Reclaiming Archival Texts with User-Friendly OCR

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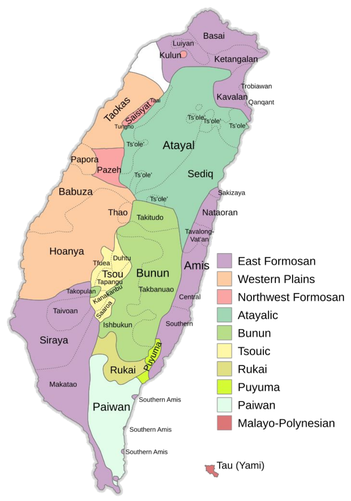
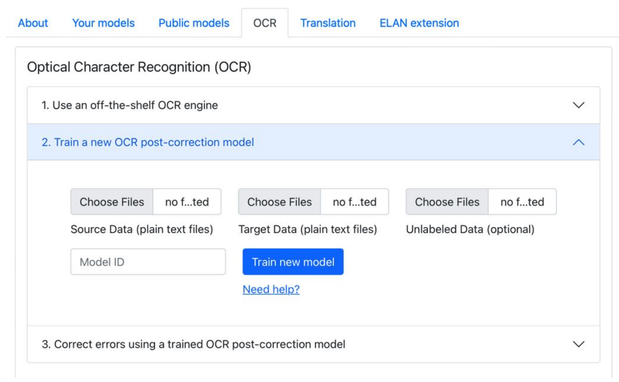
BACKGROUND

- Most pre-20thC non-European texts not yet digitized. [1]
- Especially true for Indigenous language data collected during early contact: grammars, lexica, texts, translations.
- Producing machine-readable versions of these texts is crucial for reclaiming linguistic and cultural knowledge.
- OCR can help, but few OCR models are trained on Indigenous language data from that era, performance is weak. [2]
- How can we leverage existing OCR tools for this task?



DATA

- 16 Formosan languages: Austronesian, Indigenous to Taiwan.
- Focus: **Siraya**, no longer spoken natively but being revitalized.
- 17th century Bible translations produced by Dutch missionaries.
- Not yet in machine-readable format.
- Includes unusual diacritics, characters.



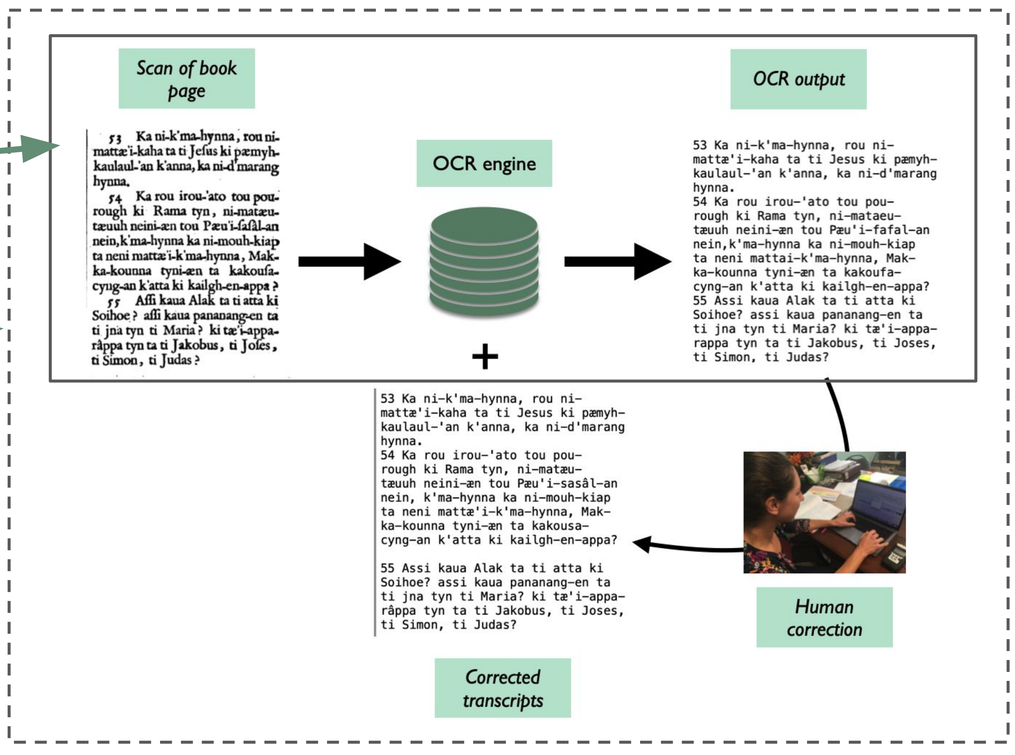
- CMULAB [3] web interface, front-end for Google Cloud Vision OCR (CNN+LSTM)
- Strong performance on Latin scripts.
- Allows tuning on corrected output.
- Very user-friendly interface.

METHOD

One "off the shelf" condition:
Output from GCV OCR with no tuning

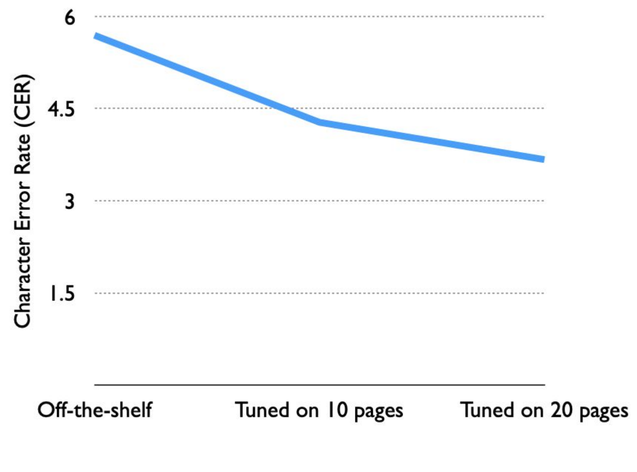
Two tuning conditions:
Output when tuned on 10 or 20 hand-corrected pages

Evaluation:
CER for 3 conditions
Time-to-transcribe for 5 transcribers from scratch and when correcting OCR



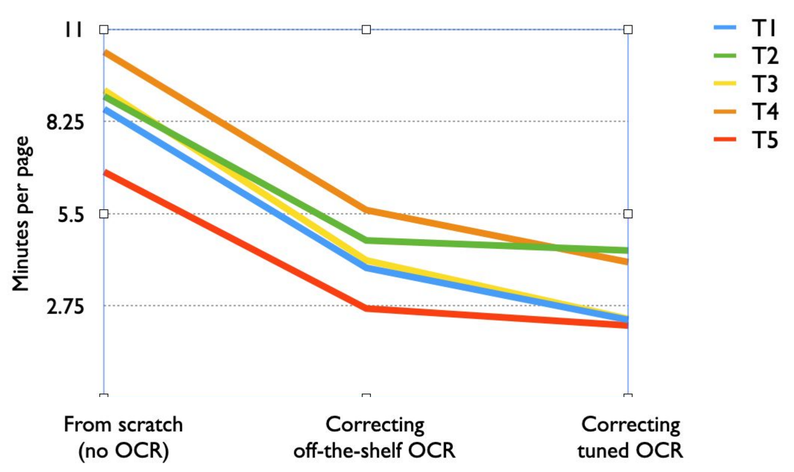
RESULTS

CER off-the-shelf and with tuning on hand-corrected output



- ✓ CER drops from 5.7 off-the-shelf to 3.6 with tuning on 20 pages.
- ✓ Time-to-transcribe reduced dramatically when correcting OCR output (average 52%).
- ✓ Further reduced when using lower-CER fine-tuned output.

Time-to-transcribe from scratch and when correcting OCR output



CONCLUSIONS

- OCR tools off-the-shelf provide remarkably accurate results even for archival texts with unusual characters.
- Results can be further improved via tuning.
- Lower CER leads to improved transcription times.

FUTURE WORK

- Existing OCR tools perform poorly on glossed text, translations in a different script (e.g., Mandarin).
- We plan to develop bespoke system for identifying glossed/translated examples in scanned texts.

ACKNOWLEDGEMENTS

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[1] Michel et al. 2011. Quantitative analysis of culture using millions of digitized books. Science 331:6014, 176-182. [2] Schwartz et al. 2021. A Digital Corpus of St. Lawrence Island Yupik. In Proceedings of the 4th Workshop on the Use of Computational Methods in the Study of Endangered Languages, 31-40. [3] Sheikh et al.. 2024. CMULAB: An Open-Source Framework for Training and Deployment of Natural Language Processing Models. arXiv preprint arXiv:2404.02408.