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Algorithms and Applications in Computer Vision

FINAL PROJECT

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COMPuTER VISION

# OPTION 2 – TEMPLATE MATCHING

## Template matching methods implemented in this project

* + 1. SIFT for template matching.
    2. Set of filters (generated for a given template) with convolution.
    3. Template matching as implemented in the article *“Matching Local Self-Similarities across Images and Videos”*.  
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**i) SIFT for template matching:**

the implementation that was used is SIFT and RANSAC for finding a match for a given pair (template and target image), images with less than 4 matches - 4 corresponding points, 8 total - were ignored because homography transformation has 8 DOF.

**Algorithm:**

1) Load images and template image.

2) Run SIFT and extract the features from each image and the template.

3) Match the features for each image with the template features.

4) Run RANSAC:

4.1 choose 4 random points.

4.2 calculate homography.

4.3 count inliers

4.4 repeat 4.1 until MAX ITERATIONS.

4.5 return homography with MAX number of inliers.

5) Apply the homography for the template and draw a box on the image.

**Pros:**

1) Fast.

2) Robust to scale, rotation.

3) Can handle significant changes in illumination.

4) Fast and efficient.

**Cons:**

1)

ii) **Set of filters (generated for a given template) with convolution:**

For a given template a set of filters was calculated in various sizes and various rotations.

**Algorithm:**

1) Load images and template image.

2) Creating different angles of the template image in different sizes.

3) Applying gaussian filter to the set of images before the applying the convolution.

4) Using convolution between the the filter set and the set of images.

5) Searching for values that are above a given threshold, those are the matches.

6) Draw a box on the image.

Pros:

1) Robust to scale, rotation.

2) Finds more than one match in a given image.

**Cons:**

1) Slow.

2) Computationally expensive.