

# Shape and Moment Invariants Local Descriptor for Structured Images

Elena Rangelova

*Netherlands eScience Centre  
Amsterdam, The Netherlands.*

## Abstract

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**Keywords:** image mathching, shape descriptors, moment invariants,

## 1 Introduction

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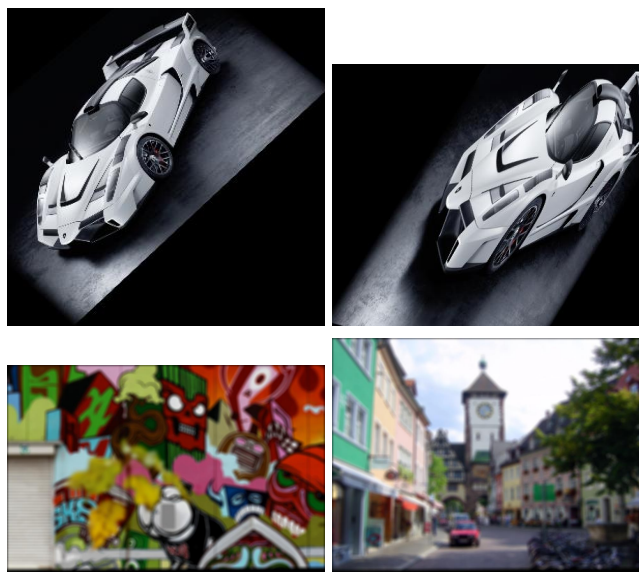


Figure 1: “Is it the same object or scene?” Matching two images under different transformation using local interest regions detected by MSER.

*Top image pair* (scale and viewpoint): SURF descriptor yields false negative (similarity score 0.096), while the proposed SMI descriptor - true positive (0.89).

*Bottom image pair (blur):* SURF gives false positive (0.27), while SMI - true negative (-0.11).

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## 2 Related Work

## 2.1 Salient region detectors

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Figure 2 shows individual colour channels.



Figure 2: A figure

## 2.2 Region descriptors

### State of the art in region descriptor

### 3 Image matching with Shape and Moment Invariant descriptor

### 3.1 Simple shape invariants

### 3.2 Moment invariants

Consider the variable  $x \in \mathbb{R}$ ,

$$f(x) = x^2 + 2 \quad (1)$$

Equation (1) is a polynomial of order 2.

### 3.3 Matching

**My Paragraph:** This is a paragraph.

## 4 Performance Evaluation

### 4.1 VGG dataset

The performance results on the VGG dataset are summarized in Table 1.

Det. + descr.	TP	TN	FP	FN	Acc.	Prec.	Recall
MSER + SURF	128	428	4	16	0.965	0.969	0.889
MSER + <b>SMI</b>	122	430	2	22	0.958	0.98	0.847
BIN + SURF	122	426	6	22	0.951	0.953	0.847
BIN (All) + <b>SMI</b>	84	432	0	60	0.89	1	0.58
BIN (Largest) + <b>SMI</b>	112	424	8	32	0.93	0.93	0.77

Table 1: Performance of salient region detectors and descriptors on the VGG dataset.

## 4.2 OxFrei dataset

The performance results on the VGG dataset are summarized in Table 2.

Det. + descr.	TP	TN	FP	FN	Acc.	Prec.	Recall
MSER + SURF	TP	TN	FP	FN	Acc.	Prec.	Recall
MSER + <b>SMI</b>	TP	TN	FP	FN	Acc.	Prec.	Recall
BIN + SURF	TP	TN	FP	FN	Acc.	Prec.	Recall
BIN (All) + <b>SMI</b>	TP	TN	FP	FN	Acc.	Prec.	Recall
BIN (Largest) + <b>SMI</b>	TP	TN	FP	FN	Acc.	Prec.	Recall

Table 2: Performance of salient region detectors and descriptors on the OxFrei dataset.

## 5 Conclusion

### A VGG dataset matching results

### B OxFrei dataset matching results

## References

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