

[ICCV2015](#)**International Conference on Computer Vision 2015**

December 11-18, Santiago, Chile

**Reviews For Paper****Paper ID** 843**Title** What makes an object memorable?**Masked Reviewer ID:** Assigned\_Reviewer\_13**Review:**

Question	
<p>Paper Summary. Please summarize in your own words what the paper is about.</p>	<p>The work studies object memorability in detail. Firstly, it proposes a new version of the memorability game of Isola et. al. which is used to collect data about memorability of object segments. Similar to Isola et. al., the study found a high human agreement on memorable objects. Thus, object memorability could also be driven by something intrinsic about the image/object region. Given this data, various properties such as saliency, low level image features, category specific labels and image memorability are examined and their relationship to object memorability studied. Finally, deep features are used to predict memorability of object regions. A benchmark for future object level memorability prediction is provided.</p>
<p>Paper Strengths. Please discuss the positive aspects of the paper. Be sure to comment on the paper's novelty, technical correctness, clarity and experimental evaluation. Notice that different papers may need different levels of evaluation: a theoretical paper may need no experiments, while a paper presenting a new approach to a known problem may require thorough comparisons to existing methods. Also, please make sure to justify your comments in great detail. For</p>	<ol style="list-style-type: none"> <li>1. First empirical study of memorability of object segments</li> <li>2. A number of interesting insights can be drawn from the analysis of object memorability in the paper. For instance, presence of some objects effects the memorability of other objects. Memorability depends on fixation cues when the number of objects in the scene is low and the number of fixations in the region is low.</li> <li>3. A benchmark for future methods which predict object memorability is provided along with several competitive baselines.</li> </ol>

example, if you think the paper is novel, not only say so, but also explain in detail why you think this is the case.

Paper Weaknesses. Please discuss the negative aspects of the paper: lack of novelty or clarity, technical errors, insufficient experimental evaluation, etc. Please justify your comments in great detail. If you think the paper is not novel, explain why and give a reference to prior work. Do not ask the authors to cite your own work. If you think this is essential, write it in the confidential comments to the AC. If you think there is an error in the paper, explain in detail why it is an error. If you think the experimental evaluation is insufficient, remember that theoretical results/ideas are essential to ICCV and that a theoretical paper need not have experiments. It is not ok to reject a paper because it did not outperform other existing

- The writing is not clear and precise.

1. The motivation for studying object memorability is not conveyed clearly. L123: Bottom up account of memorability. Isn't object memorability a more top down approach than bottom up?

2. L125: Object Memorability will enable unique applications in the fields of computer vision and computational photography. Any examples?

3. L80 - L88: None of the examples/ applications given are specific to object memorability as opposed to image memorability. It would be great to see examples of use of object memorability if possible.

- Along with the HIT rate, the False Alarm rate should also be studied. Since objects repeat across images, it might be easy to confuse one viewpoint of an object for a slightly different view point of a similar object, for instance, resulting in false alarms.

- L200 - L201: It is not clear what exactly the interface does. L198 talks about a lag of 1.5 seconds between each image being presented, and these lines talk about unlimited time to remember the contents of the image. This is also problematic, because memorability of images is shown to decay with the time delay between target repeats (Isola et. al. What makes a photograph memorable?, PAMI 2014). If this is true of memorability of image regions, then an unlimited time lag is problematic since the memorability scores obtained for objects would be uncalibrated if a lot of time was spent on gazing at some "image sequence" images and none/less on others. It would be good to see the mean and variance of the time spent gazing at the image discussed. I doubt this is much of an issue in practice, but it would be great to see this issue addressed.

#### Minor Points

1. It would be interesting to just measure the "memorability" of object regions. That is, for some users, present the segmented object first and then as a repeat to gauge the "memorability" of the exact object region. This would be an interesting experiment to study the role of context in latching on to visual cues, and how the hit rates change as compared to the experiment right now. Are there cases where an object is more memorable than an image?

2. It has been found that high level semantic concepts such as attributes are predictive of the memorability of images. It would be interesting to see studies on attributes which lead to important object regions. This would be another way to "understand" object memorability.

algorithms, especially if the theory is novel and interesting. It is also not ok to ask for comparisons with unpublished papers and papers published after the ICCV deadline. Last but not least, remember to be polite and constructive.

3. Eye Fixation/ Saliency Experiment (Sec. 3.2): Eye fixations are known to be different depending upon the target task. Comparing eye fixations during free viewing with object memorability might not be an appropriate comparison. To better understand memorability, it might be interesting to see the eye fixations when the task given is to remember image content (as in the setup of the game), and see how the eye fixations and object memorability match up.

4. L665: shouldn't it be: When a device or a furniture co-occurs with a person, the person..?

5. It would be good to have a discussion on the artifacts when showing segments due to occlusion etc. and the effect it might have had on memorability.

Preliminary Rating. Please rate the paper according to the following choices.  
 Oral: these are papers whose quality is in the top 10% of the papers at ICCV. Examples include a theoretical breakthrough with no experiments; an interesting solution to a new problem; a novel solution to an existing problem with solid experiments; or an incremental paper that leads to dramatic improvements in performance.  
 Oral/Poster: these are very strong papers, which may have one weakness that makes you unsure as to whether they should be oral or poster.  
 Poster: these are strong papers, which

Poster

have more than one weakness. For example, a well-written paper with solid experiments, but incremental; a paper on a well studied problem with solid theory, but weak experiments; or a novel paper with good experiments, but poorly written.

Weak Reject: these are papers that have some promise, but they would be better off by being revised and resubmitted.

Strong Reject: these are papers that have major flaws, or have been done before.

Preliminary Evaluation. Please indicate to the AC, your fellow reviewers, and the authors your current opinion on the paper. Please summarize the key things you would like the authors to include in their rebuttals to facilitate your decision making. There is no need to summarize the paper.

I have some reservations about the design of the Memorability experiment, especially with allowing arbitrary time on the stimulus. Clarification on that would help make a more informed assessment.

Confidence. Write "Very Confident" to stress that you are absolutely sure about your conclusions (e.g., you are an expert

who works in the paper's area), "Confident" to stress that you are mostly sure about your conclusions (e.g., you are not an expert but can distinguish good work from bad work in that area), and "Not Confident" to stress that that you feel some doubt about your conclusions. In the latter case, please provide details as confidential comments to PC/AC chairs (point 7.).

Confident

**Masked Reviewer ID:** Assigned\_Reviewer\_15

**Review:**

Question	
<p>Paper Summary. Please summarize in your own words what the paper is about.</p>	<p>The paper studies the problem of object memorability and analyzes different factors that influence the memorability of an object. A series of experiments have been performed to measure the correlation between simple color cues, saliency, object category, etc. and object memorability. The paper also analyzes the correlation between image memorability and object memorability. Additionally, some baseline methods are proposed for predicting object memorability.</p>
<p>Paper Strengths. Please discuss the positive aspects of the paper. Be sure to comment on the paper's novelty, technical correctness, clarity and experimental evaluation. Notice that different papers may need different levels of evaluation: a theoretical paper may need no</p>	

experiments, while a paper presenting a new approach to a known problem may require thorough comparisons to existing methods. Also, please make sure to justify your comments in great detail. For example, if you think the paper is novel, not only say so, but also explain in detail why you think this is the case.

- + The paper is well written.
- + The experiments have been nicely organized and provide useful insight.

Paper Weaknesses. Please discuss the negative aspects of the paper: lack of novelty or clarity, technical errors, insufficient experimental evaluation, etc. Please justify your comments in great detail. If you think the paper is not novel, explain why and give a reference to prior work. Do not ask the authors to cite your own work. If you think this is essential, write it in the confidential comments to the AC. If you think there is an error in the paper, explain in detail why it is an error. If you think the experimental evaluation is

Some parts of the paper require further clarification. Please refer to the comments and questions below.

- Objects were centered within the image they originated from. Why is location information removed ? Doesn't location play an important role for memorability?
- Line 271: A rank correlation is computed to measure the agreement of subjects, but it is not clear what the "ranking" is and where it comes from. It should be clarified in the rebuttal.
- Figure 10: What is the reason that the memorability of vehicles increases (>7 objects)?
- For the inter-class memorability experiment (line 591), it would be good to provide statistics such as number of images, frequency of co-occurring

insufficient, remember that theoretical results/ideas are essential to ICCV and that a theoretical paper need not have experiments. It is not ok to reject a paper because it did not outperform other existing algorithms, especially if the theory is novel and interesting. It is also not ok to ask for comparisons with unpublished papers and papers published after the ICCV deadline. Last but not least, remember to be polite and constructive.

categories in the dataset, etc.

- Line 751: It is not clear what segments are referred to.

- The paper would be stronger if other factors such as scale, context, or complexity of image structure were considered.

- What is the purpose of using "familiar objects"? What is the difference between target and familiar objects? It can be guessed from the context, but it would be good to clarify that in the text.

Preliminary Rating. Please rate the paper according to the following choices. Oral: these are papers whose quality is in the top 10% of the papers at ICCV. Examples include a theoretical breakthrough with no experiments; an interesting solution to a new problem; a novel solution to an existing problem with solid experiments; or an incremental paper that leads to dramatic improvements in

performance.  
Oral/Poster:  
these are very  
strong papers,  
which may have  
one weakness  
that makes you  
unsure as to  
whether they  
should be oral or  
poster. Poster:  
these are strong  
papers, which  
have more than  
one weakness.  
For example, a  
well-written  
paper with solid  
experiments, but  
incremental; a  
paper on a well  
studied problem  
with solid theory,  
but weak  
experiments; or a  
novel paper with  
good  
experiments, but  
poorly written.  
Weak Reject:  
these are papers  
that have some  
promise, but they  
would be better  
off by being  
revised and  
resubmitted.  
Strong Reject:  
these are papers  
that have major  
flaws, or have  
been done  
before.

Poster

Preliminary  
Evaluation.  
Please indicate to  
the AC, your  
fellow reviewers,  
and the authors  
your current  
opinion on the  
paper. Please  
summarize the  
key things you  
would like the  
authors to include

The paper addresses a fairly interesting problem, however, it is not novel as it shares similarities (conceptually) with previous work on image memorability. Therefore, I recommend "Poster".



in their rebuttals to facilitate your decision making. There is no need to summarize the paper.	
<p>Confidence. Write "Very Confident" to stress that you are absolutely sure about your conclusions (e.g., you are an expert who works in the paper's area), "Confident" to stress that you are mostly sure about your conclusions (e.g., you are not an expert but can distinguish good work from bad work in that area), and "Not Confident" to stress that that you feel some doubt about your conclusions. In the latter case, please provide details as confidential comments to PC/AC chairs (point 7.).</p>	Confident

**Masked Reviewer ID:** Assigned\_Reviewer\_5

**Review:**

Question	
<p>Paper Summary. Please summarize in your own words what the paper is about.</p>	<p>This paper has conducted an empirical study of memorability at the object-level. While the problem of "image memorability" and "image region memorability" is well explored in previous works [16,17,18,23], the novelty of this paper is that it studies "object memorability". To this end, the authors have investigated the relationship between visual saliency and object memorability as well as the effect of the number of objects and Inter-class memorability. Also, the authors have provided a benchmark dataset that can be used for automatically evaluating object memorability.</p> <p>Summary of experiments: The empirical result reported in this paper is that (1) the memorability of an image is directly dependent on the memorability of its most memorable</p>

	object, (2) the category of an object affects its memorability and (3) there is a high correlation between the "object memorability" and "image memorability".
<p>Paper Strengths. Please discuss the positive aspects of the paper. Be sure to comment on the paper's novelty, technical correctness, clarity and experimental evaluation. Notice that different papers may need different levels of evaluation: a theoretical paper may need no experiments, while a paper presenting a new approach to a known problem may require thorough comparisons to existing methods. Also, please make sure to justify your comments in great detail. For example, if you think the paper is novel, not only say so, but also explain in detail why you think this is the case.</p>	<p>+This paper is well written and easy to read. +Clear and straightforward evaluation criteria is used in the experiments. +The experimental setting is simple.</p>
<p>Paper Weaknesses. Please discuss the negative aspects of the paper: lack of novelty or clarity, technical errors, insufficient experimental evaluation, etc. Please justify your comments in great detail. If</p>	

you think the paper is not novel, explain why and give a reference to prior work. Do not ask the authors to cite your own work. If you think this is essential, write it in the confidential comments to the AC. If you think there is an error in the paper, explain in detail why it is an error. If you think the experimental evaluation is insufficient, remember that theoretical results/ideas are essential to ICCV and that a theoretical paper need not have experiments. It is not ok to reject a paper because it did not outperform other existing algorithms, especially if the theory is novel and interesting. It is also not ok to ask for comparisons with unpublished papers and papers published after the ICCV deadline. Last but not least, remember to be polite and constructive.

-This paper does not have any technical novelty and as the authors have mentioned, they have done an empirical study on "object memorability". The memorability of "image regions" and its correlations with saliency had been previously explored in [23] and thus this paper has incremental novelty in the problem definition.

-Authors have reported that there is a high correlation between the previously explored "image-memorability" and the "object-memorability" proposed in this paper. Therefore, the empirical results are also not very interesting and does not provide any novel conclusion for future research

-It is unclear that while the "image-memorability" is so highly correlated with "object-memorability" why is it worthwhile to compute "object-memorability" and in what other vision applications the provided dataset will be useful for?

-In line 846, the authors mention that "object-memorability" is sensitive to image segmentation. This suggest that the injected complexity for computing "object-memorability" is prone to error when the segmentation is not good.

-The authors have conducted experiments about the effect of the number of objects and inter-class memorability. In both these experiments the count of a single object category is not explored. For example, how would the memorability of person change when there is crowd of people vs. a single person?

Preliminary Rating. Please rate the paper according to the following choices.

Oral: these are papers whose quality is in the top 10% of the papers at ICCV. Examples include a theoretical breakthrough with no experiments; an interesting solution to a new problem; a novel solution to an existing problem with solid experiments; or an incremental paper that leads to dramatic improvements in performance.

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Weak Reject: these are papers that have some promise, but they would be better off by being revised and

Weak Reject

resubmitted.  
Strong Reject:  
these are papers  
that have major  
flaws, or have  
been done  
before.

Preliminary  
Evaluation.  
Please indicate to  
the AC, your  
fellow reviewers,  
and the authors  
your current  
opinion on the  
paper. Please  
summarize the  
key things you  
would like the  
authors to include  
in their rebuttals  
to facilitate your  
decision making.  
There is no need  
to summarize the  
paper.

-Some details are missing:  
~In line 738 of the manuscript the authors have mentioned that they use conv-net [26,20]. However, the authors have not mentioned which layer of the conv-net is used for extracting the features? and also what would be the effect if they use features obtained from different layers (eg. fc6 vs fc7 vs c5, etc.)? Since different layers of the conv-net capture different aspects of images, my guess is that this choice would affect the results.

-There are some shortcomings in the diagrams:  
~Figure 8 and Figure 14 does not have y-axis label!  
~Figure 14 is not self representative and does not have any kind of legend/description to define the used abbreviations.  
~In page 8, why is Figure 14 below the footnote?

Questions:

I have some questions about the experiments as listed bellow:

~ I found it hard to interpret Figure 10. Though the authors have simply concluded that the memorability of objects belonging to categories like animals and vehicles goes down significantly with increase in object number, I see that the memorability of "vehicle" category has started increasing when the number of objects goes beyond 9. While increasing the number of objects from 0 to 8 has resulted in ~0.15 decrease in object memorability, the increase of the number of objects from 8 to 10 has resulted in a sharp increase of 0.5 in memorability. What is the effect of increasing the number of objects to more than 10?  
The memorability of "animal" is also seemed to have sharply decreased from 8 to 9. Why is memorability is changing so sharply only in these two categories and where does this bias come from?

~ It is mentioned in section 2.1 that the subjects are given unlimited time to freely view the images. My question is how did you control that the subjects take at least a minimum time to look at the photos? What was the average time that subjects took to view photos? And how do you make sure that the time has been spent on viewing the photos? Since this is a cognitive study, if there has not been any supervision on the Turkers for viewing the photos in the first place, this can significantly introduce error in the data that is gathered. What has been your mechanism to avoid this type of error?

Final decision:

Based on the above points about weakness of the paper, the novelty of this paper is incremental both in terms of problem definition and the obtained results and I am not convinced that "object-memorability" is very useful for future research and that the provided data would be useful. Therefore, this paper would be more appropriate if published as a technical report or in a workshop.

Confidence. Write "Very Confident" to stress that you are absolutely sure about your conclusions (e.g., you are an expert who works in the paper's area), "Confident" to stress that you are mostly sure about your conclusions (e.g., you are not an expert but can distinguish good work from bad work in that area), and "Not Confident" to stress that that you feel some doubt about your conclusions. In the latter case, please provide details as confidential comments to PC/AC chairs (point 7.).

Very Confident