



HIEROGLYPH READING SYSTEM USING SCIKIT-IMAGE

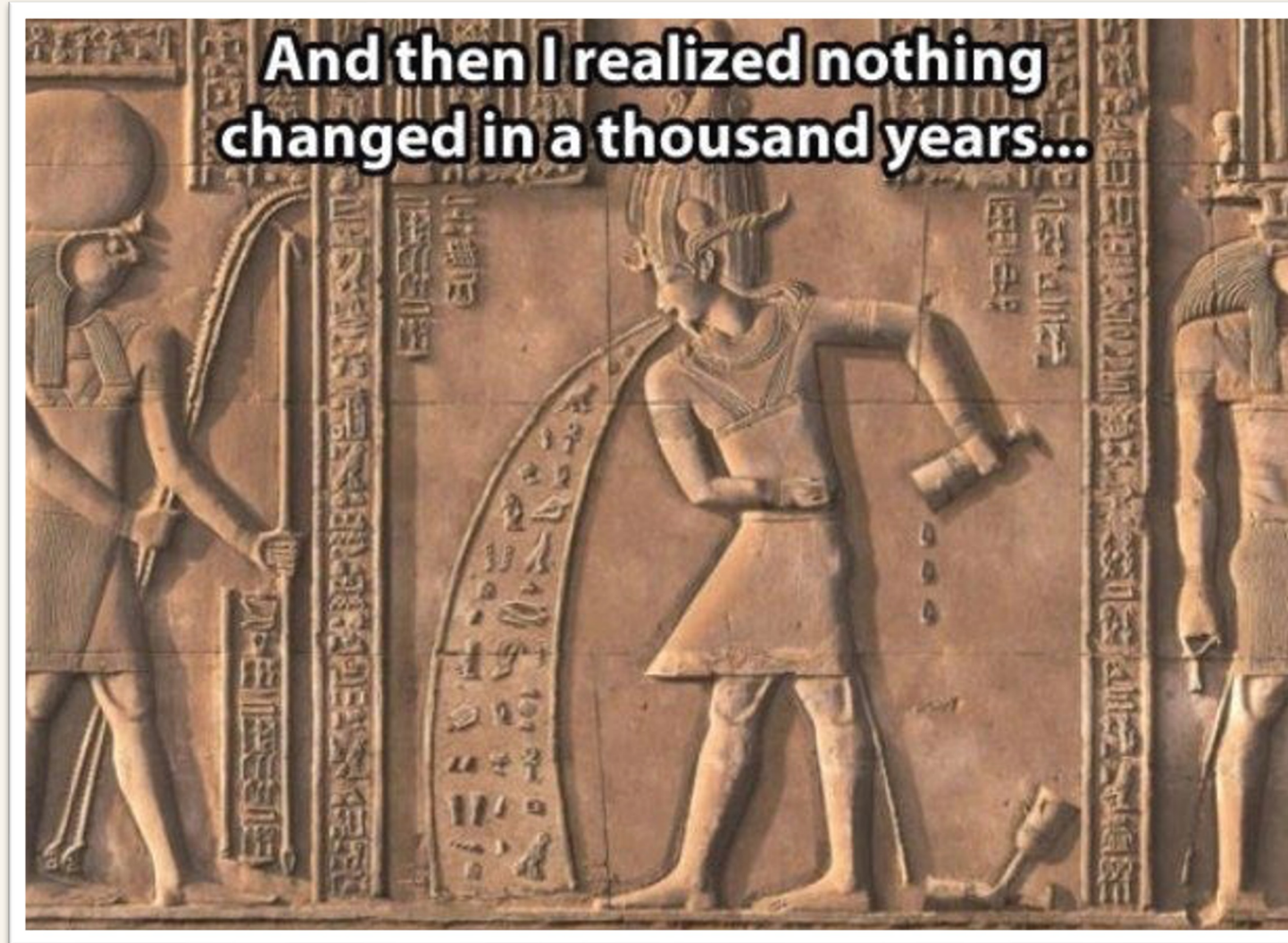
Rolfis Ramses Solano Mendez

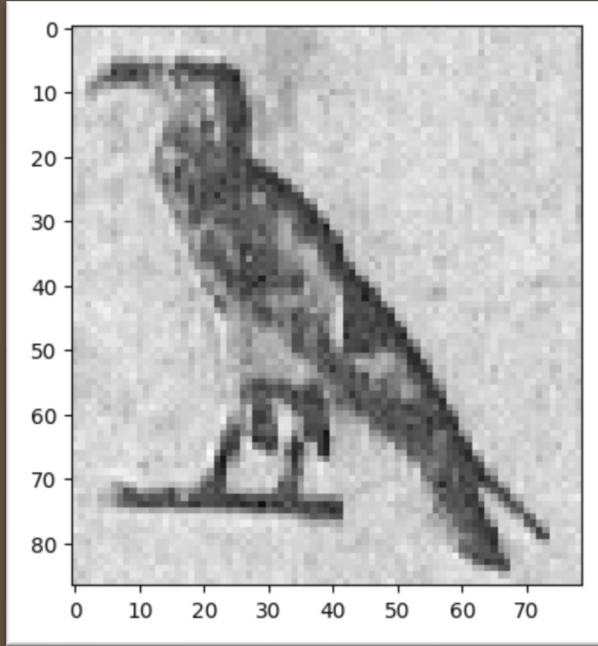
Paula Mosquera Del Río

AGENDA

1. DOMAIN
2. PROJECT DESCRIPTION
3. IMAGE PROCESSING AND FEATURE EXTRACTION
4. CLASSIFICATION
5. TRANSLITERATION AND TRANSLATION
6. CONCLUSION

HIEROGLYPHS





PROJECT DESCRIPTION

- Develop a system to recognize Egyptian hieroglyphs in images
- Transliterate hieroglyphs into phonetic representations
- Translate into English names of Egyptian deities

G1 → 'A'

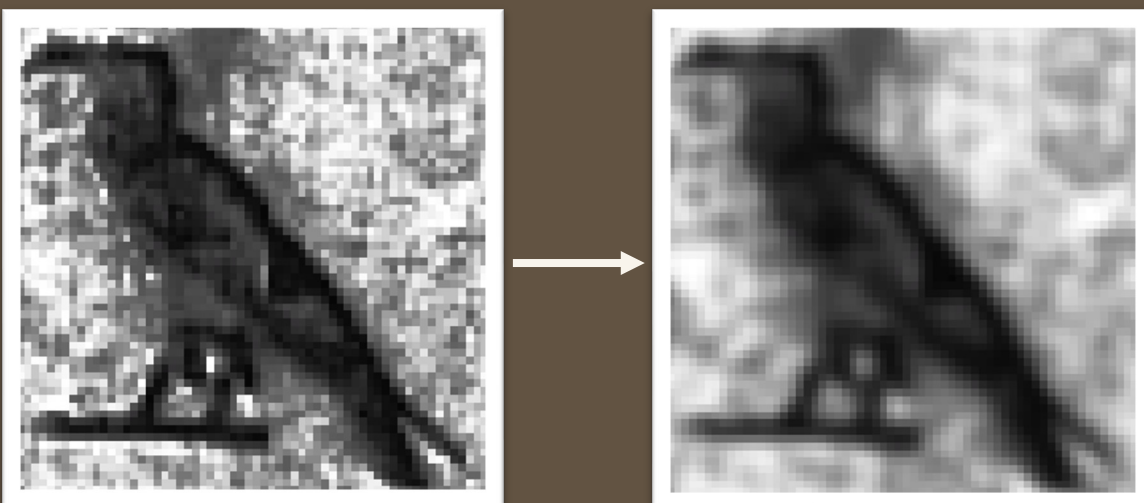


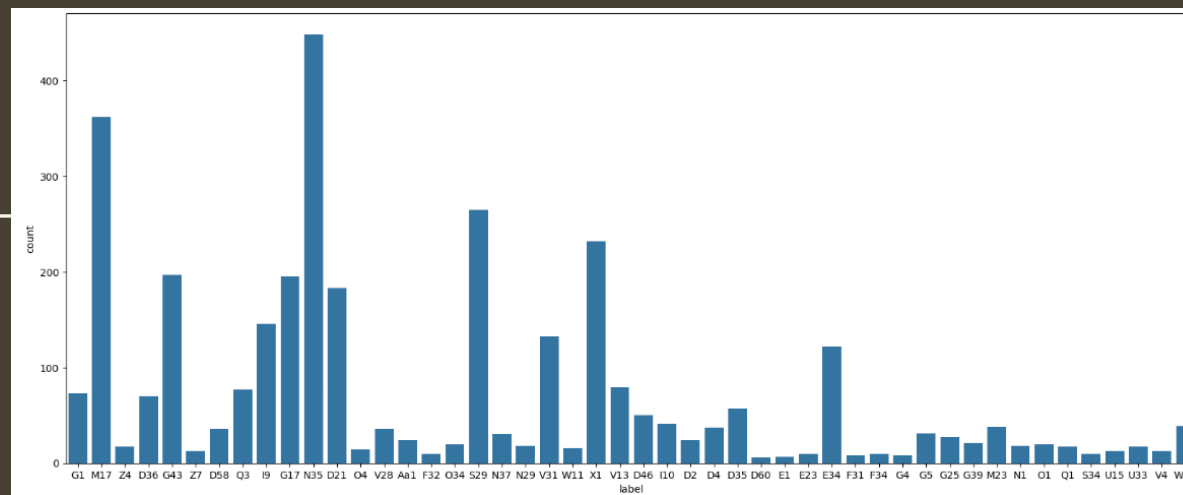
IMAGE PROCESSING & FEATURE EXTRACTION

- Resizing images with fixed aspect ratio
- Convert to grayscale to reduce complexity
- Apply histogram equalization to improve contrast
- Use Gaussian blur for noise removal while preserving edges
- Histogram of Oriented Gradients (HOG) captures edge orientation distributions
- Produces robust feature vectors describing hieroglyph structure

1755	1756	1757	1758	1759	1760	1761	1762	1763	target
0.368727	0.084597	0.051519	0.058797	0.234477	0.024358	0.056171	0.323352	0.162896	G1
0.167880	0.016888	0.063458	0.028240	0.086927	0.268027	0.268027	0.268027	0.190149	G1
0.341430	0.241406	0.179246	0.098209	0.210073	0.000000	0.000000	0.149929	0.182183	G1
0.146512	0.174489	0.269308	0.195522	0.269308	0.269308	0.146588	0.189456	0.050232	G1
0.205384	0.096347	0.031477	0.056259	0.103416	0.177207	0.191659	0.098022	0.313693	G1
...
0.219285	0.242186	0.055931	0.027106	0.127643	0.016266	0.086485	0.242186	0.150634	W24
0.238142	0.285875	0.089166	0.024682	0.027138	0.005463	0.000000	0.056310	0.151475	W24
0.197660	0.216700	0.053246	0.204677	0.247444	0.147598	0.202498	0.213175	0.049592	W24
0.194104	0.048073	0.014485	0.013363	0.050692	0.045374	0.087874	0.120575	0.222267	W24
0.352921	0.079366	0.050034	0.026607	0.217567	0.064905	0.036489	0.012515	0.179903	W24

CLASSIFICATION

- Multinomial Logistic Regression
- Assigns probabilities to each hieroglyph class
- Initial accuracy: 98%

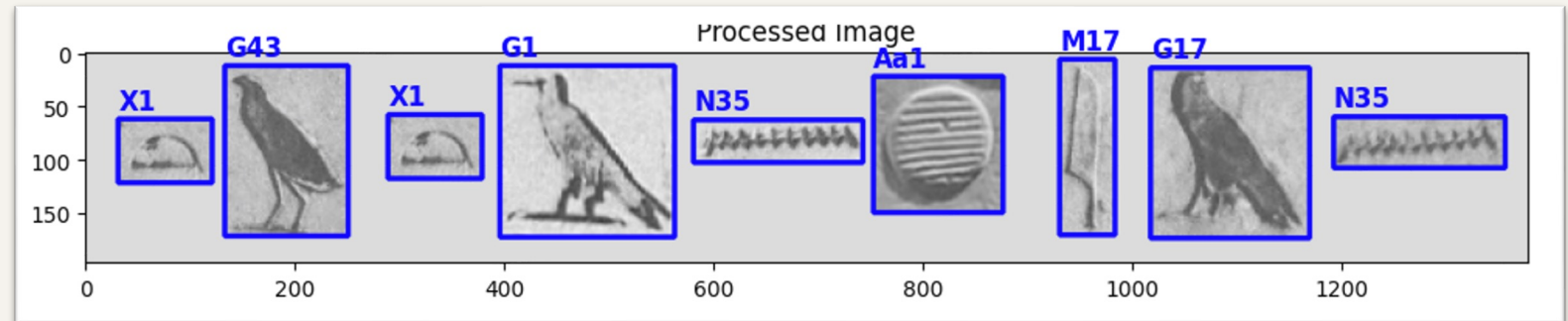


- Some classes had very few samples
- Used to create synthetic samples for minority classes
- Accuracy improved to 99% with cross-validation

TRANSLITERATION & TRANSLATION

SEQUENTIAL PROCESSING

- Detect contours to isolate individual glyphs
- Filter noise by contour area
- Sort glyphs left to right for sequential recognition



TRANSLITERATION & TRANSLATION

Output: phonetic
transliteration of glyph
sequence

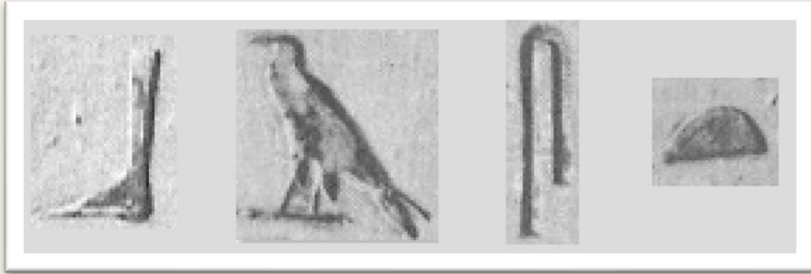
Applied fuzzy string to map
to the English names

Word:
tutanchimn
Hieroglyphic:

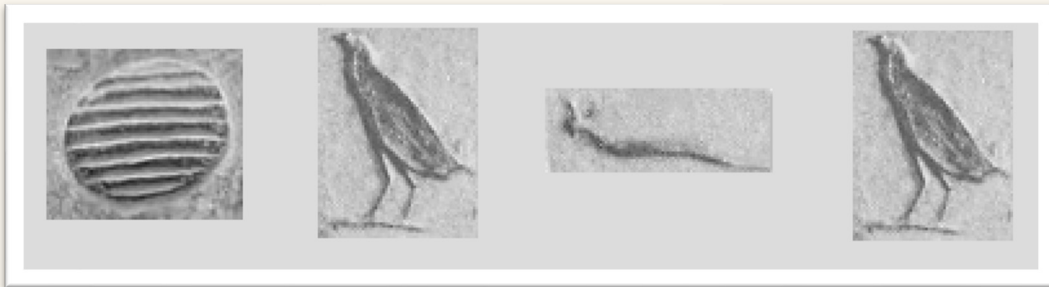


translation:
Tutankhamun

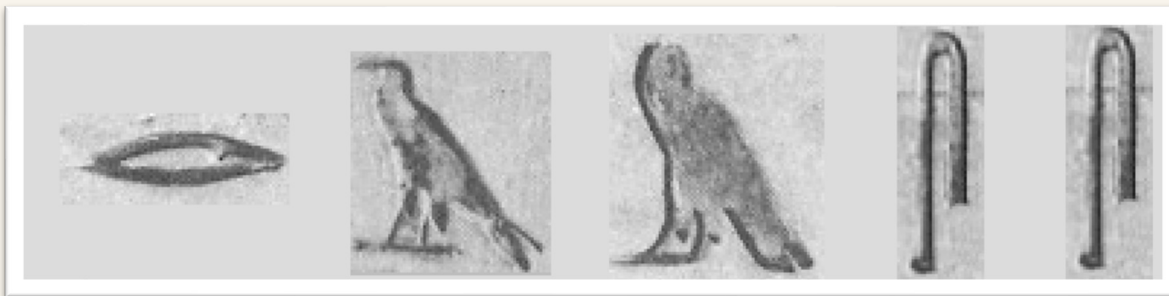
OTHER EXAMPLES



B A S T



C H U F U



R A M S S

RESULTS

- Correct glyph recognition: 7/8
- Correct translations: 6/8
- Errors due to transliteration and name differences

THOUGHTS

- Successfully recognized and transliterated hieroglyphs
- Provides insight into combining image and language processing
- Future work: handle low-contrast images, expand dataset, translate full sentences

CONCLUSION