Link to data:
https://atreus.informatik.uni-tuebingen.de/seafile/d/8e2ab8c3fdd444e1a135/?p=%2FEyetrace&mode=list

Arbitrarily shaped areas of interest based on gaze density gradient

Wolfgang Fuhl [1], *Thomas Kübler* [1], *Katrin Sippel* [1], *Wolfgang Rosenstiel* [1], *Enkelejda Kasneci* [1]

[1] *Eberhard Karls Universität Tübingen, Wilhelm-Schickard-Institut, Technische Informatik*
E-Mail: {wolfgang.fuhl, thomas.kuebler, katrin.sippel, wolfgang.rosenstiel, enkelejda.kasneci}@uni-tuebingen.de

Studying how people look at paintings usually involves the automated identification of areas that highly attract the user's gaze. Such areas of interest (AOIs) may represent either salient or semantically relevant entities of the painting. While current gaze clustering approaches can successfully identify areas of high gaze density (e.g., via mean-shift as proposed by Santella, A. and DeCarlo, D. (2004)), determining the extension of such areas is non-trivial. Circular and elliptic approximations, which are commonly used for this task, do not fully cover the shape defined by the gaze density at a specific location.
We propose two methods for shape identification of AOIs. The first is based on a local maxima intensity dependent threshold, whereas the second on the calculation of gradient direction and runs unparameterized. Both methods use a density map as input which can be computed from gaze points, fixations, or fixation clusters.
An implementation of these algorithms will integrated in the next version of Eyetrace (Sippel et al. 2015), a tool for analysis and visualization of eye-tracking data. Eyetrace offers further processing capabilities in order to create and visualize transition matrices based on these clusters.

Santella, A. and DeCarlo, D. (2004), "Robust clustering of eye movement recordings for quantification of visual interest.", *Proceedings of the Eye tracking research & applications symposium on Eye tracking*

Sippel, K., Kübler, T.C., Fuhl, W., Schievelbein, G., Rosenberg, R. and Rosenstiel, W. (2015) "**Eyetrace2014: Eyetracking Data Analysis Tool",** *8th International Conference on Health Informatics, Healthinf 2015*