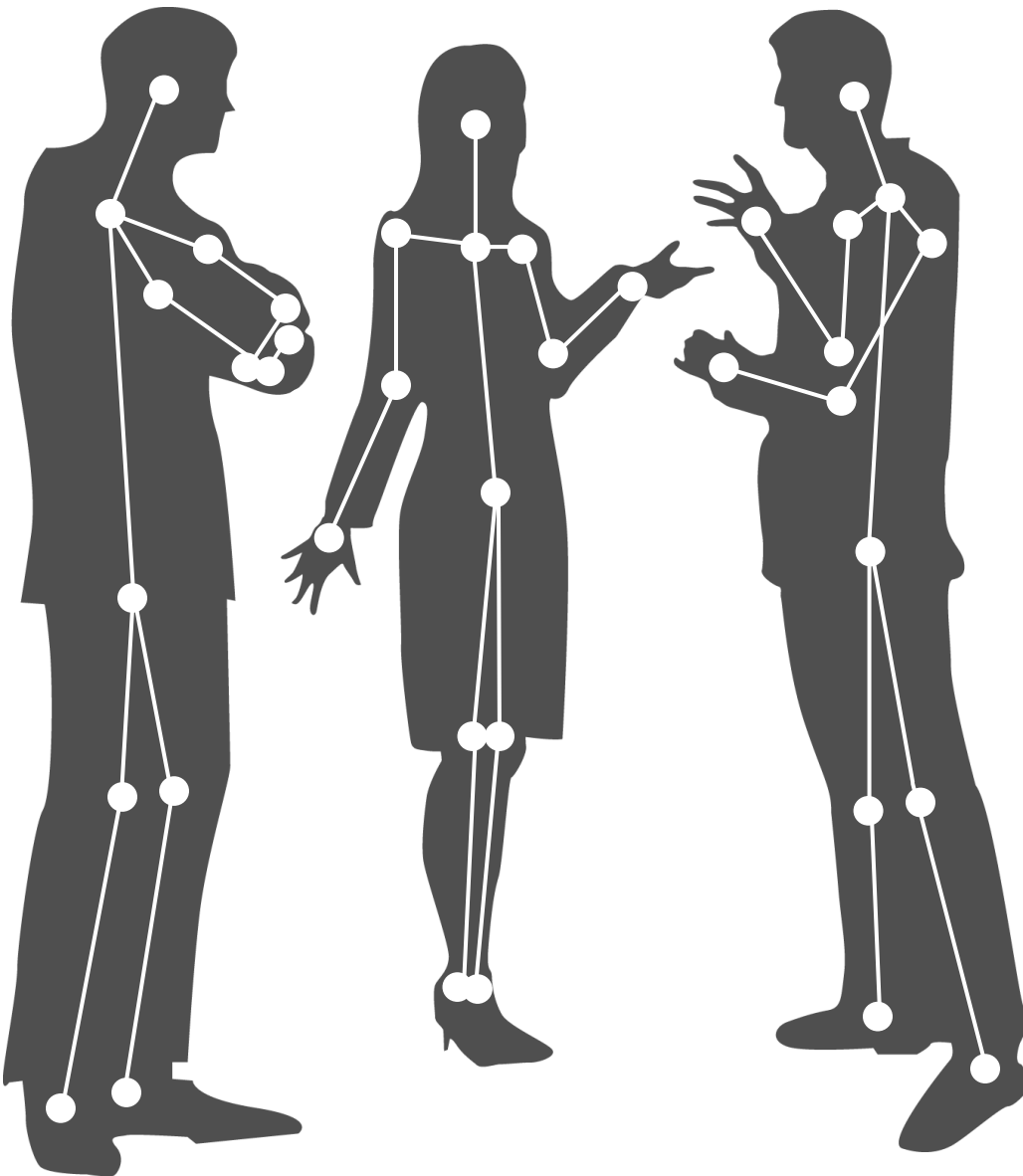
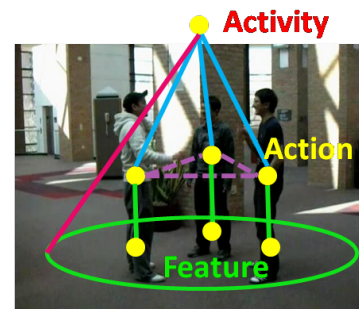
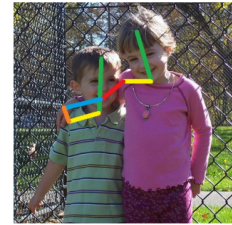
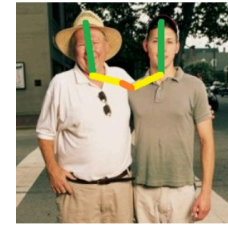


# Summary



# Nonverbal Social Signals

- Body postures



# Nonverbal Social Signals

- Body postures
- Interpersonal distance





# Nonverbal Social Signals

- Body postures
- Interpersonal distance
- Gestures





# Nonverbal Social Signals

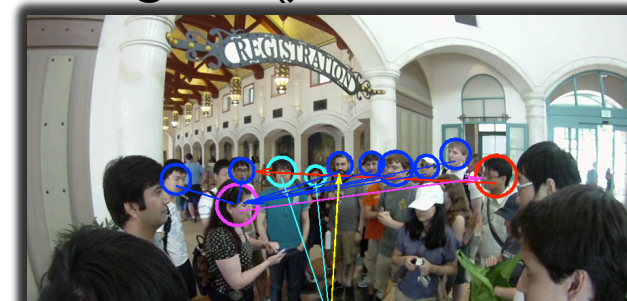
- Body postures
- Interpersonal distance
- Gestures
- Facial expressions

Social gaze directions

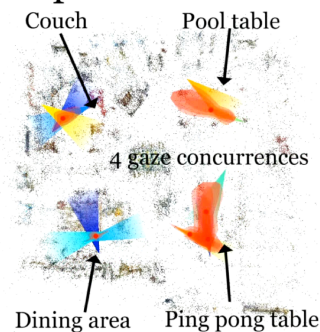
Location of joint attention:  
intersections of social gaze directions

# Nonverbal Social Signals

- Body postures
- Interpersonal distance
- Gestures
- Facial expressions
- Social gaze (joint attention)



1x speed



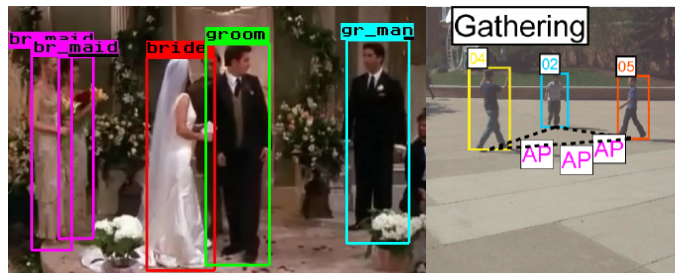
# Scene dynamism

Dynamic scene

Static scene



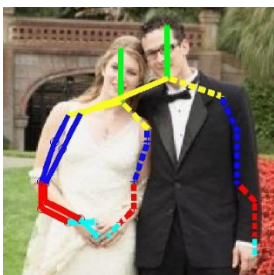
Rehg, CVPR13  
Prabhakar, ECCV12  
Prabhakar, CVPR12  
Patron-Perez, BMVC10



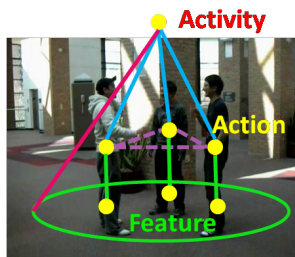
Lan, CVPR12  
Ramanathan, CVPR13  
Antic, ECCV14  
Ding, ECCV10  
Choi, ECCV12, CVPR14  
Direkoglu, ECCV12



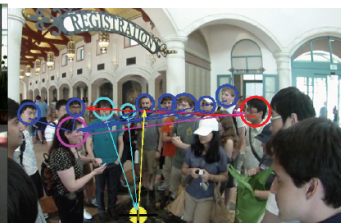
Rodriguez, ICCV11a, ICCVb  
Mehran, CVPR09  
Alahi, CVPR14



Yang, CVPR12  
Hoai, CVPR14



Fathi, CVPR12  
Choi, ECCV14  
Park, NIPS12, ICCV13



Cristani, BMVC11  
Park, CVPR15  
Arev, SIGGRAPH14



Wang, ECCV10  
Gallagher, CVPR09

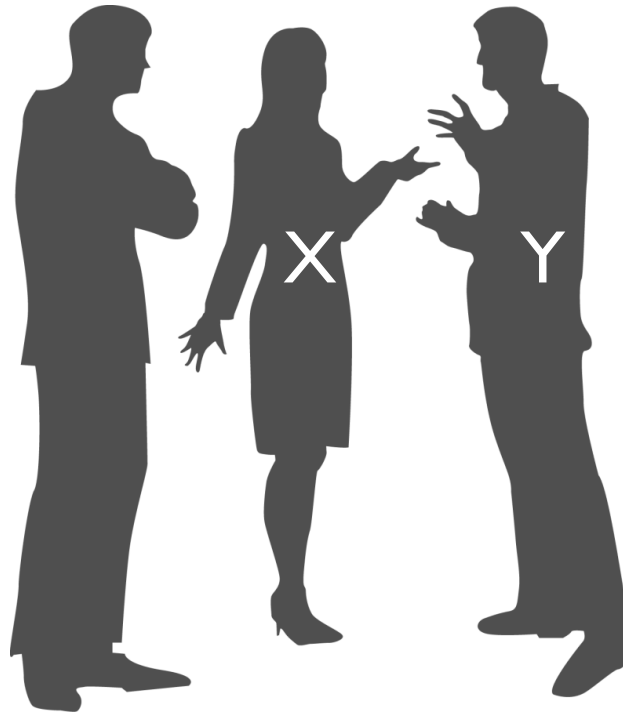
Dyadic interaction

Crowd interaction

Number of group members

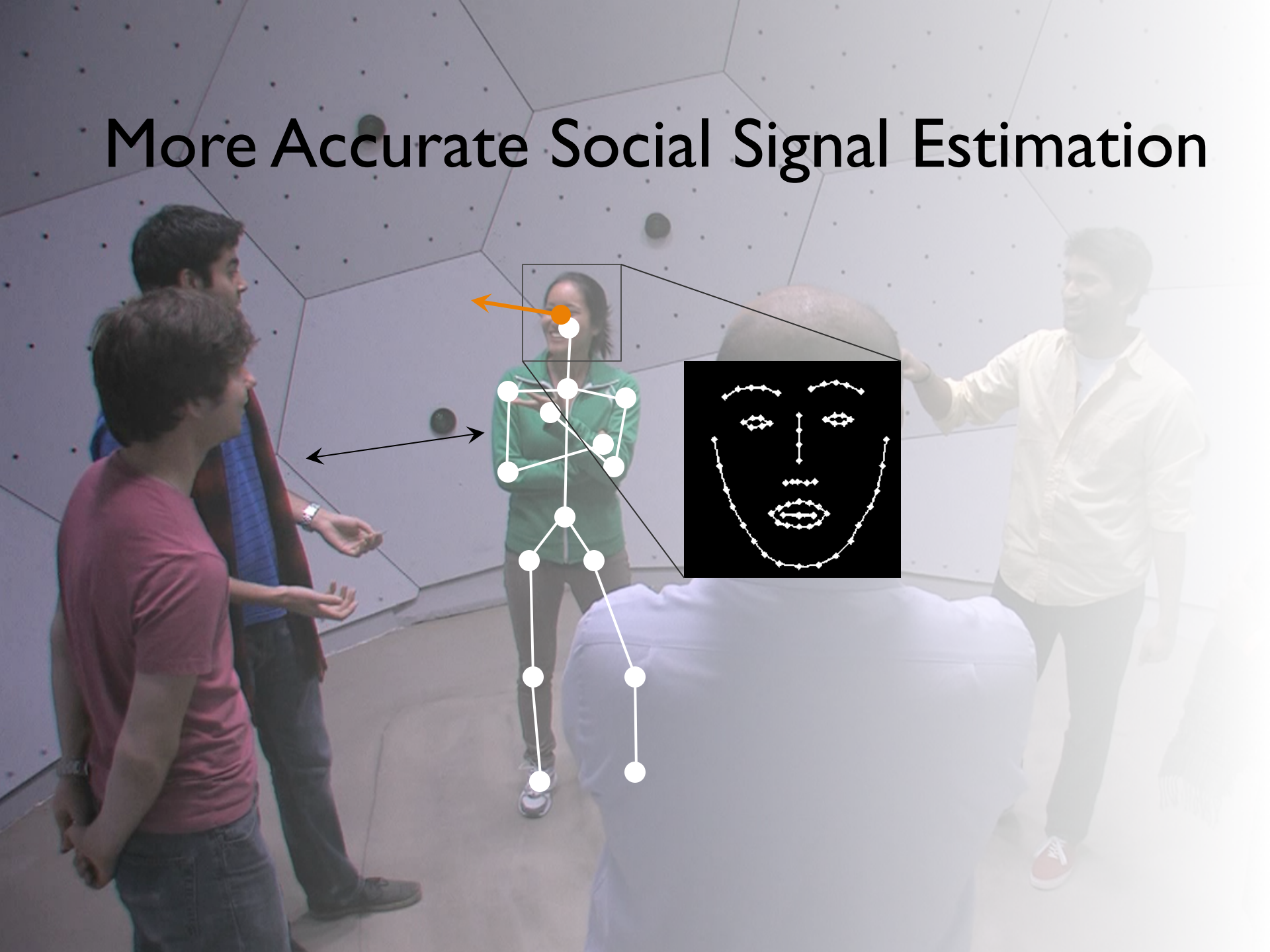
# Group Behaviors

Behaviors of  $X$  and  $Y$  are a **group behavior** if spatial/temporal predictions of  $Y$  based on  $X$  and  $Y$  jointly are more accurate than predictions based on  $Y$  alone.



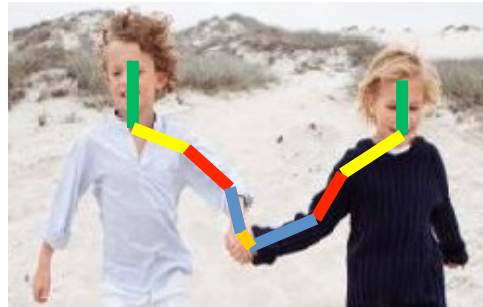
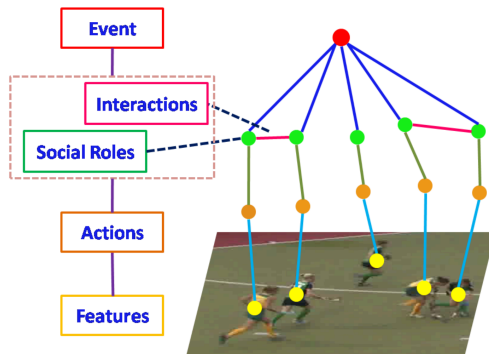
# Future Directions

# More Accurate Social Signal Estimation

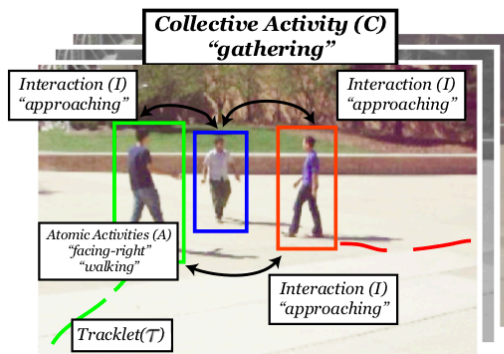




# Scalable and Accurate Models



Small scale problems  
Typically categories  $< 10$



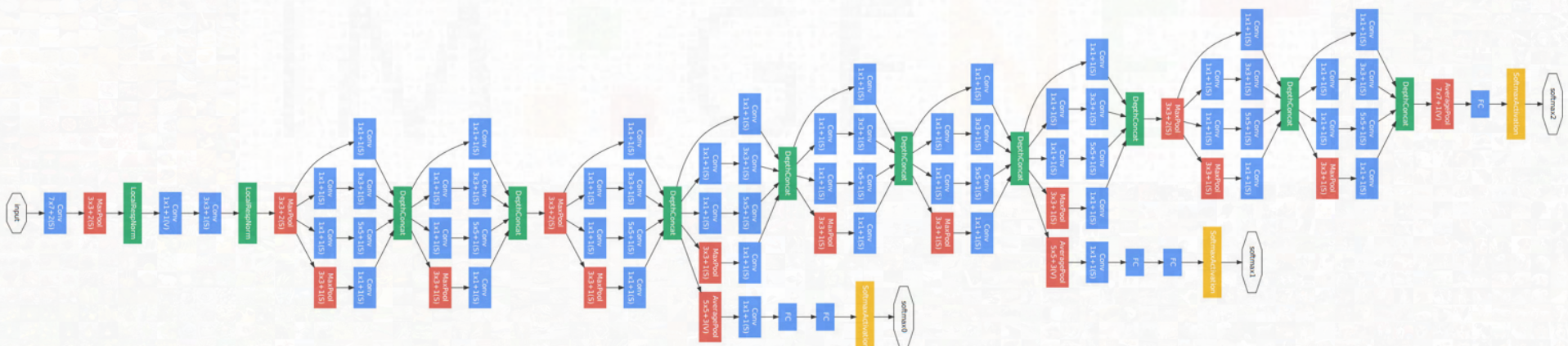
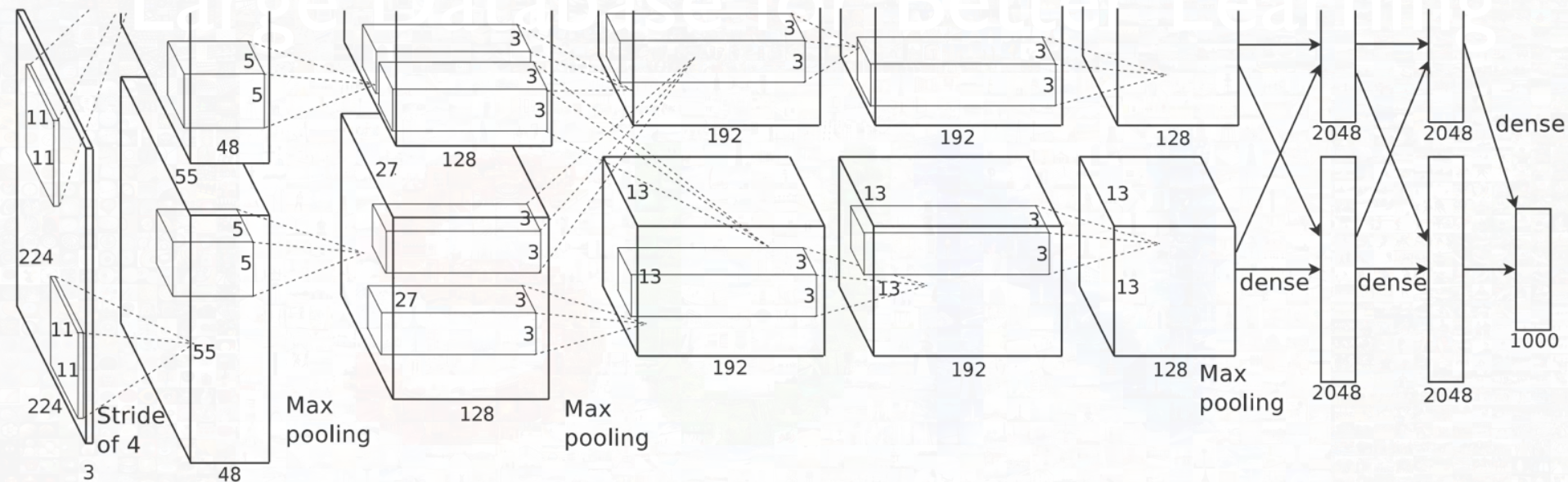


# Large Database for Better Learning





# Large Database for Better Learning





# Large Database for Better Learning





**Thanks!**