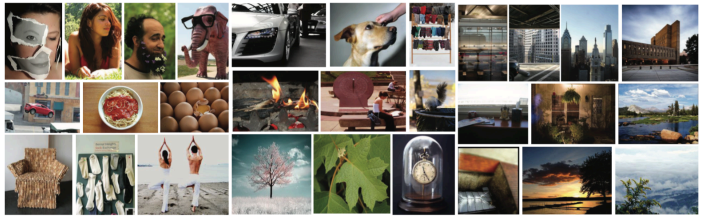
The memorability of visual images

Khosla, Raju, Torralba, Oliva (2015) & Isola, Parikh, Torralba, Oliva (2011)



high memorability

low memorability

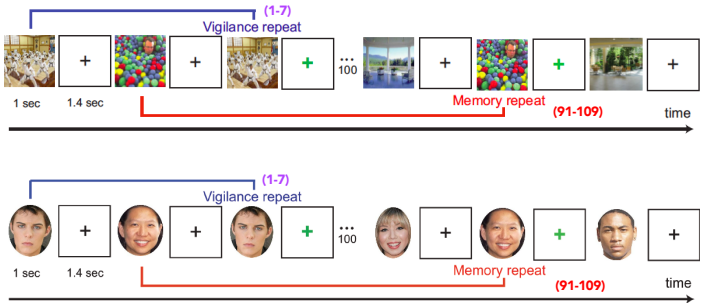
Amazon Mechanical Turk

- 60,000 photographs
- consistency across observers
- objective memorability scores

→ **LaMem database**

1

Visual memory experiments



- *vigilance repeats* every 1-7 images
- *memory repeats* every 91-109 images
- 30 game levels, 120 images per level (~ 5 mins)
- ~80 scores per ~60,000 target images

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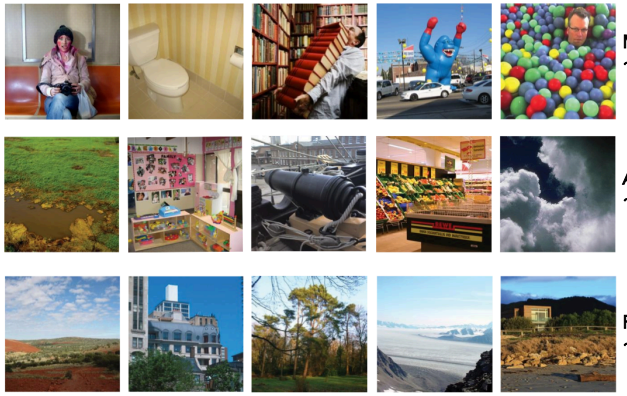
Large difference in image memorability + high consistency across observers



Memorable ~ 90%

Average ~ 67%

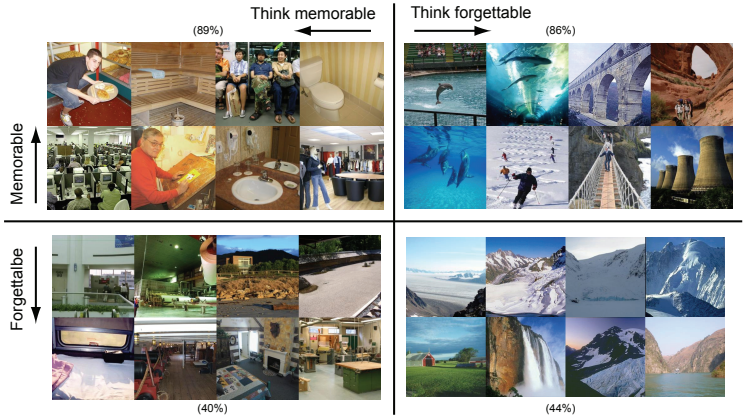
Forgettable ~40%

Mean HIT rate: 67.5% • SD: 13.5%
Mean False alarm rate: 10.7% • SD: 7.6%

Isola et al (2011). *IEEE CVPR*

3

Subjective judgments *do not predict* image memorability



Isola et al (2011). *Neural Information Processing Systems (NIPS). PAMI (2014)*

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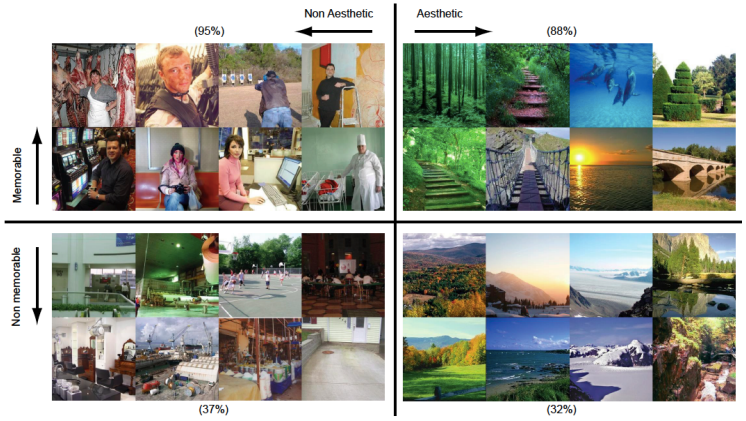
Image memorability is distinct from image aesthetic



Isola et al (2011). *Neural Information Processing Systems (NIPS)*

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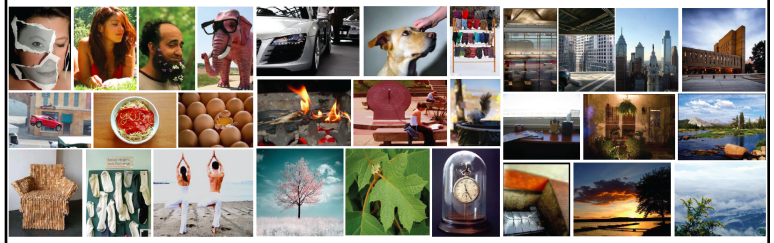
Most memorable — Least memorable



- Focus
- Enclosed Setting
- Dynamics
- Unusual

- No single focus
- Distant view
- Static
- Common

You need to recognize to remember!

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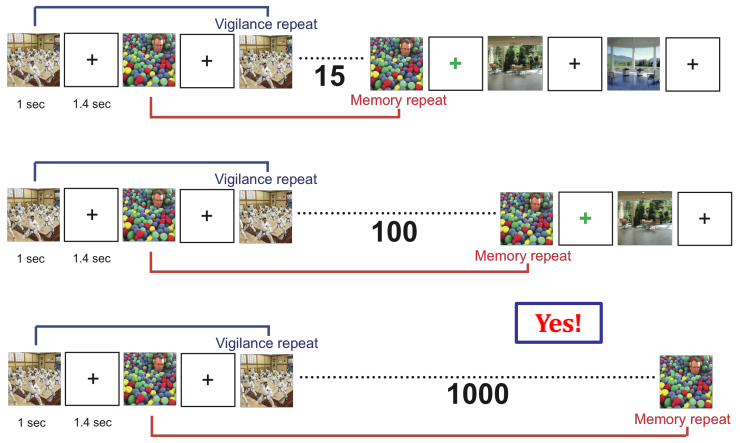
Is memorability stable across time?



Isola et al (2014). IEEE PAMI (Pattern Analysis and Machine Intelligence)

7

What about faces?

large differences in face memorability, high consistency across observers

Bainbridge, Isola, Oliva, (2013). J. Exp. Psychology: General.

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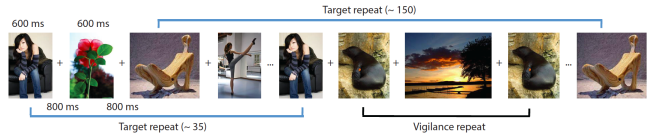
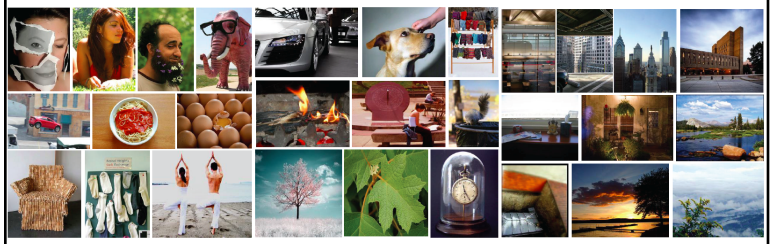
Large scale visual memorability

60,000 photographs with memorability scores





most memorable

less memorable

http://memorability.csail.mit.edu/

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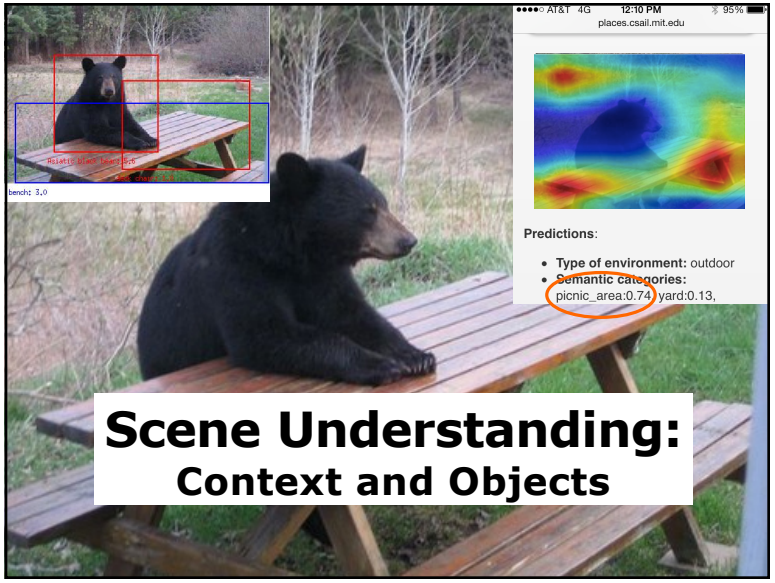
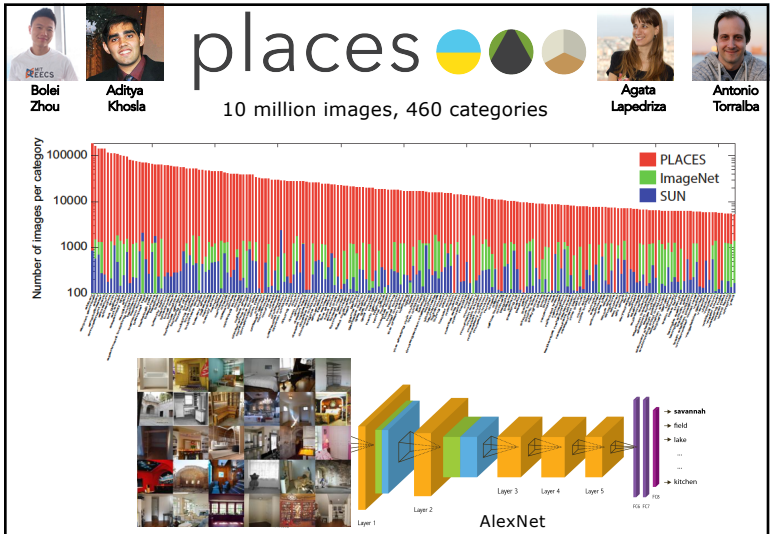


10



places.csail.mit.edu

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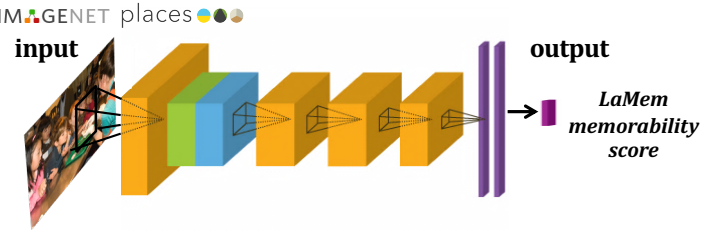
MemNet: CNN to predict image memorability



Khosla, Raju, Torralba, Oliva (2016) *Understanding and Predicting Image Memorability at a Large Scale*. http://memorability.csail.mit.edu/

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Visualizing CNN "features"

average of images that maximally activate neurons in two layers near output of MemNet
(ordered (top to bottom) by correlation with memorability)

13

Visualizing *receptive field* of MemNet neurons with strong positive or negative correlation with memorability

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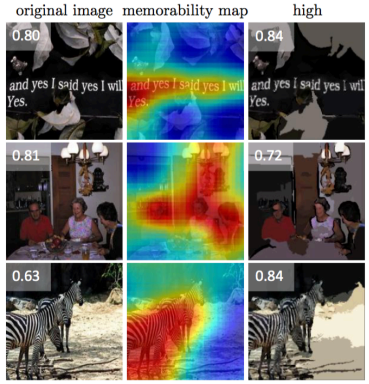
Which image regions are memorable?

generate a *memorability map:* scale up the image size, apply MemNet to overlapping subregions



use memorability map to de-emphasize the less memorable details

AMT experiment shows highlighted regions contribute to higher memorability scores

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Preserving most memorable regions

applications of memorability work?

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