

Scale invariant image registration in the domain of art conservation

1. Introduction

- Image registration has wide applicability for art conservators.
- Existing solutions often lack a common feature - scale invariance

2. Motivation

- Phase correlation is highly dependent on size
- Traditional unimodal approaches do not always perform optimally
- Manual rescaling is costly and error-prone when dealing with large number of images

3. Goal

- Find the correct size of the template image relative to a reference with at most 5% deviation from the optimal value



Figure 1: Visual representation of cross-correlation of cuboids

4. Method

- Given a scale factor, downscale and upscale the template image
- Build 3 cuboids out of the upscaled/downscaled/unchanged template images and 1 from the given reference image
- Cross-correlate the 3 template cuboids with the reference cuboid
- Update the template image to the template with the highest peak
- Repeat this a given number of times before moving to the next scale factor.

5. Results

- The algorithm estimated images from 4 different modalities with an average margin of error of 2.27%
- Table 1 shows the individual results obtained in different modalities

Modality	MoE
grayscale	1.282
ultraviolet	5.458
false color fluorescence	1.445
raking light	0.896

Table 1: Experiments with 4 different image modalities

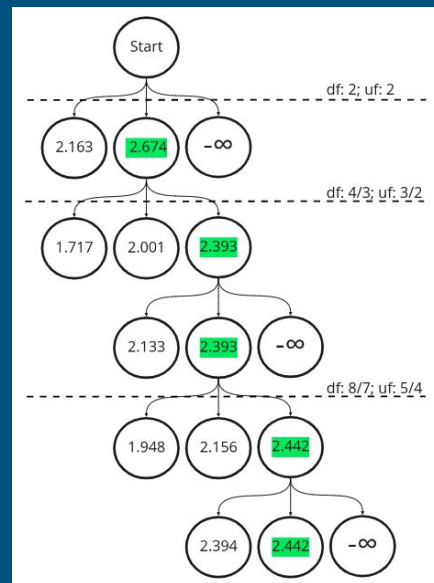


Figure 2: Tree structure of the process the algorithm undergoes

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