Leveraging Gaze Data for Segmentation and Effects on Comics

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Problem

Identifying and segmenting objects in a comic image for applying effects

Related Work

Clustering Gaze Data:
SANTELLA, A., AND DECARLO, D. 2004. Robust clustering of eye movement recordings for quantification of visual interest. In Proceedings of the 2004 symposium on Eye tracking research & applications, ACM, 27–34.

Segmentation using fixations:
MISHRA, A., ALOIMONOS, Y., AND FAH, C. L. 2009. Active segmentation with fixation. In Computer Vision (ICCV), IEEE International Conference on, IEEE, 468–475.

Our Contribution

(a) Original comic frame (b) Gaze clusters allow segment extraction (c) Comic effects such as defocusing, recoloring and stereoscopy

Comic artists direct viewer gaze towards regions important to the storyline.Gaze data is thus a natural substitute to manual user input for identifying "effects-worthy" segments.

We propose a method to cluster the noisy gaze data, and use the clusters to obtain compelling segments from the image. Effects can then be applied to this segment.

Method

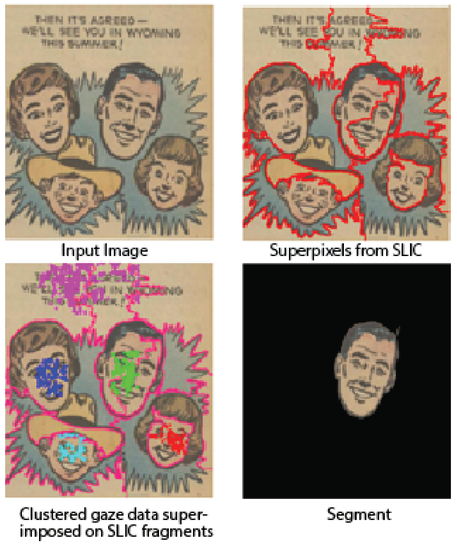
Oversegment the input image using Simple Linear Iterative Clustering [1]

Cluster gaze data using Relative Eigen Quality(REQ) [2] in a Normalized Graph-cuts framework

REQ facilitates automatic selection of number of clusters

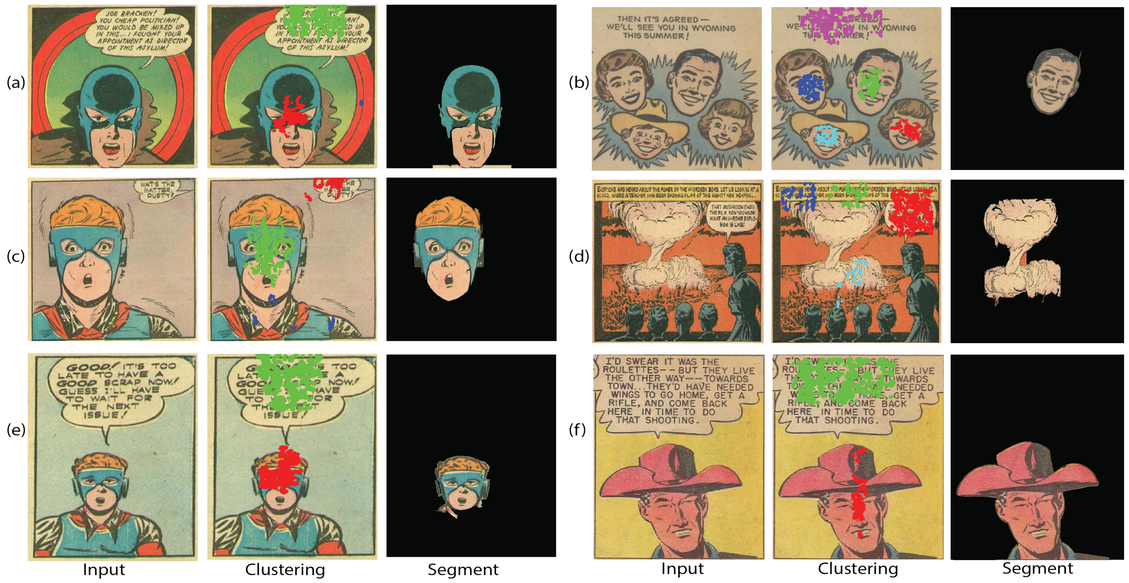
Assemble fragments into complete object using gaze density

Effects can then be applied on this object



Input Image | Superpixels from SLIC | Clustered gaze data superimposed on SLIC fragments | Segment

Results



Segmentation using eyetracking and REQ-enabled normalized cuts on six comic panels [3]

(a) Stereoscopic results on comic images
(b) Background defocus results on comic images
(c) Recoloring on still images

Potential Effects on comics

References

[1] ACHANTA, R., SHAJI, A., SMITH, K., LUCCHI, A., FUA, P.,AND SUSSTRUNK, S. 2010. Slic superpixels. Tech. rep.
[2] SHEA, J. M., AND MACKER, J. P. 2013. Automatic selection of number of clusters in networks using relative eigenvalue quality. In Military Communications Conference, MILCOM 2013-2013 IEEE, IEEE, 131–136.
[3] ARCHIVE, 2015. Internet archive. http://comicbookplus.com/