



#### Introduction

#### Motivation

1. Models and theories to predict saliency focused on regular-density scenes.

2. What drives attention in a crowded scene can be significantly different from the conclusions from the regular setting.

3. How the crowd density influences the selection of attention is unclear.

#### Contributions

1. Features (on faces) are identified and analyzed in the context of saliency in crowd.

2. A new framework for saliency prediction is proposed which takes into account crowding information and is able to adapt to crowd levels. Multiple kernel learning (MKL) is employed as a core computational method for feature integration.

3. A new eye tracking dataset is built for crowd estimation and saliency in crowd computation.

#### Dataset

EyeCrowd database. Eye fixations in Crowd database.

Stimuli: 500 natural scenes at various crowd levels.



**Subjects:** 16 students from NUS (10 males and 6 females, 20 - 30). **Procedure:** Free-viewing for 5 seconds. Labels and annotations:

- Human faces were manually labeled with rectangles.
- Two attributes were annotated on each face: *pose* and *partial occlusion*.













# Saliency in Crowd

### Ming Jiang, Juan Xu and Qi Zhao

Department of Electrical and Computer Engineering, National University of Singapore

#### **Statistics**

#### Spatial distributions of (a) fixations and (b) faces.

ŀ	0.14	0.17	0.16	0.13	0.14	0.1	0.065	0.37	0.34	0.33	0.41	0.49	0.43	0.4	0.51	0.41	0.47
	0.73	0.81	0.76	0.66	0.68	0.53	0.23	0.62	0.89	0.78	1	1.1	0.99	0.96	0.94	0.99	0.87
	1.7	2.5	2.2	1.9	1.6	1.3	0.58	1.2	1.6	1.9	1.9	2.1	2.1	2	1.9	1.7	1.6
	3	3.8	3.8	3	2.7	1.9	0.88	2.1	2.6	2.3	2.8	2.5	3	2.8	2.6	2.4	1.9
	3	4.3	3.5	3	2.4	1.7	0.83	1.6	2	2	2.2	2.2	2.3	2.4	2.1	1.9	1.7
	1.9	2.6	2.4	1.8	1.5	1.3	0.65	1.1	1.6	1.2	1.4	1.3	1.4	1.4	1.2	1.3	0.97
	1.1	1.3	1.3	0.98	0.81	0.64	0.28	0.49	0.58	0.71	0.56	0.63	0.52	0.52	0.48	0.61	0.37
	0.55	0.73	0.7	0.57	0.45	0.4	0.18	0.28	0.19	0.31	0.24	0.19	0.2	0.28	0.29	0.22	0.3
	0.32	0.43	0.4	0.38	0.3	0.25	0.1	0.2	0.13	0.15	0.13	0.14	0.19	0.19	0.18	0.1	0.13
3	0.13	0.16	0.16	0.16	0.12	0.086	0.025	0.072	0.051	0.13	0.092	0.051	0.1	0.1	0.092	0.12	0.13
( )				(1)													

#### Fixation numbers do not increase with the crowd level, while the fixation entropies do.





## Crowd density modulates the correlation of



#### Results

Stimuli	Human	SC-M	SC-S	MIT	SMVJ	AWS
	•••					4.
	4	4	1	÷.	4	1
	100	17	. 7	1.0	17	F
		ant.	555÷	920		ŝ
	lan <b>t</b> A -		1			24
		14	14	-		3
	•	2	3	8		G
				34		
	1999	1.50	神洞	20.0	200	-
			23		20	Ο.
				100	8	80
0.7				1.4 1.2		
0.65		_ <b>T T T</b>		1		ŧĬĬ





**Project Page:** http://goo.gl/fiaRO3





Data and Code: http://git.io/rETfLQ

