



Intelligent Pen

A LEAST-COST SEARCH APPROACH TO HISTORICAL DOCUMENT
IMAGE SEGMENTATION AND STROKE EXTRACTION

The Goal

Online



Offline

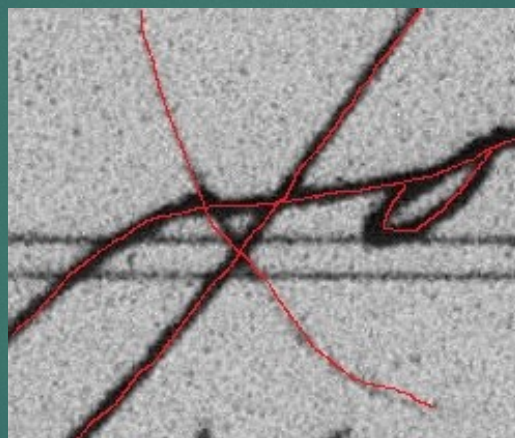


Challenges in Line Following

Gaps

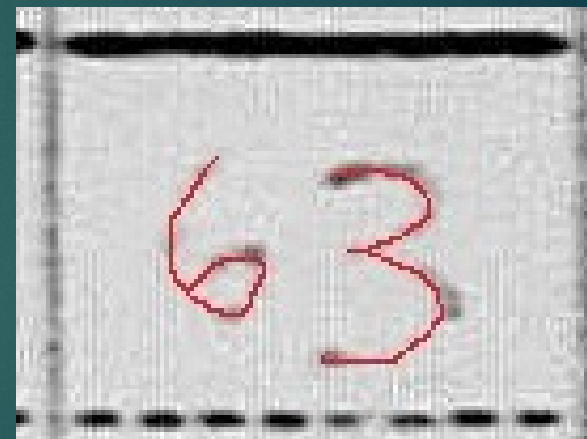


Noise



Ascenders and Descenders

Low Contrast



What's Been Done

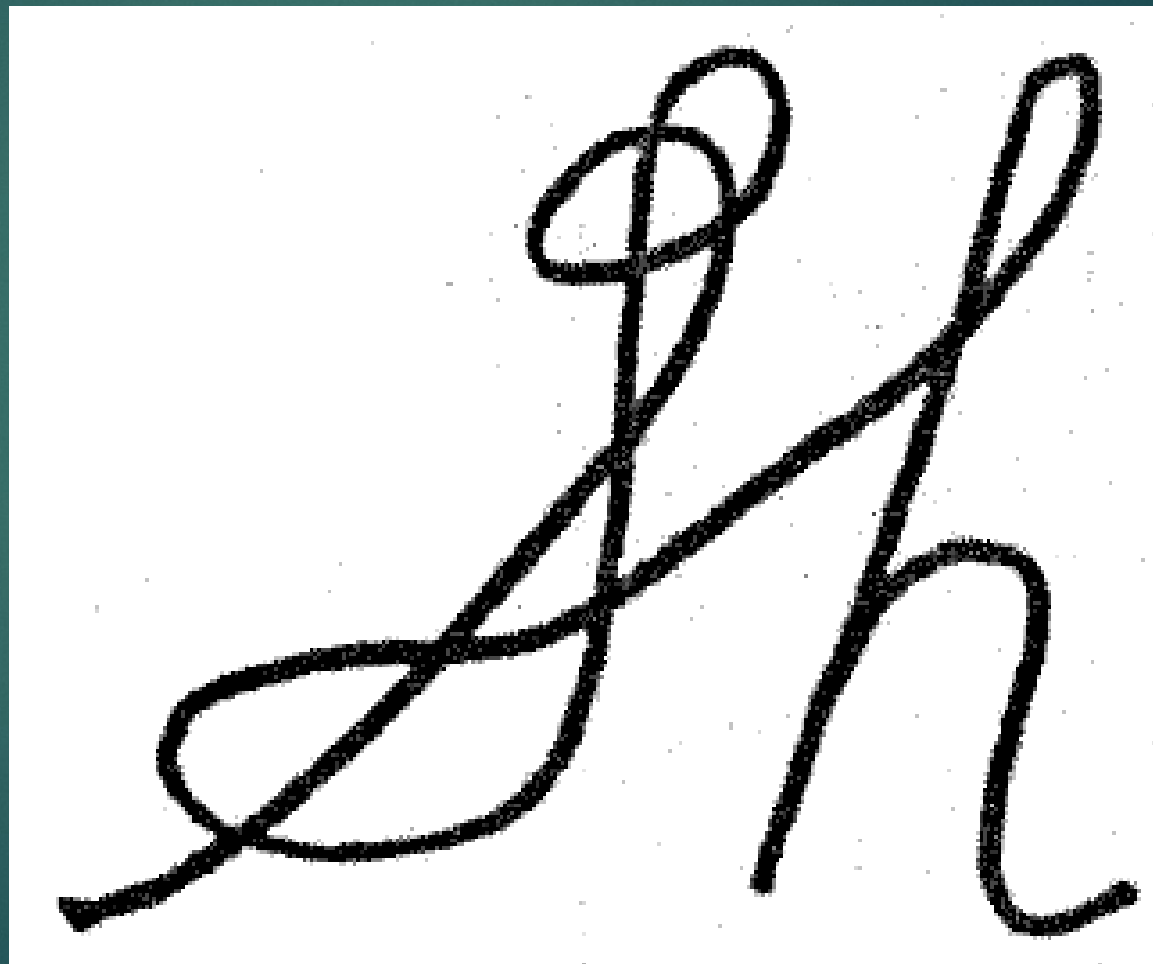
Original



Skeleton



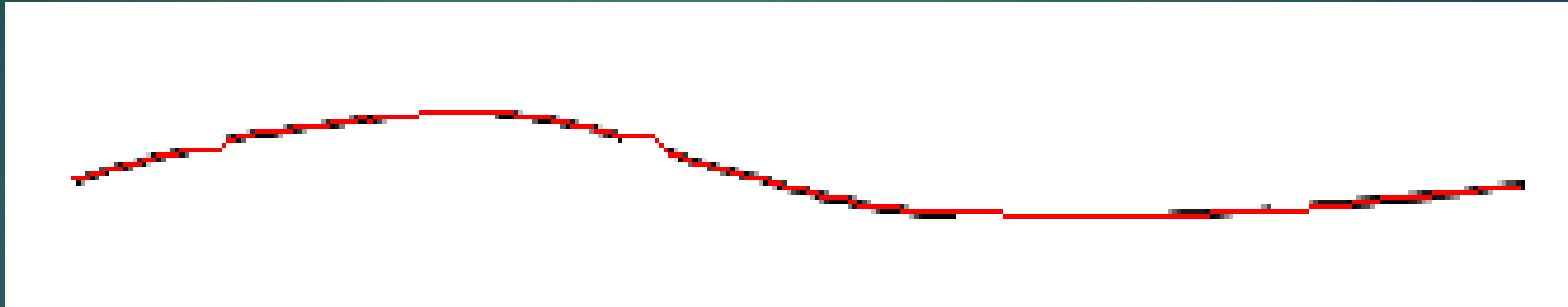
Graph



Shortest Path - Demo



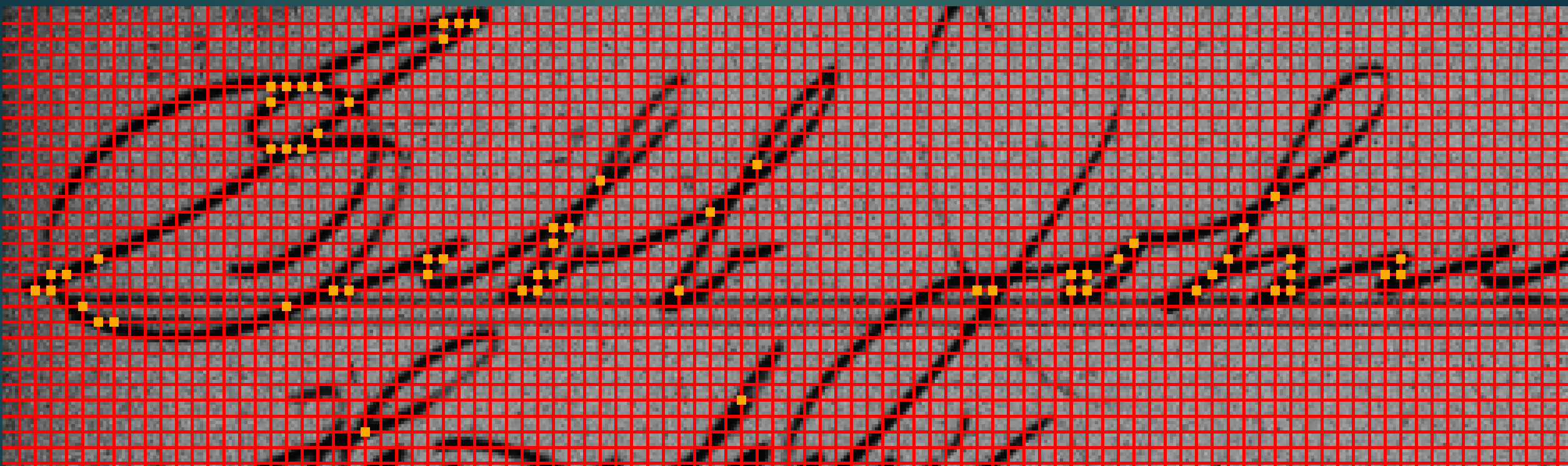
Shortest Path



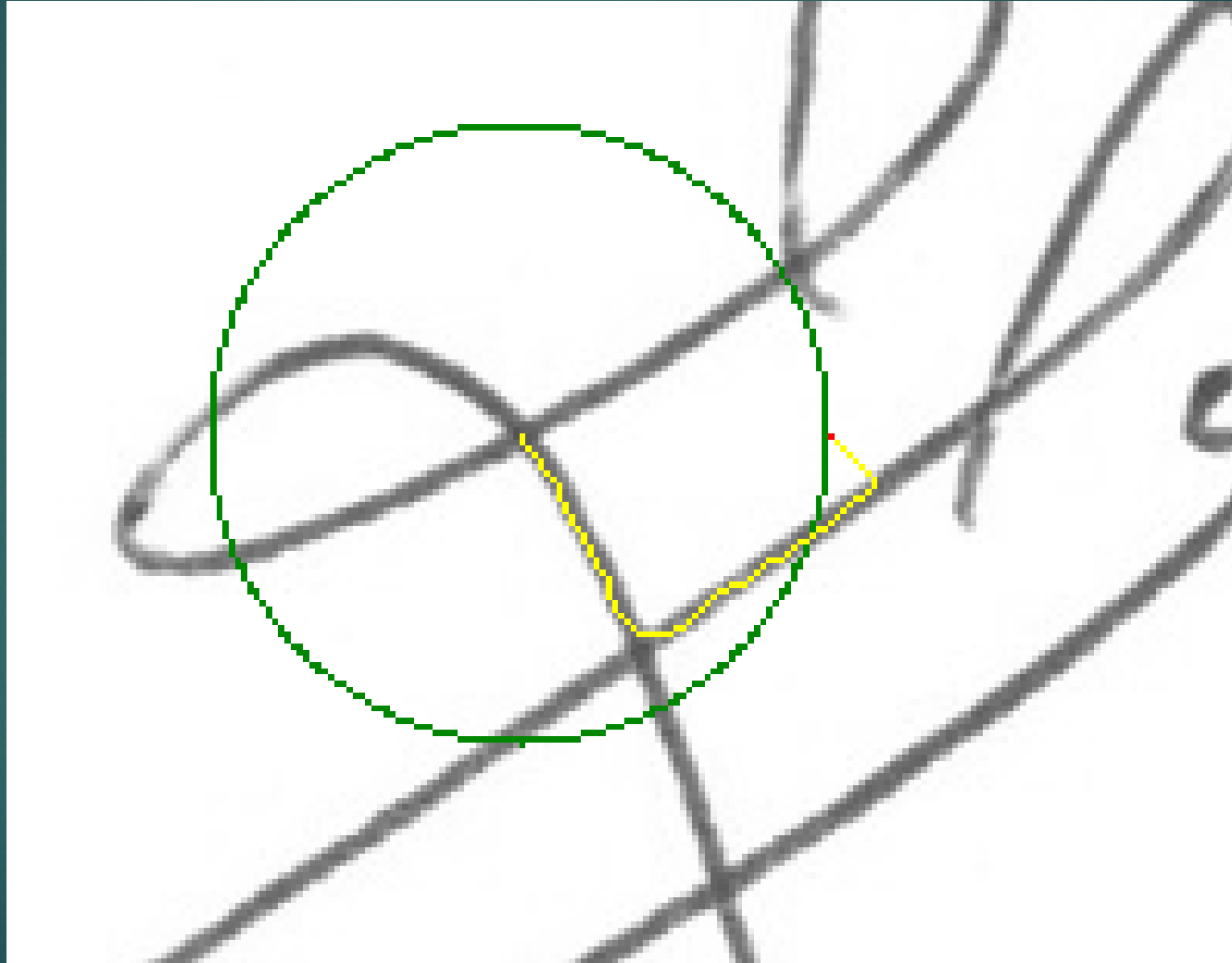
Method Overview

- ▶ Identify starting points
- ▶ Perform graph search to identify paths
- ▶ Combine overlapping paths into consensus paths
- ▶ Use consensus paths to determine new start points
- ▶ Repeat until no start points remain

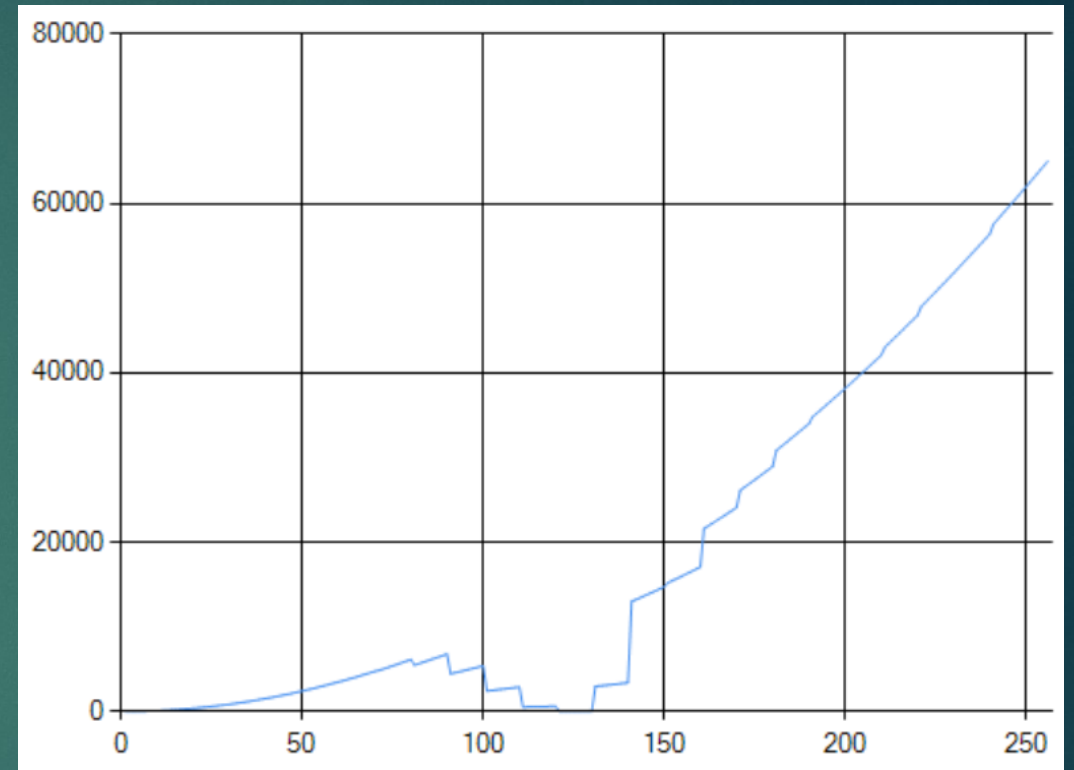
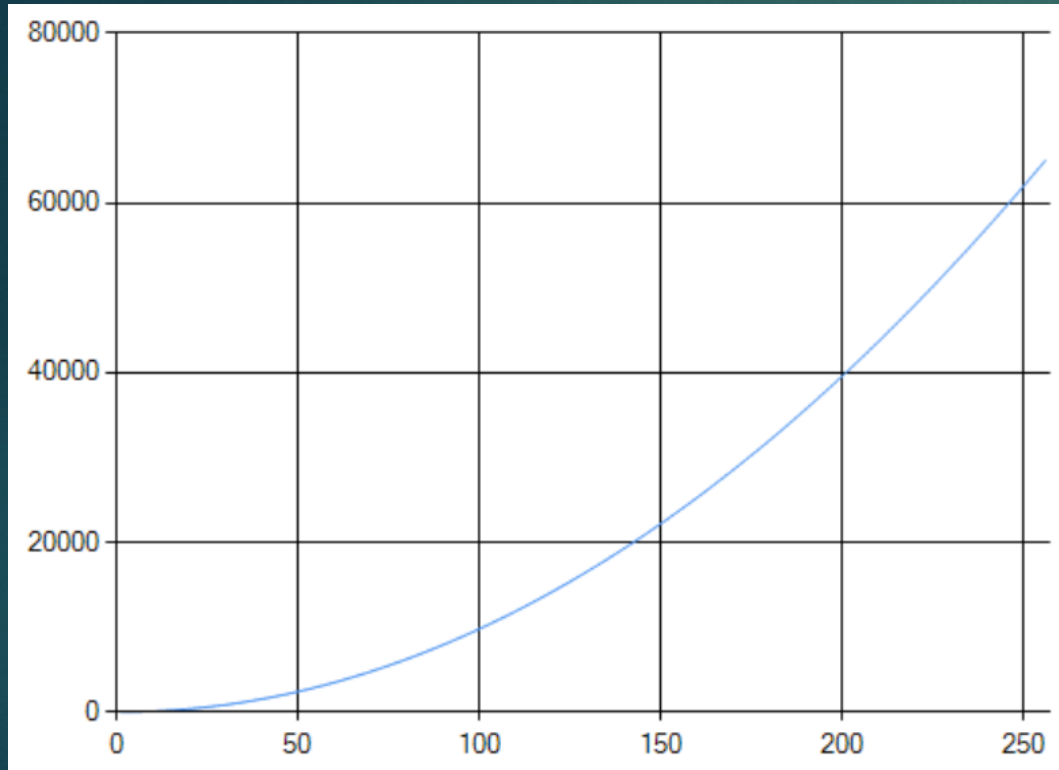
Finding Starting Points



Consensus



Cost Map Training



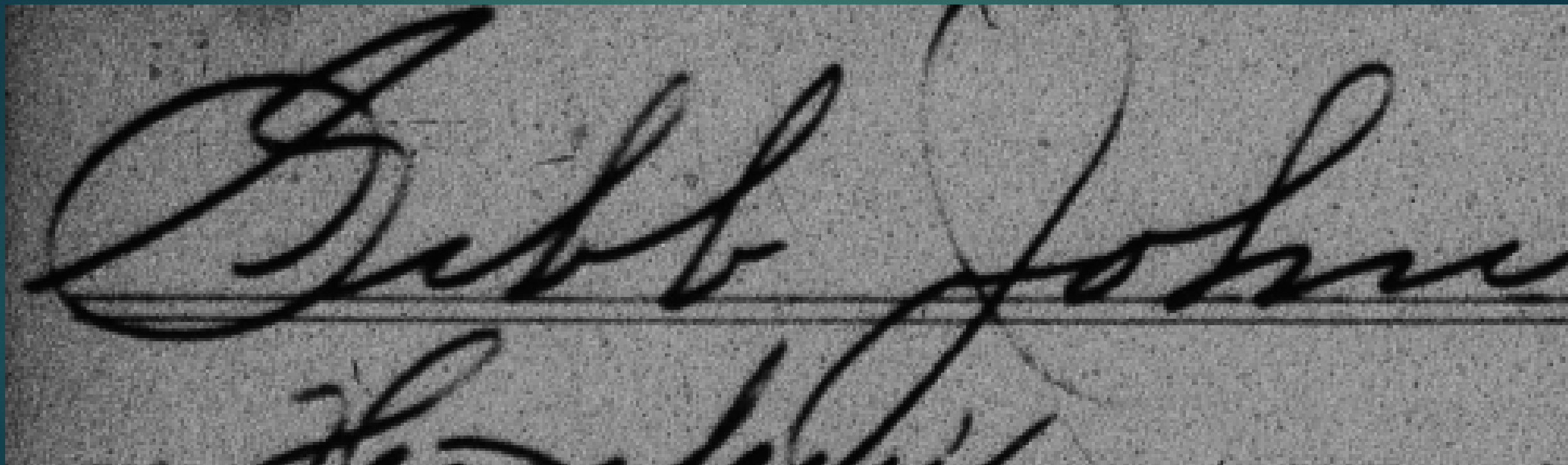
Results – ICDAR Stroke Extraction



Results – ICDAR Stroke Extraction



Results – FamilySearch Images

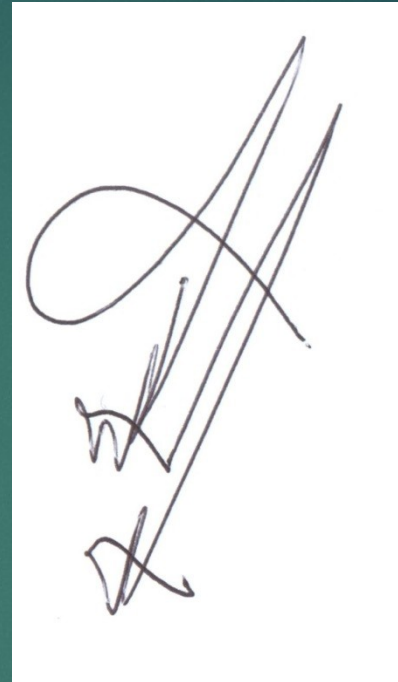
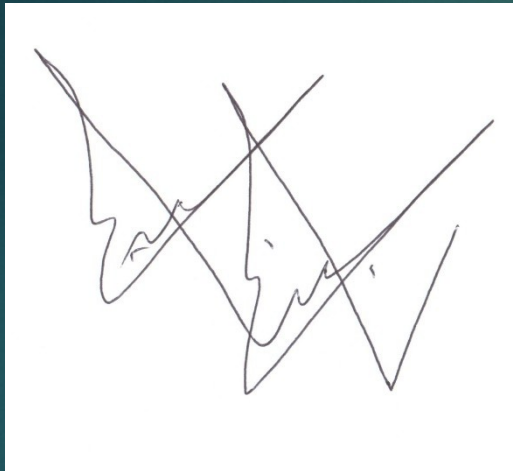


Results – George Washington's Signature



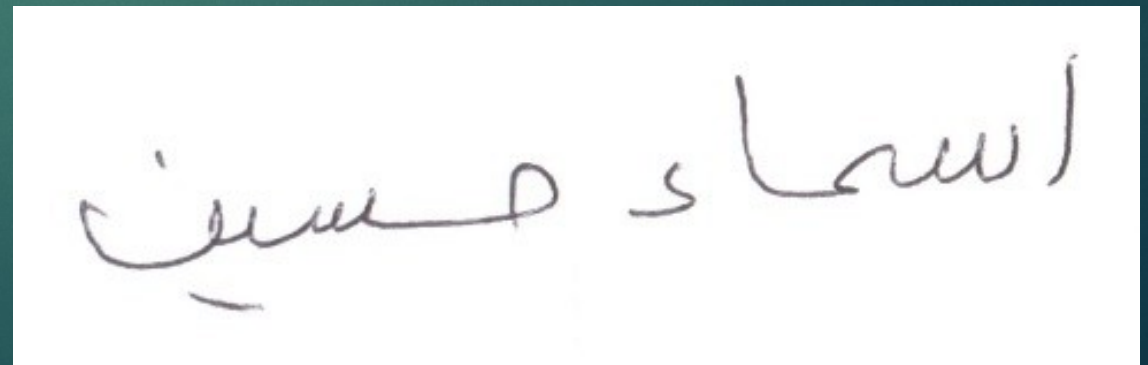
A handwritten signature in red ink, reading "George Washington". The signature is written in a cursive style, with the first name "George" and the last name "Washington" clearly legible. The ink is a vibrant red, and the signature is set against a white background.

Future Work



Stroke Recovery from Offline
Data

Ground Truthed



Future Work

or John St.
Gibbons, John

Gibson, Jonathan
2d
Kentucky Infantry

German, Thomas

Gibson, Joseph

Family Search Name Dataset
No stroke ground truth, but have transcription