Assignment3 Report

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Introduction

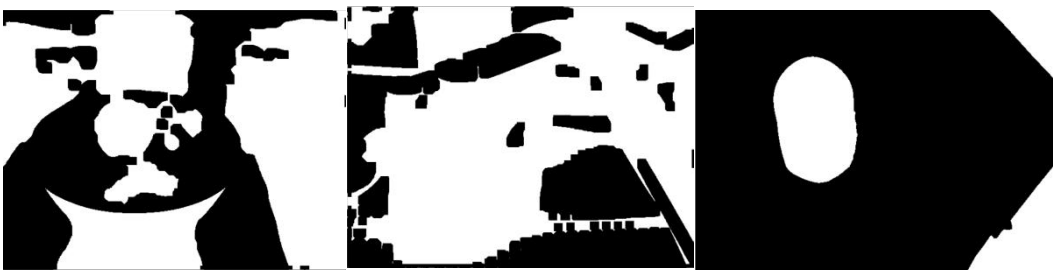
In this assignment, I implemented a program to do the image classification through cameras. The goal is to have the computer identify a specified set of objects placed on a white surface in a translation, scale, and rotation invariant manner from a camera looking straight down.

Steps

1. implementing a thresholding algorithm to separate the objects from the backgrounds.

Above is the example of a bowl, camera and mouse

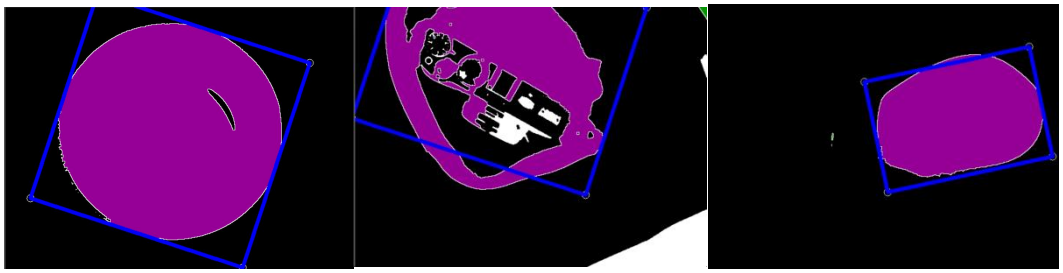
2. using morphological filtering to clean up noise or holes



bowl, camera and mouse after morphological filtering

3. Segment the image into regions and color them

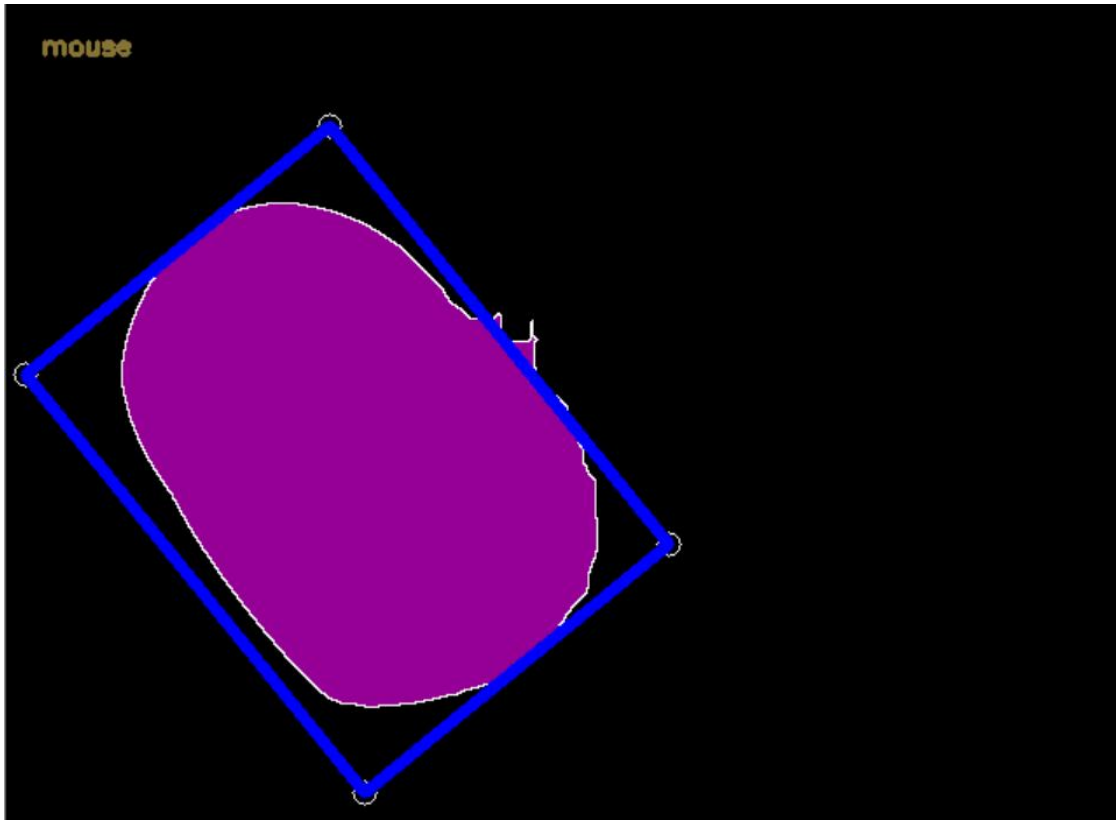
4. Adding box



5. Collect features for training data

Every time when user press “l” in the keyboard. The feature of current frame will be calculated and saved into db.txt. The user with be asked to type a name as the label of the picture. The label of a new picture will be predict by calculating its k neighborhoods in the feature dataset: db.txt.

6. Classify new image



7. Implement different classifier

In this project, I implement the K-NN classifier and direct prediction by find the closet object using Euclidean distance

8. Evaluate the performance

Check the result.csv

9. Video

https://drive.google.com/file/d/1TC5htHH7DgJVPVzt-7EgNqc8t27orLmY/view?usp=sharing

Conclusion

In this assignment, I practiced my skill with morphological filtering and feature extraction. I learned how to do the image classification.In the end, I also get familiar with many basic libs of opencv.

Acknowledgement

1. Gonzalez, Rafael C.; Woods, Richard E. (2008). Digital Image Processing (3rd ed.). Prentice Hall. p. 128. ISBN 9780131687288 .
2. ^ Gonzalez, R.C.; Fittes, B.A. (June 9– 11, 1975). Gray-level transformations for interactive image enhancement (PDF). 2nd Conference on Remotely Manned Systems: Technology and Applications. Los Angeles, California. pp. 17– 19.
3. ^ Coltuc, Dinu; Bolon, Philippe; Chassery, Jean-Marc (May 2006). "Exact Histogram Specification". IEEE Transactions on Image Processing. 15 (5): 1143–52. Bibcode:2006ITIP...15.1143C. doi:10.1109/TIP.2005.864170. PMID 16671295. S2CID 16060881.