Large-scale Scene Understanding Challenge: Eye Tracking Saliency Estimation

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1 Task description

The objective of eye tracking saliency challenge is to generate a saliency map (Fig. 1(c)), which can predict the ground truth saliency map and fixation points (Fig. 1(b)).

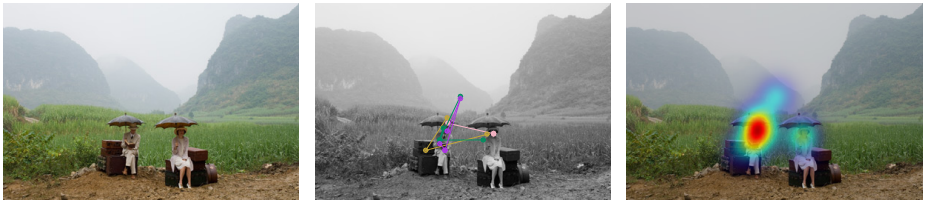
2 Data

We provide are 6000 images for training, 926 for validation, and 2000 for testing. Please download zip files for image, fixation, and saliency map and unzip them in to a same folder, e.g. Root. The raw images are collected from SUN database [2], and the eye tracking saliency ground truth are collected from crowd sourcing platform (Amazon Mechanic Turk) using the method described in [3]. Each image has been viewed by 3-10 subjects.

The training set and validation set, provided with ground truth, contains the following data field:

- *image*: The name of the image.
  The image can be found at "Root/images/*image*.jpg". The ground truth saliency map can be found at "Root/saliency/*image*.mat". The ground truth binary fixation map can be found at "Root/fixation/*image*.mat".
- *resolution*: The image resolution [height, width].
- *scenecategory*: The scene type of the image. This is an additional information to encourage scene-related algorithms. Whether to use the scene type or not is a free option, and we will compare algorithms with and without using scene type separately.
- *gaze*: The ground truth gaze data from subjects. Each structure corresponds to one subject, and there are no less than 3 subjects per image. Each gaze structure contains:
  - *location*: the image location of each gaze point, [x,y].
  - *timestamp*: the time stamp (millisecond) of each gaze point.
  - *fixation*: the fixation points estimated by mean-shift, [x,y].

The testing data contains only *image*, *scenecategory*, and *resolution* fields. People may choose whether to use *scenecategory* for prediction freely but are required to report this in the submission.



(a) Input image (b) Fixation points (c) Saliency map

Fig. 1: **Task.** We collect fixation points (b) and saliency map (c) from the crowd sourcing platform using the method described in [3]. The task is to generate a saliency map from the input image, which can predict the ground truth fixation points and saliency map.

3 Evaluation metrics

We adopt most of the standard metrics provided in MIT saliency benchmark[1] defined on both saliency map and fixation points. Specifically, we will evaluate the following metrics:

- Similarity
- CC
- AUC_Judd
- AUC_Borji
- sAUC (AUC_shuffled)

Please refer to the MIT saliency benchmark for more details.

4 Toolkit

- **demo.m**. General pipeline about how to use the toolkit.
- **GlobalParameters.m**. Define global parameters. You should set up "ROOT_DIR" to the root folder of the data.
- **predictFunc**. An example showing what to output for a prediction function.
- **evaluationFunc**. The evaluation function we will call on the server. It will take prediction, ground truth, and a metric type as input, and output the performance under the metric. The metric name can be one of the "similarity", "CC", "AUC_Judd", "AUC_Borji", and "AUC_shuffled".
- **makeFixationMap**. Convert fixation points to binary map.
- **code_forMetrics**. Codes from MIT saliency benchmark.

5 What to submit

Participants are supposed to run their algorithm on testing set and organize the result in the format exactly the same as the output of the **predictFunc**. The result is an array of cells. Each cell contains the predicted saliency map for the corresponding images in data, which shoudl be validation or testing.

References

1. Judd, T., Durand, F., Torralba, A.: A benchmark of computational models of saliency to predict human fixations. In: MIT Technical Report (2012)
2. Xiao, J., Hays, J., Ehinger, K.A., Oliva, A., Torralba, A.: 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 (2010)
3. Xu, P., Ehinger, K.A., Zhang, Y., Finkelstein, A., Kulkarni, S.R., Xiao, J.: Turkergaze: Crowdsourcing saliency with webcam based eye tracking. In: arXiv:1504.06755 (2015)