# Appearance-based object recognition using weighted longest increasing subsequence

Team AAG

#### Introduction

The authors of this paper propose a novel method to improve the performance of appearance-based object recognition.

The novel method proposed by them is weighted LIS, which has a very low computational cost.



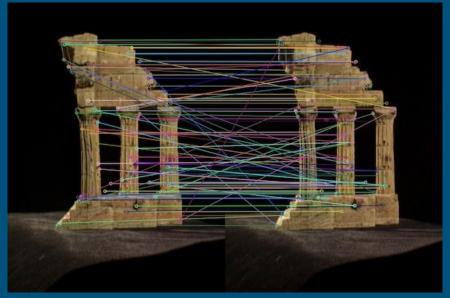




#### Motivation

The RANSAC Homography finds the best homography model for a set of keypoint pairs and rejects all keypoint matches that are not conforming to the found

homography.

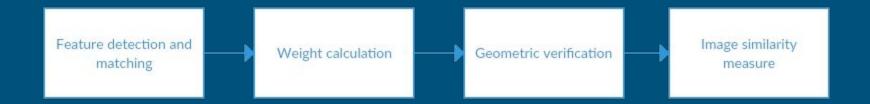


#### Motivation

#### Disadvantages of RANSAC

- 1. No upper bound on computation time
- 2. Limiting the number of iterations may generate bad results
- Performs poorly when the number of false keypoint matches out-numbers the number of true keypoint matches or when the number of keypoint matches is limited
- 4. Requires setting of problem-specific thresholds
- 5. Infeasible on mobile devices

# Overview (Main pipeline)



# Phase 1 - Feature detection and descriptors

SIFT

Can also use SURF instead of SIFT for detection and for descriptor generation.

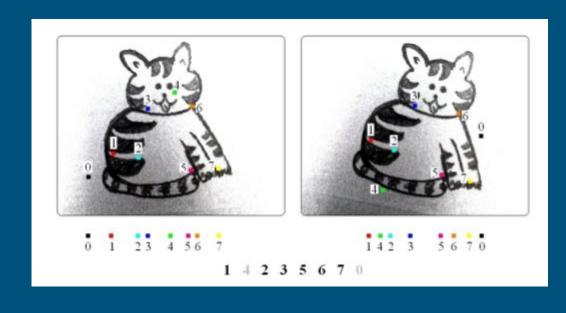


### Phase 2,3 - Weight calculation and Geometric Verification

$$w_i = 1 - d_1/d_2,$$

LIS is very fast.

Can be computed multiple times for rotation invariance.



# Phase 4 - Image Similarity Measure

f\_i is 1 for a consistent feature else 0

This is used to judge whether a pair of query and gallery images belong to the same class or object according to a selected threshold value.

$$S = \sum_{i} w_{i} f_{i},$$

## **Current Progress**

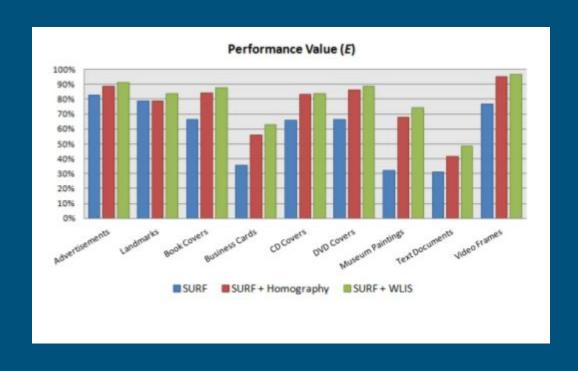
Implemented a simple recogniser utilising SIFT descriptors as well as LIS.





```
Rotating query_img
[ INFO:0] Initialize OpenCL runtime...
0 39
120 24
240 26
Rotating search_img
50 28
100 25
150 30
200 24
250 23
300 23
350 26
```

# Their results



# Their results

Datasets	Average Query Time (ms)		
	SURF	SURF+	SURF+
		Homography	WLIS
Advertisements	22.5	55.3	37.7
Landmarks	53.2	73.6	72.1

# Scope of implementation and improvements

- Will also look into current state of the art methods used in intermediate steps to improve the accuracies and computation cost and attempt to implement them. (Alternatives to KD trees, feature descriptors and WLIS itself)
- 2. Will also look into comparisons with only a subset of the gallery to speed up the computation.
- 3. Experiments to find the robustness of LIS with harder data. (Poor resolution, geometrically distorted, etc.)