Object separation from background with robust PCA

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1 Introduction

The task was to use robust PCA to separate the object from the background of the image. In this report, the object is a leaf and the background is a wooden table.

2 Data and Methodology

I used three images, one of which contained the object and two of which contained only the background with and without noise. I used the code template from Moodle. The purpose of the code is to separate the data obtained from the image with the object into two parts, using robust PCA and images with background. The parts are the Low-rank matrix, which describes the background, and the sparse matrix, which describes the deviation, i.e., in this task, the object. The code iterates the separation of the background and anomalies (the object). I reduced the image size and tested the algorithm with different numbers of iterations.

3 Results

The figure 1 shows the results obtained using robust PCA, with the original images in the top row and the resulting images in the bottom row. I used 100 iterations and 200x200 pixels as image sizes. The figure shows that in the image corresponding to Low-rank, there is a faint shadow of the object, but the background behind the shadow is the same as in the images with background. It can also be seen that the sparse matrix correctly represents the object. The overlay mask shows the location from which the anomalous observation (the object) was taken.

I tried increasing the number of iterations from 100 to 1000 and did not notice any significant improvement. Reducing the number of pixels in the image sped up the algorithm.

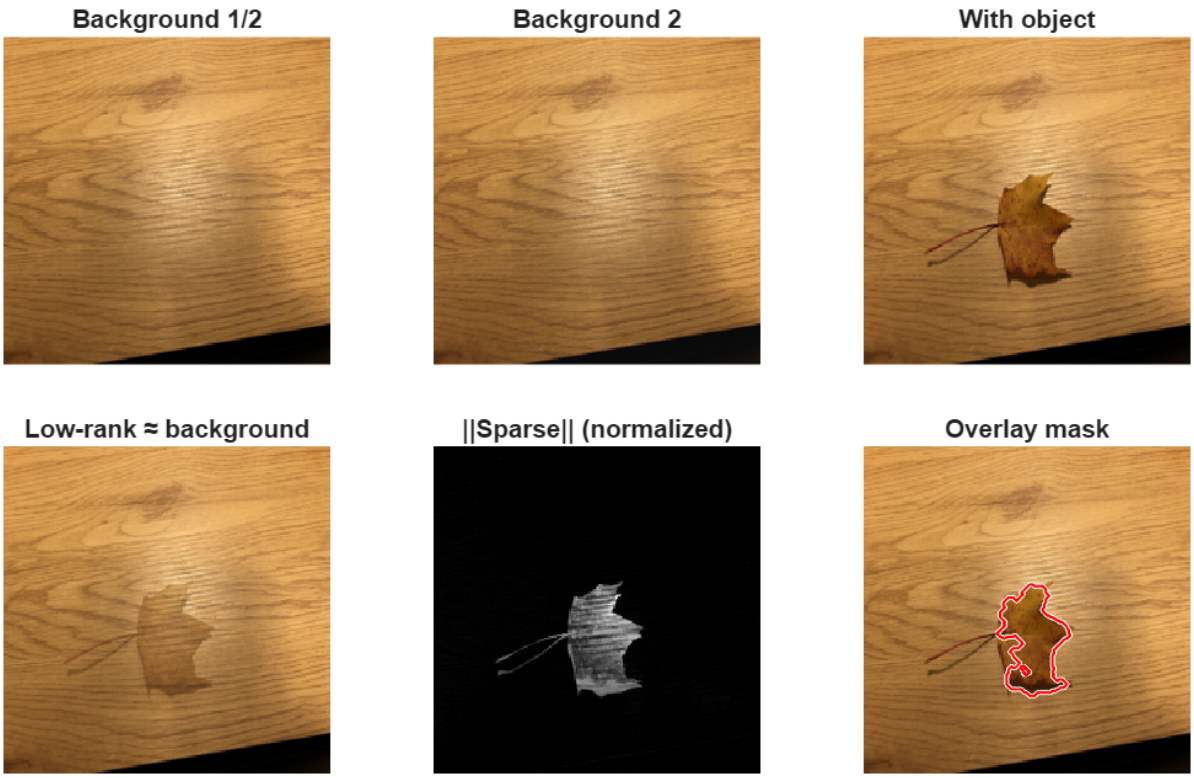

Figure 1: Robust PCA performed with an image size of 200x200 pixels and 100 iterations.