

Computational Understanding of Image Memorability



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What is memorability?

- objective and quantifiable measure of images
- consistent across observers
- filter for visual data

$$HR(I) = \frac{\text{hits}(I)}{\text{hits}(I) + \text{misses}(I)} \times 100\%$$



Crowd-sourced (AMT) memory (image recognition) games

Application areas

- understand human memory
- design better user interfaces
- smarter visual search
- diagnose memory problems
- design better logos
- summarize big data and videos
- face memory accuracy, biases, and mistakes
- design better educational material
- inception, image manipulation
- design mnemonic aids
- design better data visualizations
- understand and predict cultural trends

Is memorability predictable?

FIGRIM Dataset

	highest memorability	lowest memorability	HR:
amusement park			64.2%
pasture			59.2%
airport terminal			55.6%
mountain			50.2%
cockpit			49.5%



Memorability rank is consistent across participants

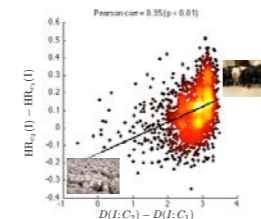
Can we model image context?

$$D(I; C) = -\log P_c(f_i)$$

$$P_c(f_i) = \frac{1}{\|C\|} \sum_{j \in C} K(f_i - f_j)$$

ran 21 separate experiments: one per scene category → within-category experiment
 AND
 an additional experiment, combining images from all categories → across-category experiment

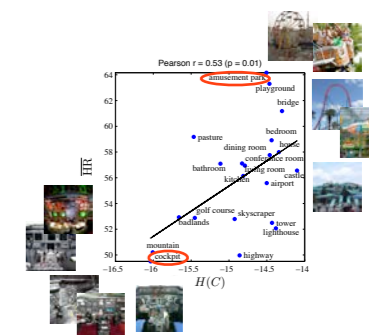
Contextually distinct images are more memorable



Memorable within categories Memorable across categories



More varied image contexts are more memorable overall



$$H(C) = \mathbb{E}_c[-\log P_c(f_i)]$$

Can we use eye behavior to make predictions for individuals?

We train a classifier to predict whether a set of eye movements will lead to a successful encoding

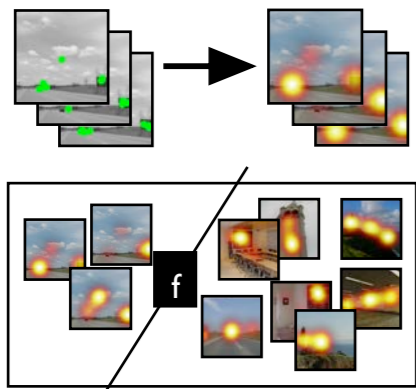
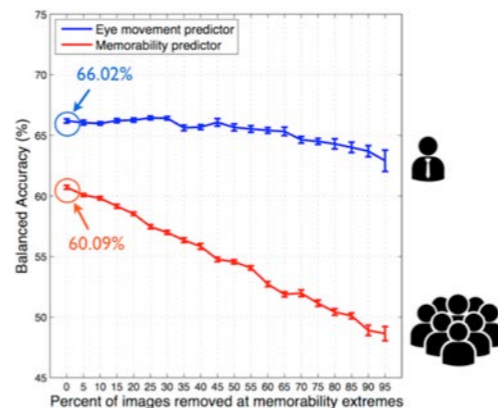
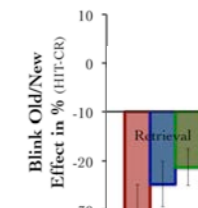
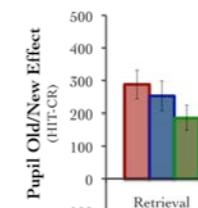


Image	Predicted: successful	Predicted: unsuccessful

Where you look in an image is predictive of whether you'll remember it later



Your pupil dilations and blink rates are indicative of how difficult it is to retrieve an image from memory



Memorability differences show up early!

