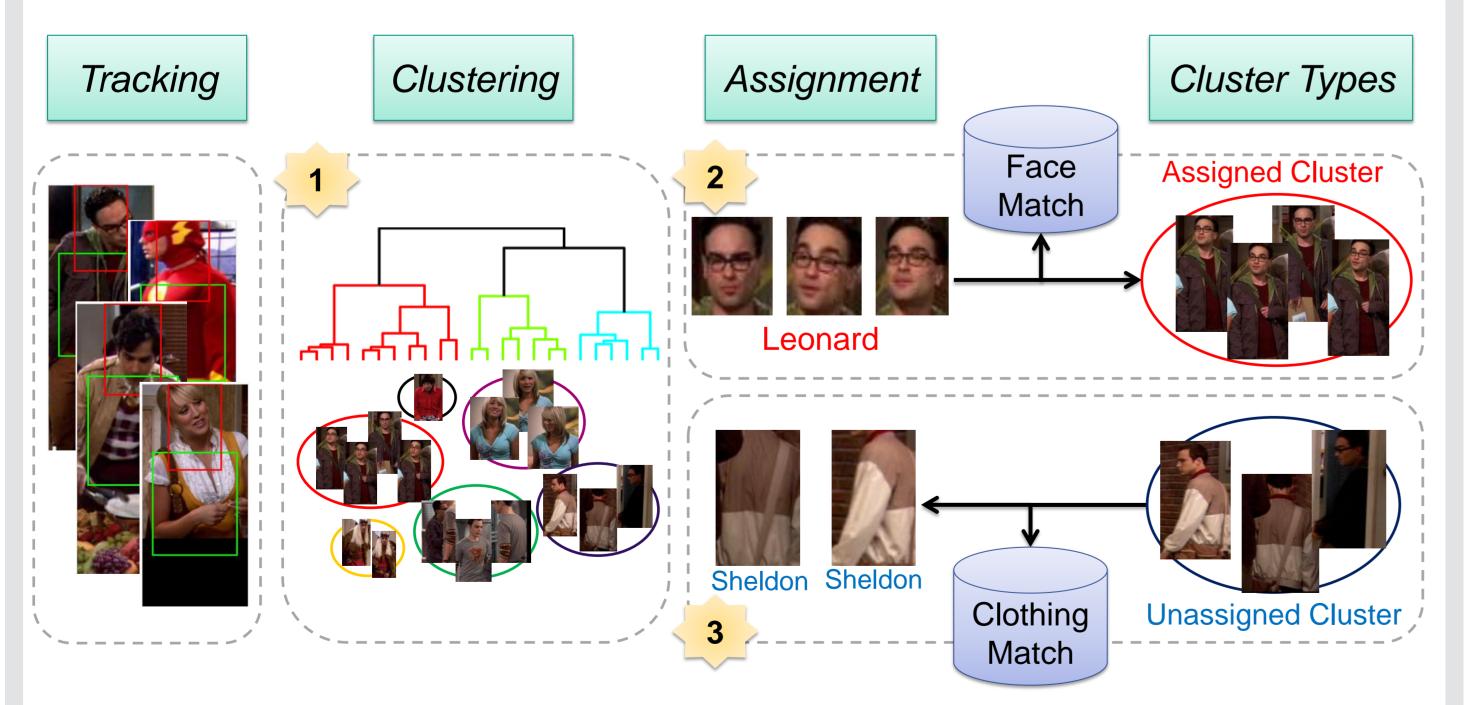- Inference by energy minimization in the MRF

Results
The Big Bang Theory Season 01, Episodes 01 – 06

No Face Characters identified! | Face wrong Clothing corrects
Clothing wrong Face corrects | Uniqueness Constraint

Face Recognition	Acc
Face Only	71.8
Clothing + Face	79.8
Full Model	83.2

Person Recognition	Acc
Max Prior (Sheldon)	27.5
Face Only	63.1
Clothing Only	76.2
Clothing + Face	79.8
Full Model	82.6

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