A proof of concept for aligning sketches to their corresponding painting

Author: Marit Radder (m.e.radder@student.tudelft.nl)
Supervisors: Ruben Wiersma, Ricardo Marroquim, Elmar Eisemann

1. Background

Aligning sketches to their paintings could give us more insight into the creative flow of the artist

Conover et al. uses craquelure to extract keypoints [1]

Craquelure is not present in sketches

2. Research questions

Is it possible to register sketches to paintings? And what **image registration methods** can be implemented to align sketches to their corresponding painting?

3. Method

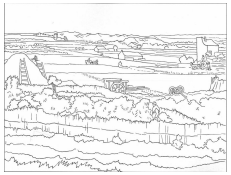


fig 1: simplistic outlines of De oogst (sketch

fig 2: simplistic outlines of De oogst colored in (painting)

TIN edge detection

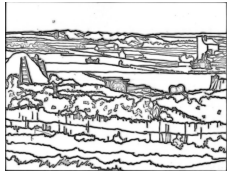


fig 3: found edges of the "sketch"

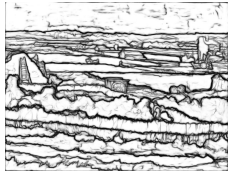
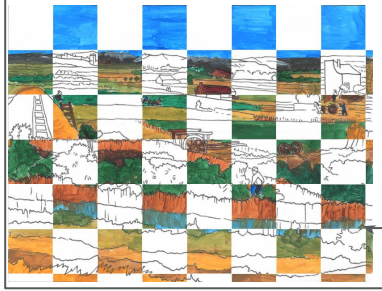


fig 4: found edges of the "painting"

fig 5: stitch between transformed sketch and painting



1. Manual ROI annotation
2. Feature description using Gradient Field of Histograms of Orientations
3. Brute force matching
4. Get transformation by taking average translation of ROI
5. Apply transformation
6. Cross-correlation for exact translation
7. Apply cross-correlation transform

4. Results

Amount of ROI	Amount of overlap
1	0,607
2	0,639
4	0,684
8	0,629
16	0,652

Accuracy	Precision
1	1
1	0,8571428571
1	0,75
0,8571428571	0,495
0,8307142857	0,3577142857

ROI size	Amount of overlap
32	0,666
64	0,684
128	0,66
256	0,654

Accuracy	Precision
0,8928571429	0,6662857143
1	0,75
0,9642857143	0,7257142857
0,8571428571	0,559

Bin size	Amount of overlap
2	0,674
4	0,676
8	0,684
16	0,686

Accuracy	Precision
0,8928571429	0,631
0,8928571429	0,7014285714
1	0,75
0,9285714286	0,6771428571

Manual alignment	Amount of overlap
	0,698

With cross-correlation	Without
0,684	0,679

5. Conclusion

It is possible to register sketches to paintings, does not outperform manual alignment.

Using TIN, 4 ROI of 64 x 64 pixels and 8 orientation bins

The use of cross-correlation is ineffective

References:

[1] D. M. Conover, J. K. Delaney, and M. H. Loew, "Automatic registration and mosaicking of technical images of old master paintings," *Applied Physics* A, vol. 119, pp. 1567–1575, 6 2015.