Datasets

Standard Dataset

ETFP (EYE-TRACKING AND FIXATION POINTS)

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Data Format: *.jpeg

Links: ETTO (Eye-tracking Through Objects)
(https://github.com/alessandrobruno10/saliency/tree/master/etto)

EToCVD (Eye-tracking of Colour Vision Deficiencies)
(https://github.com/alessandrobruno10/saliency/tree/master/etocvd)

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Keywords: image processing; computer vision; eye-tracking; visual attention

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ABSTRACT

ETFP (Eye-Tracking and Fixation Points) consists of two eye-tracking datasets: EToCVD (Eye-Tracking of Colour Vision Deficiencies) and ETTO (Eye-Tracking Through Objects). The former is a collection of images, their corresponding eye-movement coordinates and the fixation point maps, obtained by involving two cohorts, respectively, people with and without CVD (Colour Vision Deficiencies). The latter collects images with just one object laying on a homogeneous background, the corresponding eye-movement coordinates and fixation point maps gathered during eye-tracking sessions. The primary purposes behind the two datasets are to study and analyse, respectively, colourblindness and object-attention.

A brief description of the experimental sessions and settings for both EToCVD and ETTO is given down below.

EToCVD: The experimental sessions for EToCVD involved eight subjects with a fully efficient colour vision perception and eight participants with a colour-deficient vision system. More precisely, three subjects were affected by deuteranopia, while the other five were affected by protanopia. We conducted two experimental eye-tracking sessions: the first was focused on detecting how different the fixation points among the two cohorts. The first one is needed to assess our method's effectiveness in enhancing the images for colour blind people. Both eye-tracking sessions consist of repeating the same procedures. The first session also includes a test with Ishihara plates to evaluate which kind of colour vision deficiency the subjects were affected.

ETTO: The primary purpose of ETTO is to investigate the relationships between saliency and object visual attention processes. A computer showed each image at full resolution for a time frame of three seconds, separated by one second of viewing a grey screen. The database consists of several pictures with single objects in the foreground and a homogeneous coloured background region. ETTO has been used to assess saliency methods' effectiveness based on different computational and perceptual approaches concerning the object attention process.

The experimental sessions have been conducted in a half-light room. The participants were kept almost 70 cm off a 22-inch monitor having a spatial resolution of 1,920 by 1,080 pixels. During the eye-tracking session, a Tobii EyeX device recorded the eye movements, the saccadic movements, and the scan paths of each subject while looking at the images projected on the screen. For each subject, a calibration step was needed, in order, to minimise saccadic movement tracking errors, to compute

and assess the geometry of the setup (e.g., screen size, distance, etc.), and to collect measurements of light refractions and reflection properties of the corneas of each subject. Rather than using the standard Tobii EyeX Engine calibration (nine-point calibration step), we used Tobii MATLAB Toolbox 3.1 calibration, whose procedure relies on a set of 13 points.

Viewers were shown each image for 3 seconds, while Tobii EyeX acquired the eye movements' spatial coordinates. The eye-tracker collected, on average, 160 spatial coordinates per 3 seconds because of the frequency rate of 55 Hz). Before switching to the next image, the screen turned grey for 1 second to refresh the observer retina from the previous image signal.
Instructions:

- *Instructions for EToCVD Dataset*
- *EToCVD consists of three main image folders. ETOCVD_ALLFIXATIONLOCS containing all fixation point maps acquired during the first three seconds of image observation; ETOCVD_ALLFIXATIONMAPS* containing all the fixation maps (obtained by smoothing the fixation point maps)

- *ETOCVD_ALLFIXATIONLOCS* - Contains all the fixation point maps acquired during the first 3 seconds of image observation. The tests have been performed with observers not affected by any colour vision deficiency (*fixationLocsNoCVD* directory), affected by protanopia (*fixationLocsCVD_P* directory) and affected by deuteranopia (*fixationLocsCVD_D* directory). For each of the three directories, there are two subdirectories, one containing the full fixation point maps (*full* directory) and one containing the fixation point maps obtained excluding the first 200 ms of observation (*excluding_200ms* directory)
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- *ETOCVD_ALLFIXATIONMAPS* - Contains all the fixation maps (obtained by smoothing the fixation point maps), which show the most salient areas of the respective images. Directory hierarchy is identical to that of *ETOCVD_ALLFIXATIONLOCS*
- *ETOCVD_ALLSTIMULI* - Contains three subdirectories: '*images*' contains the unmodified images shown to all observers, *imagesRecoloredCVD_P* contains the images enhanced for observers affected by protanopia and *imagesRecoloredCVD_D* contains the images enhanced for observers affected by deuteranopia.

Instructions for ETTO:

ETTO consists of images, fixation point maps and the fixation maps (the latter are smoothed version of the fixation point maps).

All data are stored in the folders as follows:

- *ETTO_ALLSTIMULI - Contains the images (resized and redistributed with permission of the OPED (http://www.cvl.isy.liu.se/research/objrec/posedb/) authors)*
- *ETTO_ALLFIXATIONLOCS - Contains the fixation point maps*
- *ETTO_ALLFIXATIONMAPS - Contains the fixation (attention) maps.*

If you are interested in working on the topic, email me at alessandrobruno10 at gmail dot com

If you use the datasets above please cite our following scientific publications:

@article{bruno2020multi, title={A Multi-Scale Colour and Keypoint Density-Based Approach for Visual Saliency Detection}, author={Bruno, Alessandro and Gugliuzza, Francesco and Pirrone, Roberto and Ardizzone, Edoardo}, journal={IEEE Access}, volume={8}, pages={121330--121343}, year={2020}, publisher={IEEE} }

@inproceedings{ardizzone2012image, title={Image Quality Assessment by Saliency Maps}, author={Ardizzone, Edoardo and Bruno, Alessandro}, booktitle={VISAPP 2012}, pages={479--483}, year={2012} }

@inproceedings{ardizzone2017exploiting, title={Exploiting visual saliency algorithms for object-based attention: A new color and scale-based approach}, author={Ardizzone, Edoardo and Bruno, Alessandro and Gugliuzza, Francesco}, booktitle={International Conference on Image Analysis and Processing}, pages={191--201}, year={2017}, organization={Springer, Cham} }

DATASET FILES

- Unzip saliency-master.zip and store ETFP (Eye-Tracking Fixation Points) Dataset collection. saliency-master.zip (53.43 MB)

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