Framework for Quantitative Analysis of Scripts

VINODH RAJAN
vrs3@st-andrews.ac.uk
PhD Student
Computer Science
Quantitative Analysis
(of Scripts!)

✓ Application in Digital Paleographic methods to differentiate hands/scribes

✓ Scripts require this for further analysis and comparison
Framework

✓ Spline Conversion
  ✓ Converting characters to mathematical splines

✓ Reconstruct Trajectory
  ✓ Recover kinematic information

✓ Stroke Segmentation
  ✓ Break character into basic strokes

✓ Calculate Metrics
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
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.

Global Heuristics
Length minimization
Curvature minimization
Direction of writing
Starting and ending points
And other script level heuristics
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.
Method for Segmentation

Extreme Curvature Points
Pen Lift points
Disjoint Points
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...
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
Prototype Implementation
If you would like to try out the prototype system, drop in a request to vrs3@st-andrews.ac.uk