ESTIMATING IMAGE DISTORTIONS FOR MIRROR ANAMORPHOSES USING SAMPLED POINT DISPLACEMENTS

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1. PROBLEM DESCRIPTION

Figure: Anamophic art by István Orosz

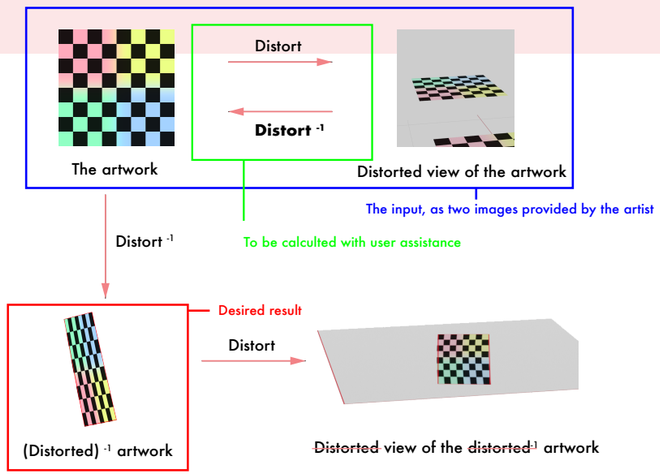
- **Mirror anamorphosis:** the distorted view of an artwork using a reflective object
- The artwork is designed for the distorted view to form a recognizable image
- It is difficult for artists to resolve the correct distortions while creating the artwork

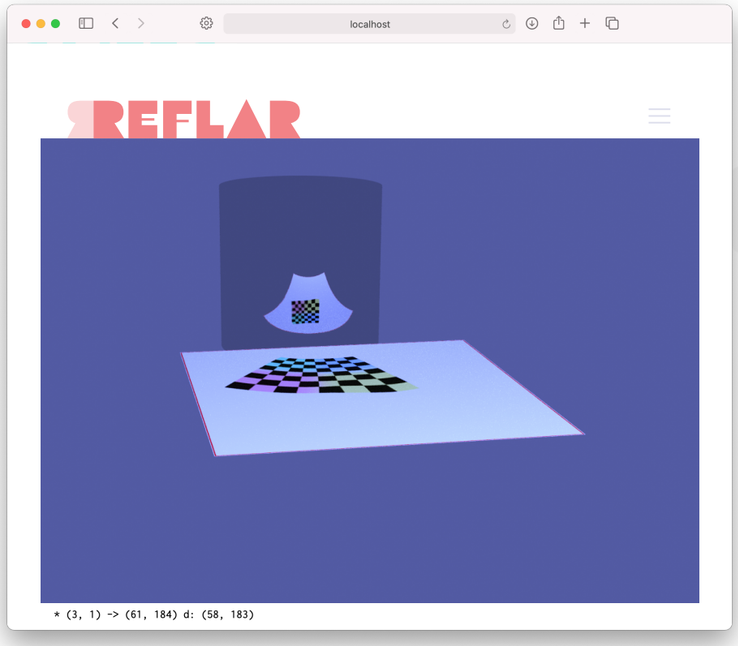
2. GOAL

"Calculating mappings between artworks and their distorted view with minimum user assistance."

Q: Why? A: To enable artists to directly design the distorted view, while a computer resolves the correct distortions

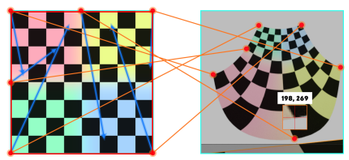
Q: How? A: Using just two images and an interface





3. METHOD

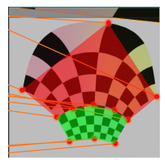
- An interface will be built in which a user can sample point displacements to create a partial mapping



- An algorithm will be used for estimating the **full mapping**.

  → 4. ALGORITHMS

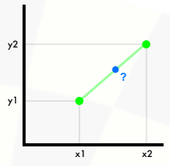
- By calculating (regional) confidence values, the interface can guide the user to sample more point displacements

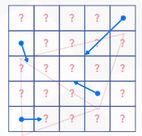


- The user will be able to improve the mapping by iteratively reviewing results and sampling more points

4. ALGORITHMS

Interpolation: estimating values between known data points





... for two dimensions?

... for scattered data?

=> creating a polygonal surface

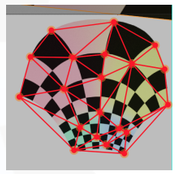
The 3 levels: nearest neighbor vs. linear vs. cubic

Curves: can we do better than cubic?

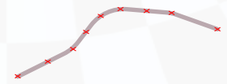
=> splines, radial basis function

Confidence: what/how to compare?

=> image similarity & subdivision surface



User errors: data fitting vs. data interpolation?



5. RESULTS

Nearest neighbor: unpractical

Linear: Best for planar mirrors

Cubic: Best for (slightly) curved mirrors with irregularities

RBF interpolation: Best for advances curvatures with small irregularities

Splines: Best for advances curvatures with no irregularities

=> The better at estimating advanced curvatures, the less flexible for irregularities

Data fitting cannot properly distinguish between irregularities and user errors.

=> User interface design & user responsibility

=> **Sweet spot:** Iteratively 'trying' multiple methods, choose result with highest confidence