Matching and retrieval of smooth objects

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November 9, 2011

1 Implementation plan

1. Extracting a foreground object
   (a) Segmentation into super-pixels using global probability of boundary detector (gPb)
   (b) Super-pixels background / forground classification trained on 300 annotated pictures
   (c) Grouping super-pixels using connected components (small components are to be removed)
2. Building a (several-scale) descriptor for an extracted object. The proposed descriptor consists of two parts:
   (a) HoG descriptors at centers that are uniformly sampled from boundaries
   (b) Occupancy grid (a table with proportions of pixels belonging to the foreground in a given patch)
3. Retrieval
   (a) Bag-of-boundaries (BoB) - an approach similar to bag-of-words (BoW)
   (b) Pruning retrieval results by fitting a loose homography
   (c) Ranking using corrected tf-idf (as described in [1])

2 Dataset

Sculptures 6K – the dataset of 6340 images used in [1] with ground truth annotation for twenty sculptures and their viewpoints, and consisting of works principally by Moore and Rodin. The dataset contains some distractor images to be used as negative examples. The dataset specifies a training/test split that we're going to use to assess the system performance. The dataset will be obtained from [2].

3 Experiments and evaluation

We'll report mAP over a reasonable number of queries (70 queries used in [1], we'll see if we can do as many). Baseline with BoW might be implemented if time permits.

4 Work sharing

The project will be conducted in a group of two. Every team member will take part in implementing every stage of the system pipeline. We'll also do pair programming sessions to share experience and pick next actionable items.

References

[1] R. Arandjelovic, A. Zisserman, Smooth Object Retrieval using a Bag of Boundaries, ICCV 2011

[2] Sculptures 6K dataset, http://www.robots.ox.ac.uk/~vgg/data/sculptures6k/