Computer Vision Project
Summer 2021
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Sheet 5, starting from June 21st, 2021, due July 12th, 2021, 13:45 hours

Deliverables

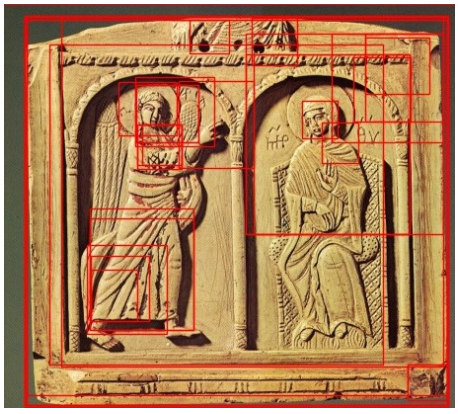
1. Code files and Result-Images
2. writeup.pdf
3. questions.pdf

Introduction

In this exercise, we will perform *selective search* algorithm for object detection. The parameters for the algorithm are taken from felzenszwalb paper. We will test the algorithm on 3 images each from 3 different fields of digital humanities namely Art history, Christian Archaeology and Classical Archaelogy.

Task: Implement selective search algorithm (all functions found in student.py):

(a) Christian Arch - Annunciation scene



(b) Result image

Folder structure and Code details

The folder titled, "proj5-cv" provided to you should have the following folders: 'code', 'questions' and 'writeup'. Apart from these, there will be one more file, 'exercise-05.pdf' (this file) which guides you across the project.

Note: All the '*.py' files can be found in the 'code' folder.

Initial run: Running main.py unchanged will return empty regions for every test image resulting in no boxes detected and the output will be same as input image.

Data: The starter codes have one image loaded from Christian Arch. You must generate the results on all the three images provided under the data/chrisarch, data/arthist and data/classarch folders and store them in results folder.

Task Description

In total, there are 8 tasks to be implemented. Details of all of them are provided in the student.py file in code folder. However, here's a brief description of all the tasks. Start looking at *selective_search* function in the student.py file as all the tasks start from there.

- Task 1: Generate Initial segmentations. Refer to Felzenszwalb paper mentioned before.
- Task 2: Extract all the regions from the initial estimate based on four similarities: color, texture , size and fill as was discussed during the lecture. Note that one of the important subtask is to generate histograms, details are explained in the code-skeleton.
- Task 3: Extracting list of neighbors which basically are neighboring regions, later used for merging the regions.
- In a hierarchical procedure,
  - Task 4: merge the regions.
  - Task 5 and 6: Mark and remove the old similarities
  - Task 7: Calculate the new similarities with the new region
- Task 8: Generate the final regions which represents the proposals containing some important object information.

Questions and Writeup

Instructions for questions are provided in questions/questions.tex. Please follow the instructions given there, compile it into a PDF and submit it along with your code.

For writeup: Describe your process and algorithm parameters, show your results, describe any extra credit, and tell us any other information you feel is relevant. We provide you with a LaTeX template writeup/writeup.tex. Please compile it into a PDF and submit it along with your code.

Mandatory
Submitting the result images for all the provided data (9 images).

Parting comment

Scene classification and recognition is very good place to start in computer vision and all these methods before deep learning such as sliding window approach, selective search are very important and form a strong base if you want to work in deep learning in future. I also understand that not everything you will experiment is going to give you best results and neither can you accommodate it all in 5 pages (writeup page-limit), however this is the challenge every good researcher faces while presenting her or his work. So, let's have a flavor of the same and I wish you all the very best for this exercise.