
Framework
for
Quantitative Analysis
of
Scripts
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Quantitative Analysis (of Scripts!)

- ✓ Application in Digital Paleographic methods to differentiate hands/scribes
- ✓ Scripts require this for further analysis and comparison

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Framework

- ✓ Spline Conversion
  - ✓ Converting characters to mathematical splines
- ✓ Reconstruct Trajectory
  - ✓ Recover kinematic information
- ✓ Stroke Segmentation
  - ✓ Break character into basic strokes
- ✓ Calculate Metrics

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Spline Conversion

- ✓ The characters are represented as B-splines
- ✓ They are very efficient in preserving the shape and curvature of glyphic segments
- ✓ They can be manipulated without significant effort & eases analysis

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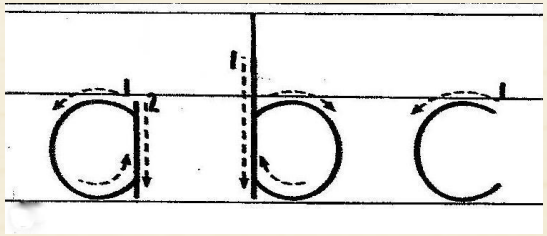
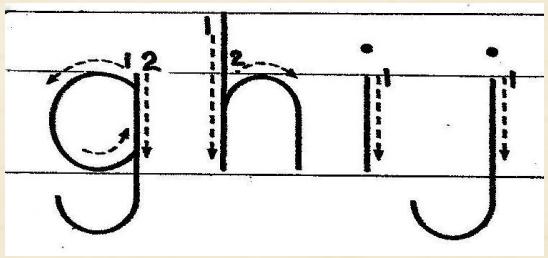
Trajectory Reconstruction



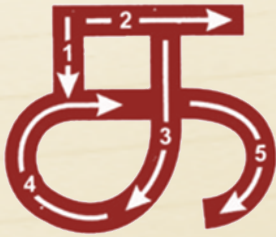


The trajectory of the character also allows several additional features to be computed

Trajectory Reconstruction

By applying a set of heuristics on the static shape of the character, the trajectory can be obtained

Map → Graph Generate → Eülerian paths Evaluate & Rank →



Global Heuristics

Length minimization

Curvature minimization

Direction of writing

Starting and ending points

And other script level heuristics

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Stroke Segmentation

Predicting major "landmark points" in a glyph that are crucial to the shape/ formation of the glyph

The character is broken down to primitive strokes.

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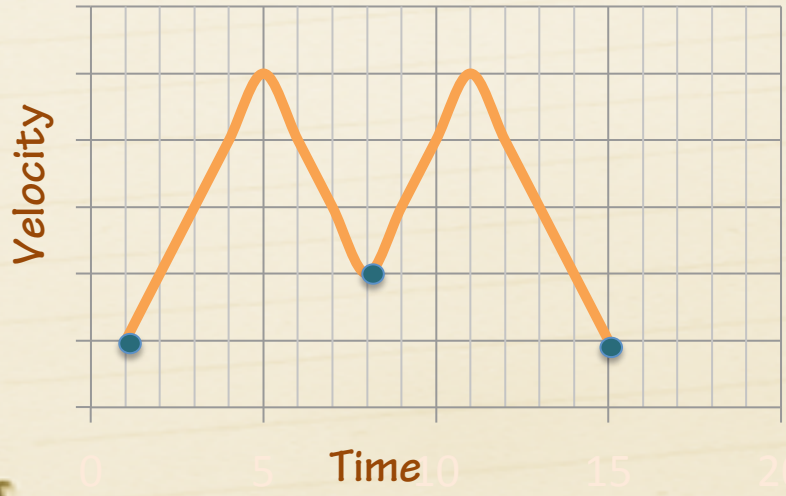
Method for Segmentation



Extreme Curvature Points

Pen Lift points

Disjoint Points

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Deriving Metrics

Static Metrics

Average Curvature, Openness, Compactness, Number of Crossings..

Production Metrics

Pen Lifts, Velocity Inversions, Retraces.

Stroke Metrics

Stroke Ratio, Initial Angle, Inter-stroke angles...

And.. Others...

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Why Stroke-derived Metrics ?

- ✓ They are natural than pixel based metrics
  - ✓ Writing is made up strokes
    - Upstrokes & Downstrokes
- ✓ These metrics define the characters better
- ✓ The metrics possess qualitative significance

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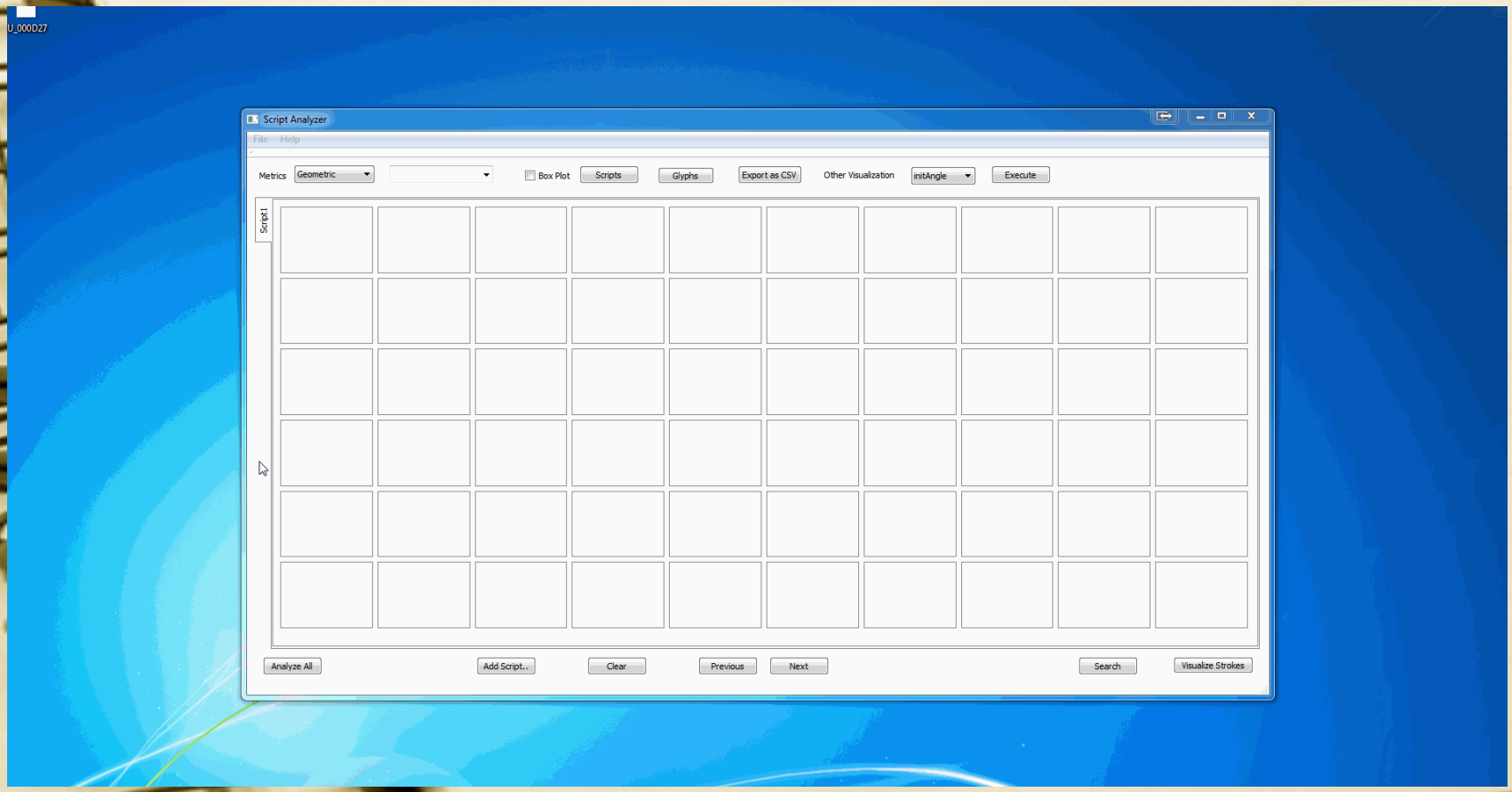
Prototype Implementation



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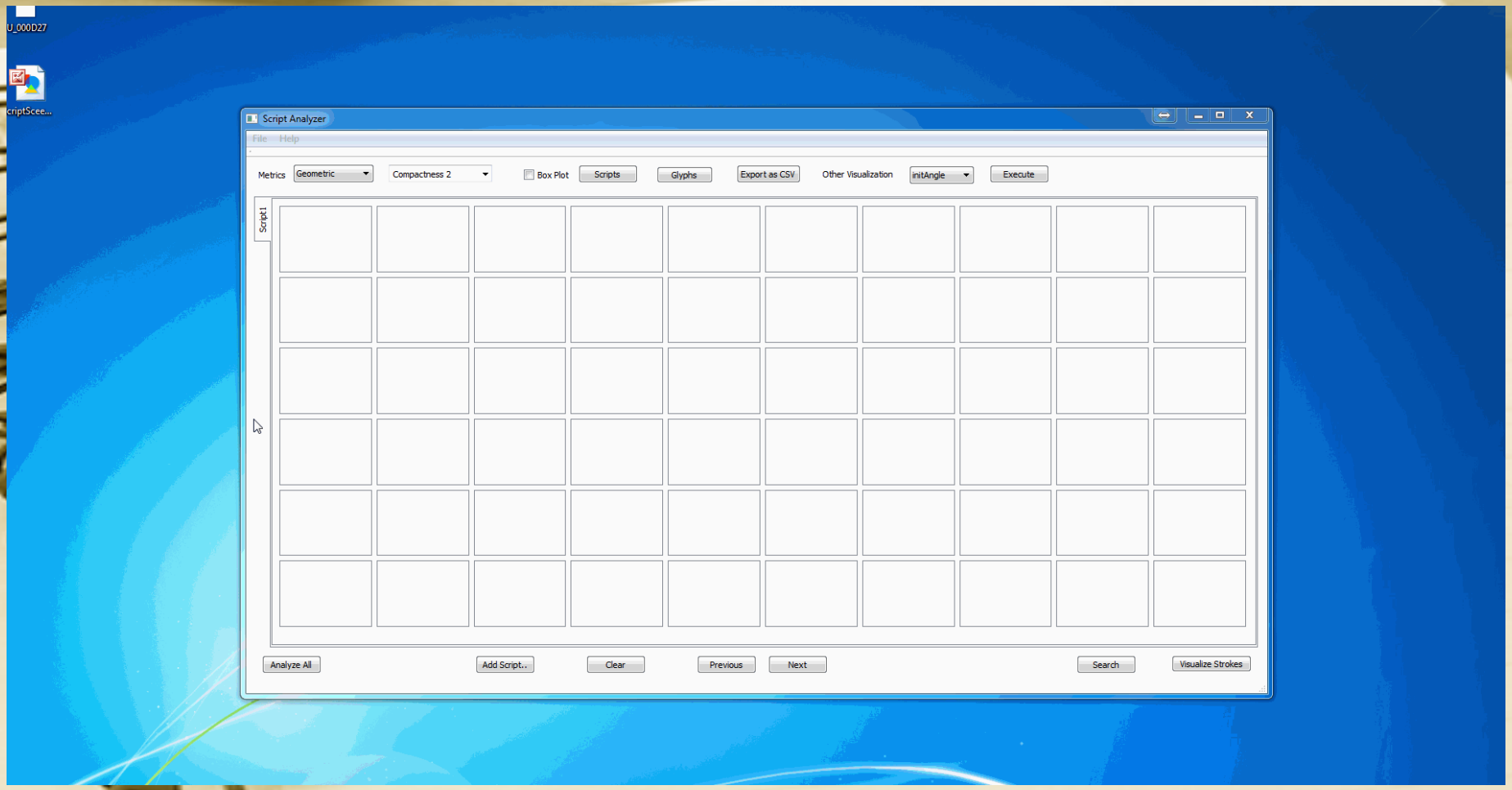

If you would like to try out the prototype system, drop in a request to vrs3@st-andrews.ac.uk

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