Project 5 Writeup

Haobo Song

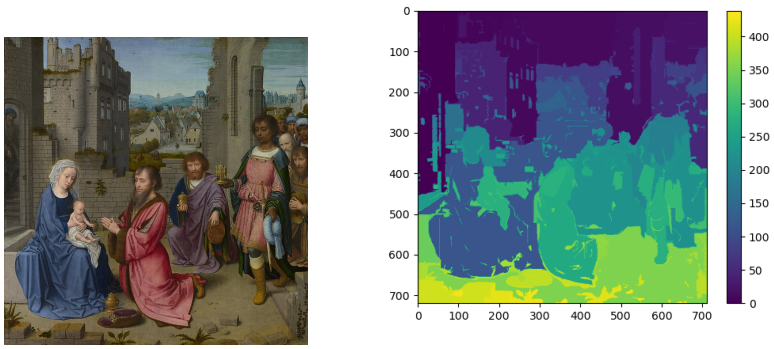
Project Overview

In this experiment selective search algorithm [1] was implemented in practice. And 9 graphs were tested using python code, with relatively good results

Implement

The entire selective search is divided into three main steps.

1. Segment smallest regions 1 by the algorithm of Felzenswalb [2].



(a) original image (b) small regions

Figure 1: Initialising small regions of the image

2. Calculate the similarity(color,shape,size,texture) between two regions and merge the two regions with the greatest similarity to obtain a new larger region, which will be added to the region set.

3. Repeat step 2 until there is only one region left, and the resulting set of regions is the output of the algorithm.

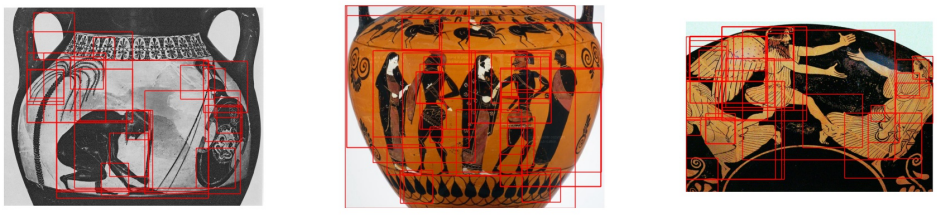
Result

Following the instructions of the exercise, we implemented the algorithm and obtained the following result 2

As shown in Figure 2, after implementation, all results have reached the expected results.

(a) image from arthist folder

(b) image from chrisarch folder

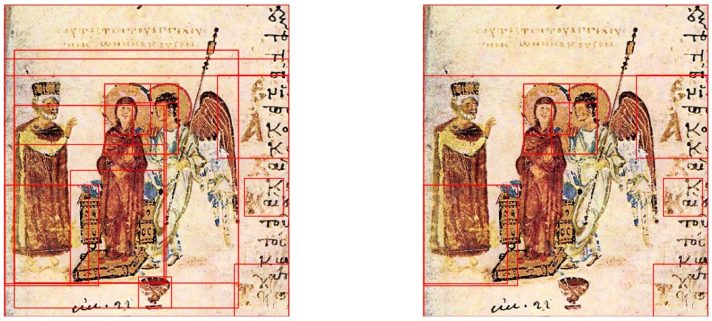


(c) image from classarch folder

Figure 2: Results of all experimental figures

Discussion

For the generation of the final bounding box, we can achieve a preference by giving a weight to the different similarity criteria when measuring the similarity of the regions.



(a) No change to similarity weights (b) similarity weights has changed

Figure 3: Different similarity measure weights are used for the same image

As Figure 3 shown above, we have given more weight to the colour similarity and obtained a different bounding box from the original result. As you can see from the right image 3(b), there are fewer bounding boxes than left image 3(a), especially in the upper part of the image, where areas of the same colour are divided into a single bounding box. In addition, As shown in the figure below 4 the sensitivity to small object detection can be improved by modifying the size threshold of the smallest bounding box, but usually he also produces more redundant bounding boxes.

(a) No change to size threshold (b) size threshold has changed

Figure 4: Different size threshold are used for the same image

We can conclude that with the selective search algorithm, we can quickly do a pre-processed segmentation of the image and get a lot of regions of interest, but the detail is not ideal . Segmentation in detail requires parameter adjustment or other algorithms

References

[1] J. R. Uijlings, K. E. Van De Sande, T. Gevers, and A. W. Smeulders, "Selective search for object recognition," *International journal of computer vision*, vol. 104, no. 2, pp. 154–171, 2013.

[2] P. F. Felzenszwalb and D. P. Huttenlocher, "Efficient graph-based image segmentation," *International journal of computer vision*, vol. 59, no. 2, pp. 167–181, 2004.