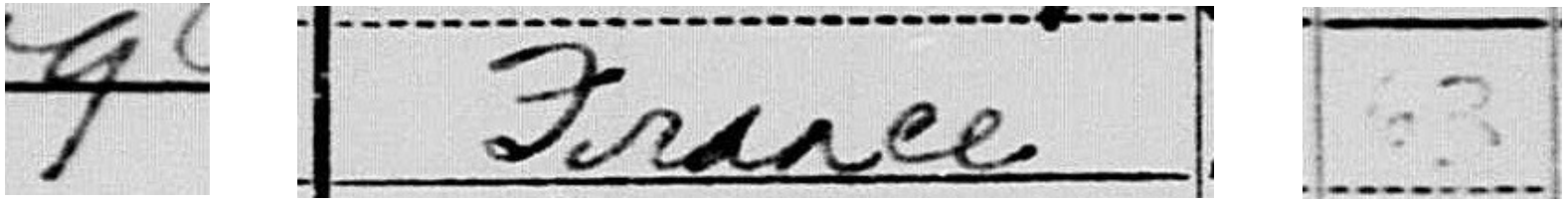
Intelligent Pen

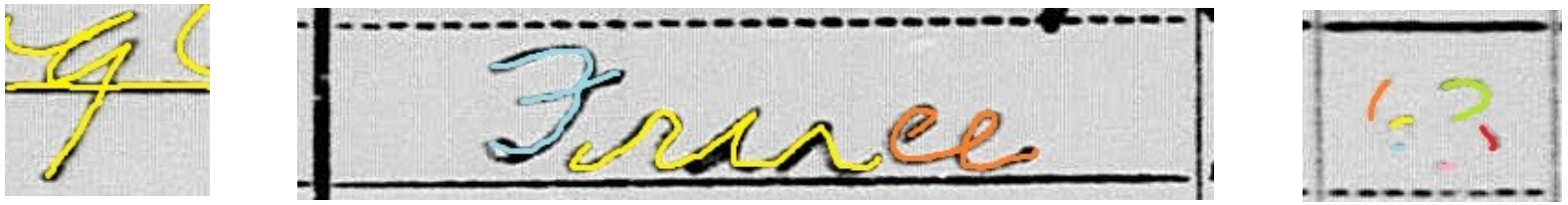
A Least-Cost Search Approach to Historical Document Image Segmentation and Stroke Extraction

Challenges

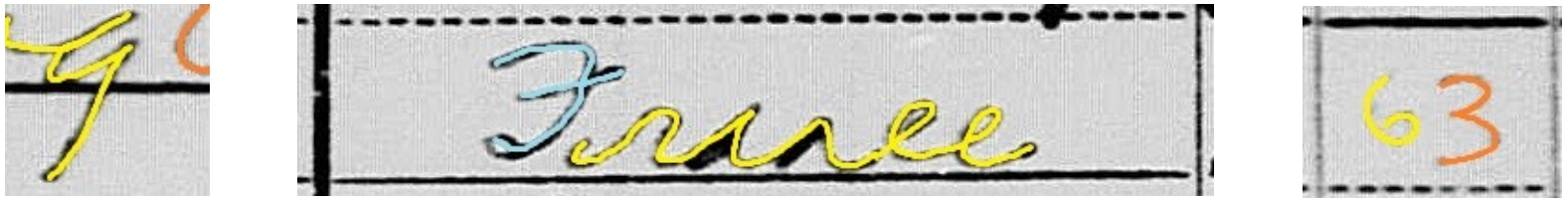
Original:



Current Methods:



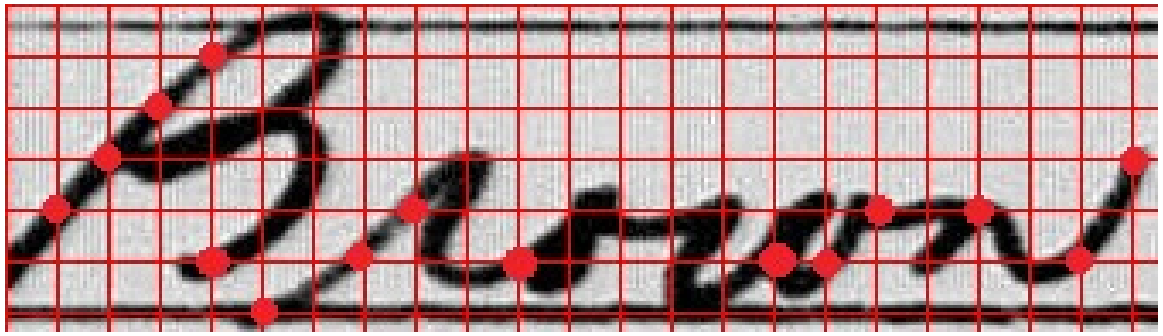
Goal:



Method Overview

- Identify starting points
- Perform graph search to identify paths
- Combine overlapping paths into consensus paths
- Merge adjacent consensus paths into trace-lines

Finding Starting Points



Cost Function

$$C(p) = w_i f_i + w_d f_d + w_t f_t + w_l f_l + w_O f_O + w_v f_v$$

f_i: Pixel Intensity

: Pixel Intensity

f_d: Change in direction

: Change in direction

f_t: Change in line thickness

: Change in line thickness

f_l: Is the pixel on a form line?

: Is the pixel on a form line?

f_O: Distance to the nearest form line (if outside cell bounds)

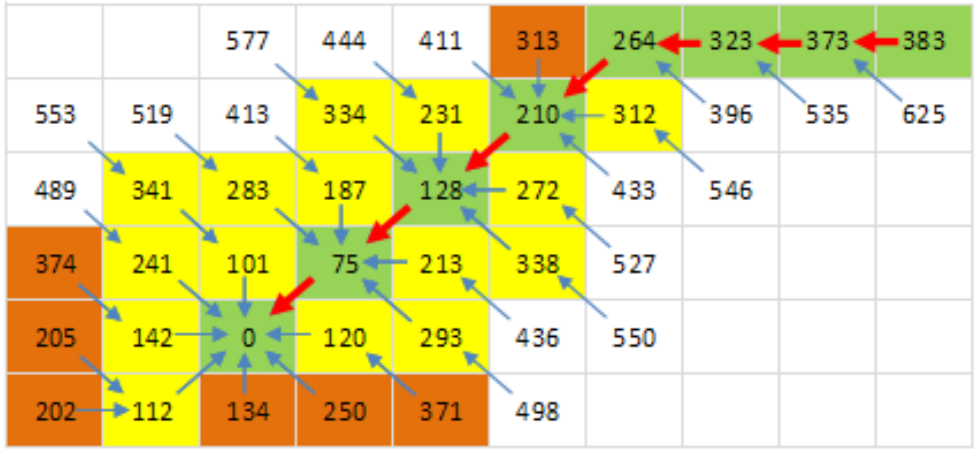
: Distance to the nearest form line (if outside cell bounds)

f_v: Has the pixel already been visited?

: Has the pixel already been visited?

Graph Search Function

102	113	243	213	201	103	54	59	50	10
212	236	226	206	103	82	102	132	212	252
248	240	208	112	53	144	223	234	219	213
232	241	101	75	138	210	255	244	219	208
205	142	91	120	218	223	212	248	207	254
202	112	134	250	251	205	216	240	232	230



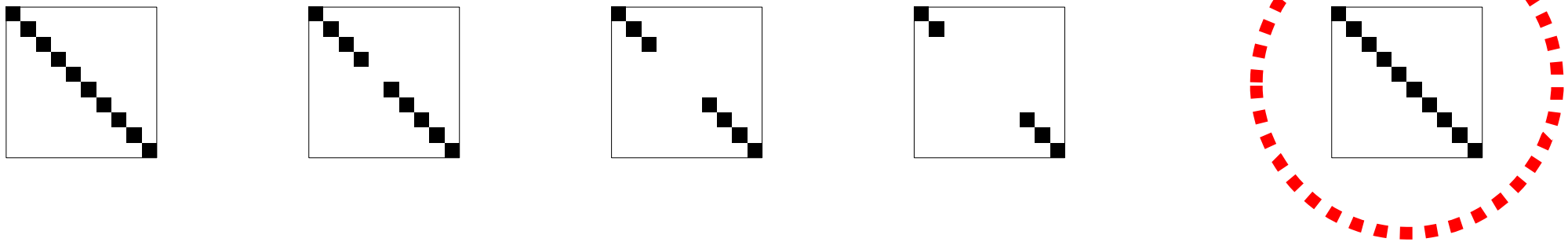
$$C(p) = w_i f_i + w_d f_d + w_t f_t + w_l f_l + w_O f_O + w_v f_v$$

Radial Search and Consensus

Radial Search and Consensus

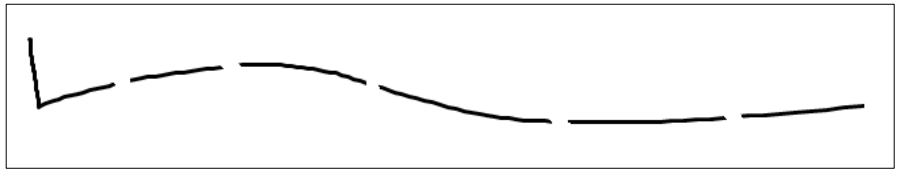
Initial Results

- How would a skeleton method handle a diagonal line?
- How about a gap?
- What about a wider gap?
- What do we want it to do?

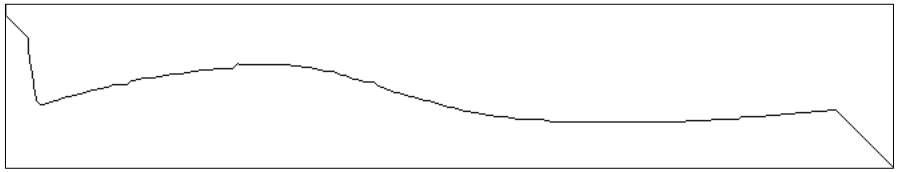


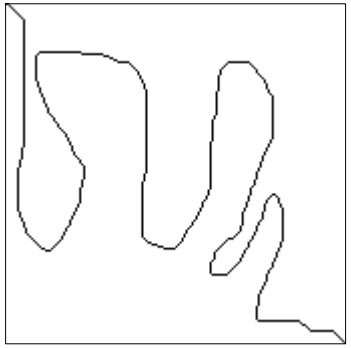
Initial Results

Original Image



Optimal Path





So can it read George Washington’s Signature?

… Not quite yet.

Questions?


NOT SURE IF GOOD PRESENTATION CONTENT
OR JUST FANCY POWERPOINT ANIMATIONS