

# Homework 3

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Introduction to Signal and Image Processing

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## Contents

<b>1 Ransac</b>	<b>2</b>
1.1 Introduction . . . . .	2
1.2 Results . . . . .	3
<b>2 Texture Synthesis</b>	<b>5</b>
2.1 Introduction . . . . .	5

# 1 Ransac

## 1.1 Introduction

RANSAC (random sample consensus) is a rather simple algorithm designed to cope with a large proportion of outliers in input data. It is a resampling technique which generates different solutions by using the minimum number of data points required to estimate the underlying model parameters. Unlike other estimation techniques which use as much data as possible, RANSAC only uses the smallest possible set and proceeds to enlarge this set with consistent data points.

The algorithm can be broken down to 5 steps

1. Select randomly minimum number of points to determine the model parameters
2. Solve for the parameter of the model
3. Determine how many points from the set of all points fit with a predefined tolerance
4. If fraction of number of inliers over the total number points in the set exceed a predefined threshold, re-estimate model parameters using all identified inliers and terminate
5. Else, repeat steps 1 to 4 (N iterations)

The number of iterations should be chosen high to ensure that at least one set of random samples does not include any outliers.

## 1.2 Results

The following pictures are the results with the ransac algorithm. The used parameters are:

- Iterations = 500
- Threshold = 2
- n samples = 2

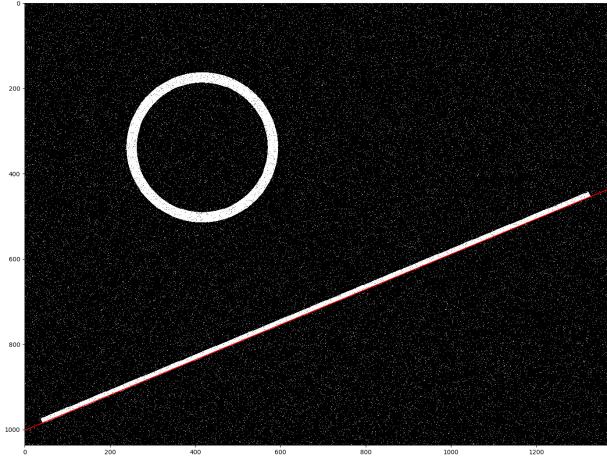


Figure 1: Found line aligns well with the only line in the picture



Figure 2: Found line aligns with inner edge of pool



Figure 3: Found line aligns with bottom part of bridge



Figure 4: Found line aligns with upper edge of the net

## 2 Texture Synthesis

### 2.1 Introduction

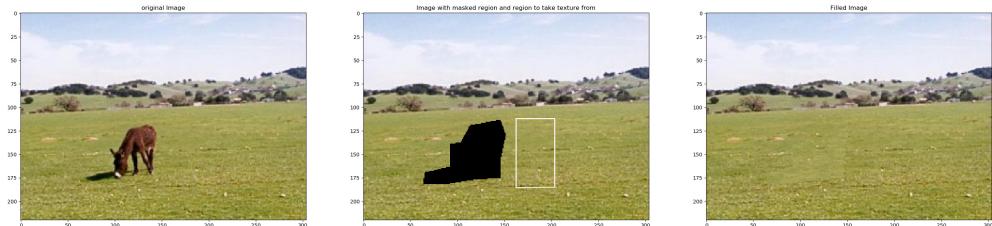


Figure 5: With patch of size 10