SUBJECTIVE EVALUATION OF CONTEXT-AWARE SALIENCY DETECTION ALGORITHM

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Introduction

Visual Saliency is the subjective perceptual quality which makes certain parts of an image to stand out more than others. The traditional measurement of visual saliency generally detects the dominant object in the image. A major drawback of this method is that by mainly focusing on the dominant object, its context in the image is lost. The latest saliency detection method – context-aware saliency [1] – detects not only the dominant object but also its surroundings that adds semantic meaning of the scene. In this project, we provide an extensive evaluation of context-aware saliency detection method.

Traditional Saliency

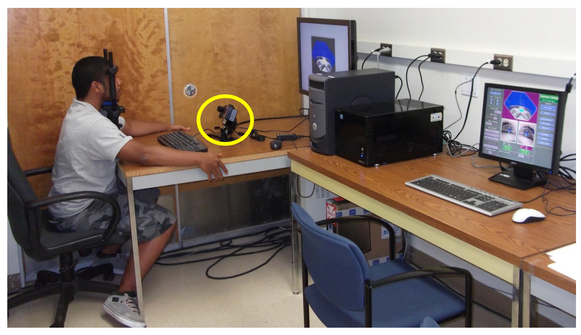
Context-Aware Saliency

Aim

By using the eye tracker, we capture the human gaze pattern needed to understand the context of a scene and use it as ground-truth to evaluate the implemented context-aware saliency detection method. Through comparing the experiment results to the saliency maps created by the algorithm, we identified the strength and the weakness of the algorithm. In addition, we believe that the human fixation data we have collected will be beneficial to the evaluation of various saliency detection methods.

Equipment and Setup

EyeLink1000 Eyetracker system



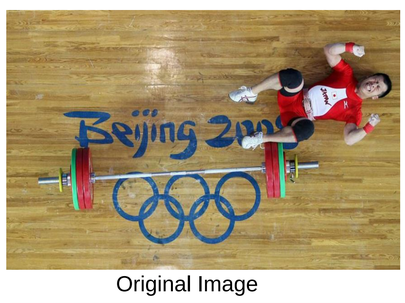
Experimental Process

- 60 images from various categories shown for 4 seconds to each of the 17 viewers.
- **Task:** The viewer was instructed to look at the parts that best describe the image and give brief description of scene.
- **Goal:** Evaluate Context-Aware Saliency and create a data set that can provide ground truth data.

Results

Algorithm matches human perception

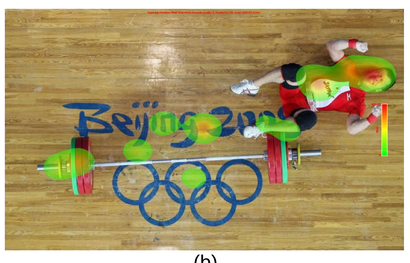
- Image has simple background
- Salient portion(s) have distinct differences in color and/or texture



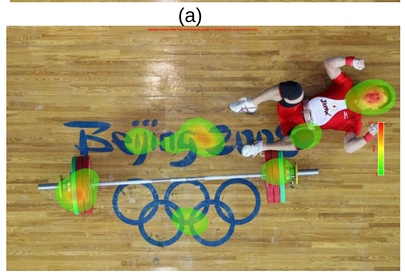
Original Image

Context-Aware Saliency Algorithm [1]

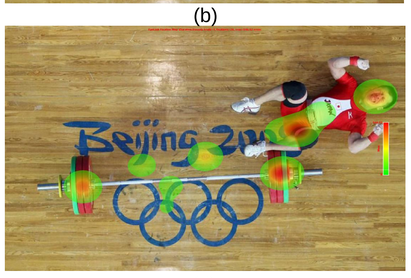
(a)



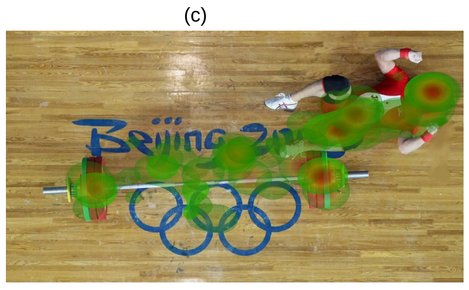
(b)



(c)



(d)



(e)

(a)-(d): Fixation map for individual human subject

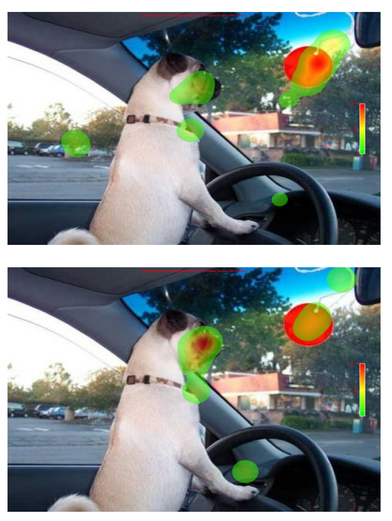
(e): Ensemble fixation map for eight human subjects

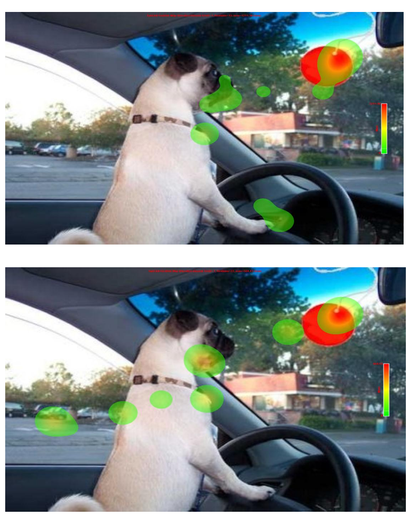
Algorithm partially matches human perception

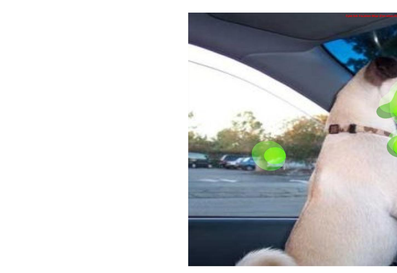
- Image has simple foreground
- Salient portion(s) have a similar color and/or texture as its surroundings

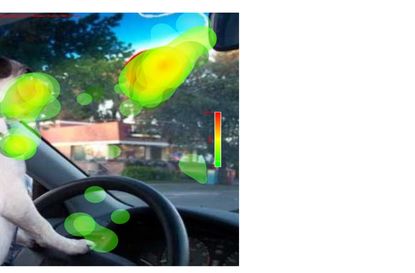
Original Image

Context-Aware Saliency Algorithm [1]





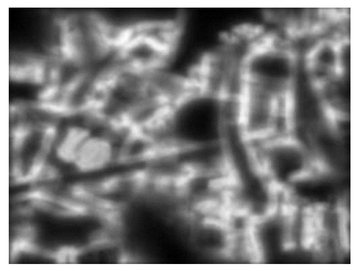




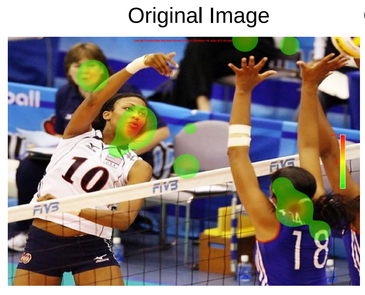
Algorithm differs from human perception

- Image is very busy
- Dominant object is not obvious

Original Image



Context-Aware Saliency Algorithm [1]



Original Image

Context-Aware Saliency Algorithm [1]

Conclusion and Future Plans

- Match to human perception
  - Simple background and distinct foreground
- Partial match to human perception
  - Plain foreground with more complex background
- Different from human perception
  - Busy image
  - Unclear main object
- Effects of...
  - Blurring and noise in image
  - People's prior knowledge/background

References

[1] Stas Goferman, Lihi Zelnik-Manor, and Ayellet Tal, "Context-Aware Saliency Detection", IEEE International Conference on Computer Vision and Pattern Recognition, 2010

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