

## Video Analysis for Sociology

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## Describing Changes in Human Appearance Over Time



Charlie's Angels: 1976 and 2000



Miami Vice: 1984 and 2006



Dukes of Hazzard: 1979 and 2005



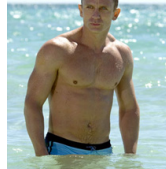
## Describing Changes in Human Appearance Over Time



No more spitting, smoking at parks?

FLURRY OF E-MAILS OVER PROPOSED CODE city cites public health and safety issues

Total ban on smoking in public places from 2013



## Sociology Research

The Incidence and Context of Tobacco Use in Popular Movies from 1988 to 1997

Madeline A. Dalton, Ph.D.,<sup>1\*</sup> Jennifer J. Tinkla, B.A.,<sup>1</sup> James D. Sargent, M.D.,<sup>2</sup> Michael L. Beach, M.D., Ph.D.,<sup>2</sup> M. Bridget Ahrens, M.P.H.,<sup>3</sup> and Todd F. Heatherton, Ph.D.<sup>1</sup>

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- Typical data sets: 250 movies

Preventative Medicine Vol 34, 2002

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Gender Displaying Television Commercials: A Comparative Study of Television Commercials in the 1950s and 1980s<sup>1</sup>

Kenneth Allan<sup>2</sup>  
University of North Carolina at Greensboro

Scott Coltrane  
University of California, Riverside

- Typical data sets: 250 movies, 617 commercials

Sex Roles Vol 35 Nos 3/4, 1996

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Journal of Alcohol Studies Vol 51 No 5, 1990

Volume 51, 1990 • Issue 5: September 1990

Portrayals of Alcohol on Prime-Time Television:

Lawrence Wallack, Joel W. Grube, Patricia A. Madden, Warren Breed

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<p>The Incidence and Context of Tobacco in Popular Movies from 1988 to 1999</p> <p>Madeline A. Debus, Ph.D.<sup>1,2</sup>, Jennifer J. Tickle, B.A., James D. Smith, Michael L. Booth, M.D., Ph.D., J. M. Bridget Altevus, M.P.H.<sup>1,2</sup>, and Todd E. F.</p> <p>Department of Psychology, University of North Carolina at Greensboro</p>	<p>Volume 51, 1990 &gt; Issue 5: September 1990</p> <p><b>Portrayals of Alcohol on Prime-Time Television:</b></p> <p>Lawrence Wallack, Joel W. Grube, Patricia A. Madden, Warren Breed</p>
<p><b>Gender Displaying Television Commercials in the 1950s and 1980s</b></p> <p>Kenneth Altan<sup>1</sup> University of North Carolina at Greensboro</p> <p>Scott Coltrane University of California, Riverside</p>	<p><b>Prevalence of smoking among major movie characters: 1996-2004</b></p> <p>Keliah A. Worth<sup>1</sup>, Soniya Dai Cui<sup>1</sup> and James D. Sargent<sup>1,2</sup></p> <p><sup>1</sup> Cancer Prevention Research Program, Norris Cotton Cancer Center, Lebanon, New Hampshire, USA <sup>2</sup> Department of Pediatrics, Dartmouth Medical School, Lebanon, New Hampshire, USA</p>

- Typical data sets: 250 movies, 617 commercials, 195 television episodes, 900 movies

Tobacco Control Vol 15, 2006

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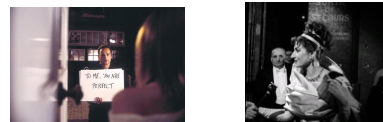
- Typical data sets: 250 movies, 617 commercials, 195 television episodes, 900 movies
- Raters (usually students) view video in entirety twice and view each incidence multiple times; usually 10% overlap for inter-rater reliability

## Goal: Video to Statistics

- Automatically find attributes, and number of occurrences, in video data
- Minimize supervision (many different possible attributes)

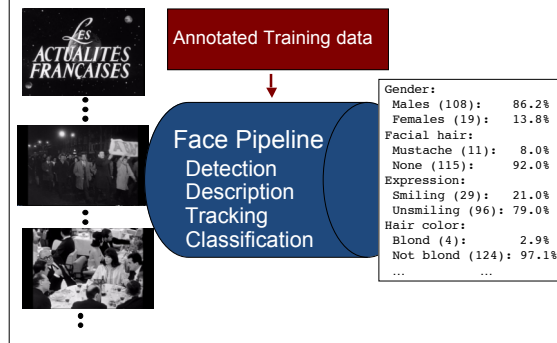


## Data

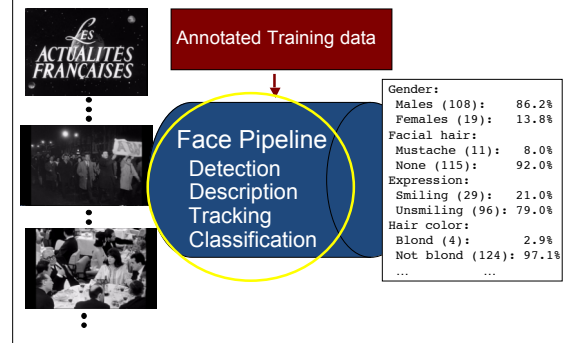


- Hollywood movies from different time periods
  - The Graduate, Roman Holiday, When Harry Met Sally, Love, Actually
- Institut National de l'Audiovisuel
  - R&D: L. Laborelli and D. Teruggi
  - 1.5 Mhours of annotated audiovisual archives, 50 years of TV

## Currently: focus on facial attributes

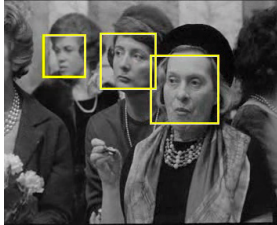


## Currently: focus on facial attributes



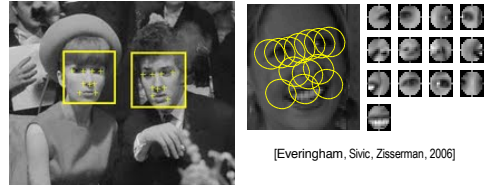
## Face Pipeline: Detection

- Run face detection on each frame (Viola-Jones)



## Face Pipeline: Description

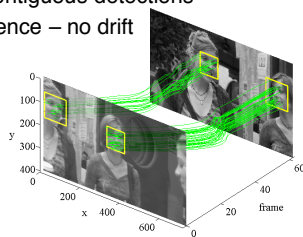
- Face representation - local image descriptors at facial feature points
- Extended pictorial structure model



[Everingham, Sivic, Zisserman, 2006]

## Face Pipeline: Tracking

- Measure “connectedness” of a pair of faces by point tracks intersecting both
- Doesn't require contiguous detections
- Independent evidence – no drift
- Faces into tracks

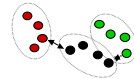


[Everingham et al. 2006]

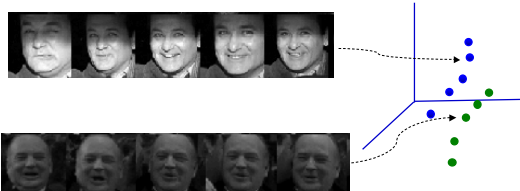
## Face Pipeline: Classification

- Classify tracks using SVM
- Distance between tracks is the minimum distance between facial features (not a kernel):

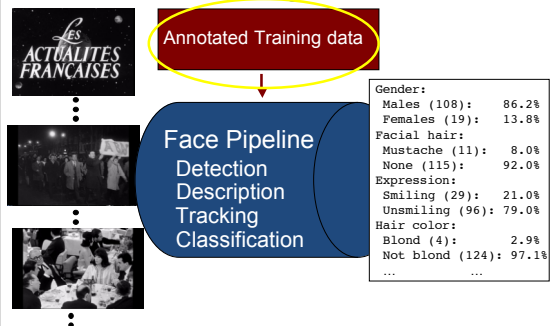
$$D(T_i, T_j) = \min(d(x, y) \mid x \in T_i, y \in T_j)$$



## Classification: Matching face sets



## Training data



## Training data

- Need annotated training data
- Ideally we would train on a large number of attributes with limited supervision
- Looked at two sources: video or still images
- Mechanical Turk (Amazon)
  - Large scale coordination of manual tasks
  - Turks label one frame of the track or a single still image

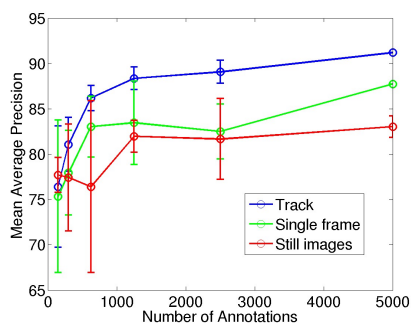
## Training from still images vs video



- Still images:
  - + Variation across people
  - + Potentially labeled data from web for free
  - + Higher quality (resolution, no motion blur)
  - Not much variation in expression
- Videos:
  - + Variation across viewpoint/expression
  - + Same domain as the testing set
  - Not much variation in people



## Current results: gender



## Automatically tagged video

## Current work

- Preliminary conclusions: Better to train on videos
- Ongoing work: Study how to combine still images and videos to improve attribute labeling
- More attributes:
  - Race, age, hair color, eye wear
  - Use upper body detection to capture clothing, hairstyles
  - Dynamic attributes: smoking, drinking, smiling
- Video to Statistics
  - Understand where we fail so even when we miss faces, we can report statistics