



Introduction

There is clear evidence that people use global scene properties faster than basic-level information in scene categorization¹.

However, there is uncertainty about the degree to which scenes are characteristics of various global properties.

Thus, reference scales that can describe the subjective continues changes in characteristics of global properties would be essential for perceptual researches.

Method

Subject

1055 subjects in total participated on Amazon Mechanic Turk for \$1.75.

Stimuli

7035 images of scene were selected from Scene Understanding (SUN) database².

Task

Subjects were asked to decide which of a random pair of scenes was more natural, man-made, open or closed.

Each task consists of 450 trials which takes about 15~25 minutes.

Analysis

- Elo/Stephen:
 - Uncertainty in standard deviations
 - Restricted with chess player ranking
- SVM
 - Demanding in computational memory
- Bradley Terry Model

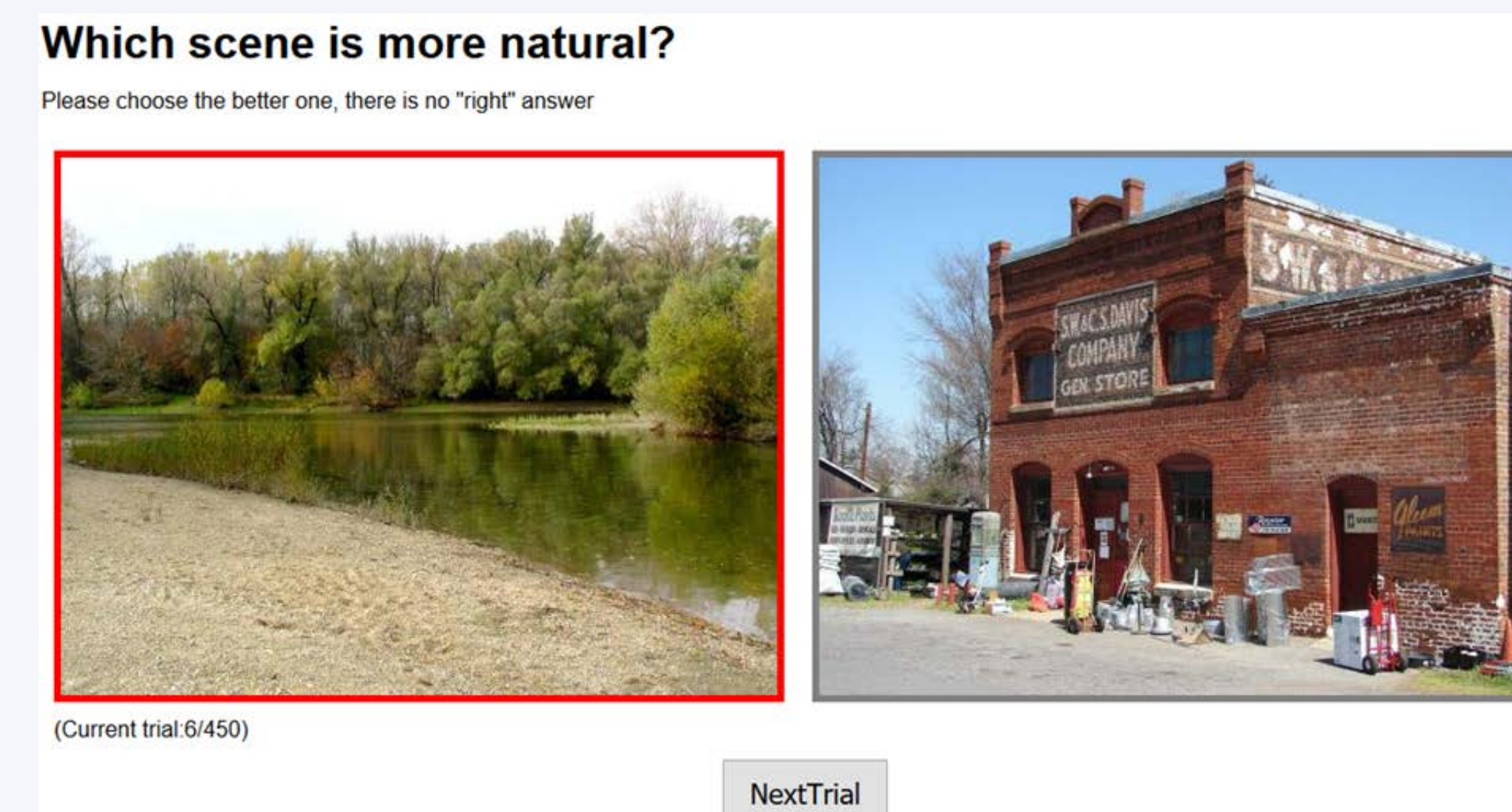


Figure 1. An example of an trial in task posted on Amazon Mechanic Turk. Subject were asked to answering the question by clicking on image to choose.

Bradley Terry Model³

$$\Pi_{ab} = \frac{\exp(\beta_a)}{[\exp(\beta_a) + \exp(\beta_b)]}$$

Π_{ab} : the probability that a > b
 β_i : ability parameter
 $\Pi_{ab} > \frac{1}{2}$ when $\beta_a > \beta_b$



Spearman's rank correlation coefficient

Natural and Man-made:
 $r = -0.86, p < 0.01$
 Open and Closed:
 $r = -0.93, p < 0.01$
 Natural and Open:
 $r = 0.83, p < 0.01$
 Man-made and Closed:
 $r = 0.77, p < 0.01$

Conclusion

Our standard ranking scales take wide range of subjective opinions about how people perceive the scene images, hence can benefit research areas such as neuroscience and computational vision in further.

In the future work, we hope to use these scales as the basis for studies on the interrelations between the perceptual processing of these attributes.

Reference

1. Greene, M. R., & Oliva, A. (2009). Recognition of natural scenes from global properties: Seeing the forest without representing the trees. *Cognitive psychology*, 58, 137-176.
2. Xiao, J., Hays, J., Ehinger, K. A., Oliva, A., & Torralba, A. (2010, June). Sun database: Large-scale scene recognition from abbey to zoo. In *Computer vision and pattern recognition (CVPR), 2010 IEEE conference on* (pp. 3485-3492). IEEE.
3. Firth, D., & Turner, H. L. (2012). Bradley-Terry models in R: the BradleyTerry2 package. *Journal of Statistical software*, 48(10), 1-31.