

Accurate Ellipses Detection based on Co-clustering Algorithm

Abstract—Circles are important structures in computer vision since they play as a common feature for especially human-made objects, and they expose more information than points or lines of an object. In this survey, we are devoted to reviewing the detection of the perspective projection of human-made perfect circles, which are accurate ellipses, based on the co-clustering algorithm. To speed up and drop redundant information, we first extract arc segments from source images with an efficient and accurate arc-support line segment detection method. After some connecting are done among the little arcs we gain from last steps, we define a 5D metric space that can express the ellipse-relationship among those arcs and conduct co-clustering algorithm to determine the number of ellipses in the source image and specify which arcs are from the same ellipse. Afterwards, we have a validation procedure to ensure what we detect is an accurate ellipse and visualize the result.

Index Terms—Ellipse, co-cluster

I. METHOD/ELLIPSE DETECTOR

In this section, what we introduce is an ellipse detection method with probability control based on the co-clustering scheme. The whole picture comprises mainly: (1) Arc Detection; (2) Generation of Candidates Field; (3) Correlation (4) Co-clustering and (5) Validation. Details are elaborated upon in the following sections.

A. Arc Detection

It is a very popular scheme to begin the ellipse detection with arc detections. In our procedure, it is expected to get long arcs as many as possible. Many of them adopt the canny edge detector to extract the arcs from the edge. [1], [2] Nevertheless, they dropped the intensity information at first, and thus

B. Cocluster Arcs

ACKNOWLEDGMENT

The authors would like to thank my lovely Ex-girlfriend.

REFERENCES

- [1] H. Dong, D. K. Prasad, and I.-M. Chen, “Accurate detection of ellipses with false detection control at video rates using a gradient analysis,” *Pattern Recognition*, vol. 81, pp. 112–130, 2018.
- [2] Q. Jia, X. Fan, Z. Luo, L. Song, and T. Qiu, “A fast ellipse detector using projective invariant pruning,” *IEEE Transactions on Image Processing*, vol. 26, no. 8, pp. 3665–3679, 2017.