Finding and Tracking People from the Bottom Up

**Objectives**
- Self starting
- Track multiple people
- Track multiple activities
- Robust to drift
- Robust to occlusion
- No bg subtraction
- Computationally efficient

**Key Observation**

Body parts have **constant** appearance

*A blue torso stays blue*

**Algorithm**

Detect putative segments with edges

Learn appearance by clustering

Find new segments

**Results: Multiple Activities**

- Few leg detector responses
- Final track with additional legs found using appearance
- Final track with additional segments found using appearance

**Results: Moving Clutter**

- Few leg detector responses
- Final track with additional legs found using appearance

**Results: Counting People**

- Correct track occluded
- Recovery from occlusion
- Birth of new track

**Learning by clustering**

- Observed images (Im) encode that segment positions (P) vary over time, but segment appearances (C) are constant; we marginalize out images to simplify
- Full body model includes 9 segments: torso + left/right upper/lower arms/legs
- We derive inference procedure for a simple torso-arm person model

**Model**

Loopy Inference on embedded trees

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