Canonical views of scenes depend on the shape of the space

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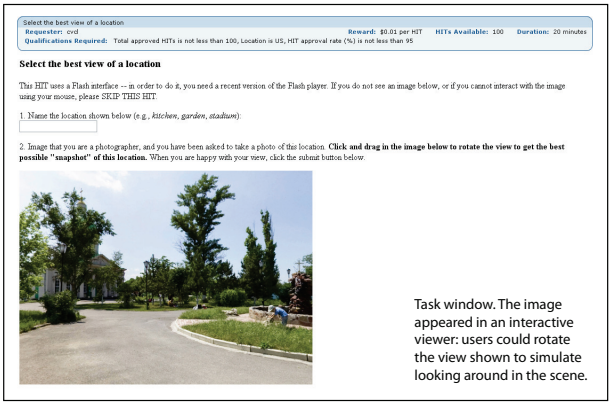
Introduction

Preference for "canonical" views of objects in recognition, depiction, and imagery (Palmer, Rosch, & Chase, 1981).
Are there canonical views of scenes? What determines the canonical view of a scene?

Experiment

1084 panoramic photos, each shown to 10 different workers on Amazon Mechanical Turk
On each trial, workers performed two tasks:

1. Name the location shown in the image (eg, "classroom")
2. Rotate the image in a 360-degree viewer to show the "best view" of the location

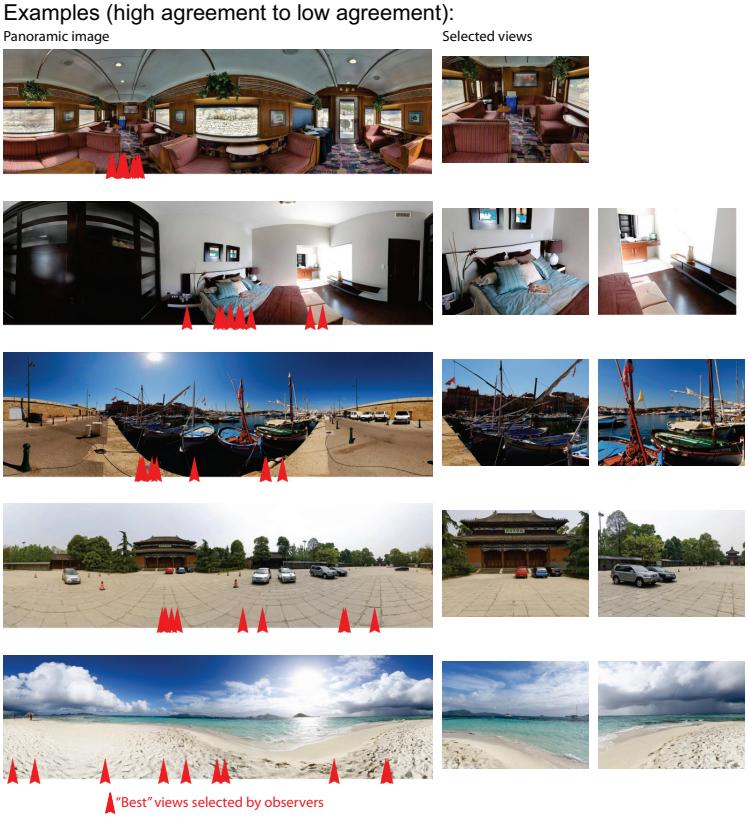


Task window. The image appeared in an interactive viewer: users could rotate the view shown to simulate looking around in the scene.

Results

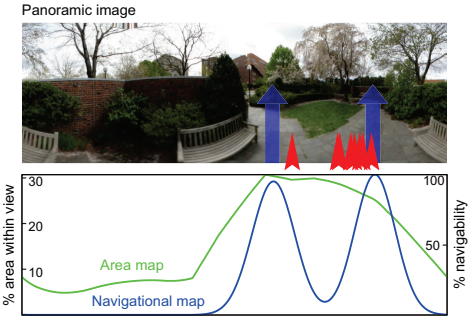
Agreement was generally high (Rayleigh's test of nonuniformity returned $p < 0.01$ for 538 images (50% of images), $p < 0.05$ for 694 images (64% of images))

Examples (high agreement to low agreement):

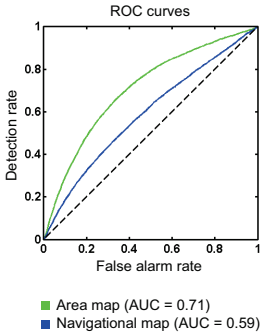


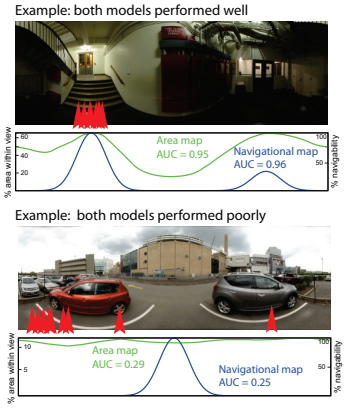
Modeling the shape of the space

The boundaries of the space were obtained by outlining the ground plane and calculating the area around the camera. Navigational paths were marked by Mechanical Turk workers.



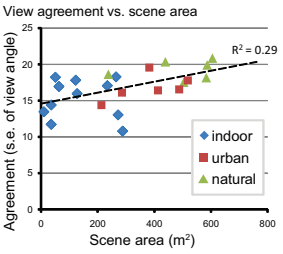
The area map represents the percent of the space visible in each direction. The navigational map represents navigability in each direction.

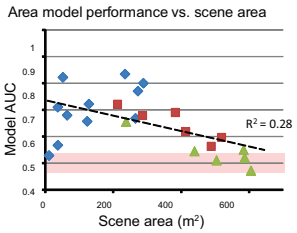


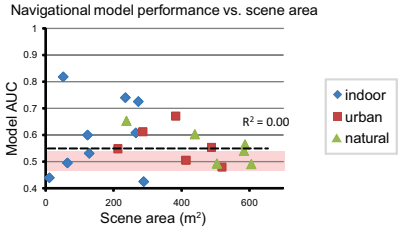


Model performance and scene area

View agreement was highest in small, indoor / man-made spaces and lowest in natural scenes. The area model also performed better in smaller, indoor spaces. The navigational model's performance was not related to scene area.







Conclusion

There is high agreement on the "best view" of a scene.
The best view of a scene is the one that shows as much of the space as possible, not necessarily the functional view for navigating in that space.

References

Palmer, S., Rosch, E., Chase, P., (1981). Canonical perspective and the perception of 40 objects. In Attention and Performance IX, Ed. J. Long, A. Baddeley (Hillsdale, NJ: Lawrence Erlbaum), pp. 135-151.