Public Abstract

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Title:Classification of Mixed Data Points for Coupled Circles Estimation

Circles fitting is a challenge task which has attracted wide variety of interests in many application areas, such as, Computer Vision, Target Tracking and Pattern Recognition. For most of the coupled circles estimators, the knowledge of the number of circles and the belongings of the data points to the circles are necessary. However, the information is usually not available in practice. In this thesis, the solutions of the two problems will be presented.

This thesis proposes a new method which combines the Mean Shift method and the Naïve Bayes classifier to improve the joint estimation of the number of circles and classification of data points when the number of data points are limited. It treats the noisy data points of circles as a list of measurements in the real valued coordinates. The results are supported by the simulations with synthetic data. Comparing with other clustering methods, for instance the K-Means method, the proposed solutions can improve the estimation accuracy of the number of circles to nearly 100% and also increase the classification accuracy of data points when the noise power is in high level.

The proposed solutions can estimate a single circle and more than one concentric circles and obtain good estimation results of the circles parameters, the circles center and radii. It can be applied to locate the position of sensors and detect the approximate circle objects etc.