Revitalizing Endangered Languages Using Natural Language Processing

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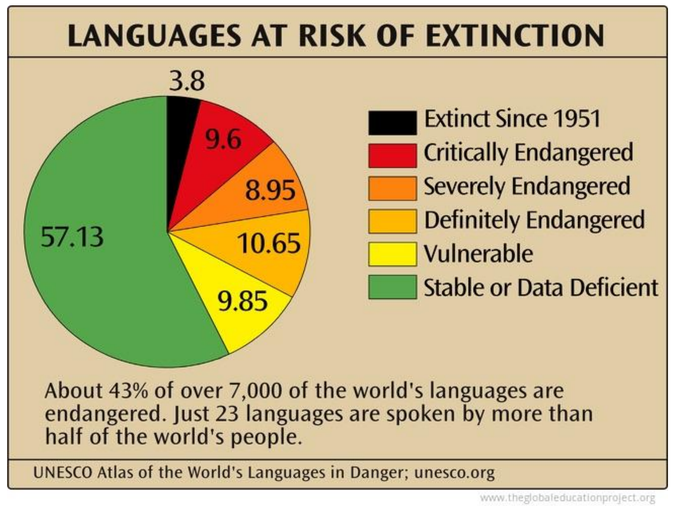
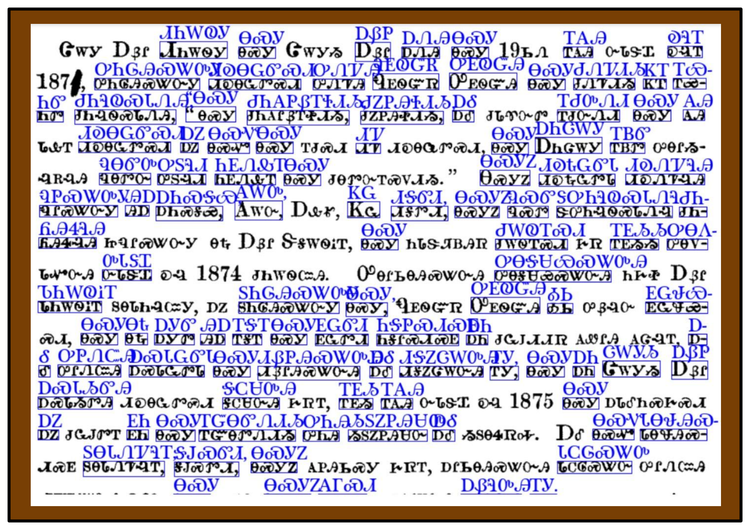
Introduction



- Preserving Culture:
  - There are currently about 7000 languages in the world, 50-90% of which will be dead or endangered by the end of this century
  - Languages are an integral part of our identities and culture
  - Languages also hold a significant amount of knowledge
- Community Priorities:
  - The indigenous communities are highly marginalized community
  - They must to be heavily involved during the process to ensure that the work being done is what they need and want
- Under Representation in NLP:
  - 88% of the languages spoken in the world are underrepresented in NLP
  - Less NLP technology support means less users exposed to the languages
  - Fewer speakers creating language content = scarcity of resources = hindrance in the development of NLP technology

Our Methods

- Neural Machine Translation
  - Train Cherokee-to-English NMT model using OpenNMT-py
- Optical Character Recognition
  - Enhance the pre-existing dataset by retrieving parallel data from sources such as children's books using OCR



Using OCR to extract Cherokee text from PDF

Findings and Discussion

- Machine Translation
  - Cherokee-to-English MT model trained on a Bible dataset yielded a BLEU score of 35.74
  - The BLEU score dropped to 13.695 when the model was trained on a larger dataset since the dataset included both old and new English
  - It is extremely difficult to find more data sources given that Cherokee is a low resource language
- Optical Character Recognition
  - Quality of OCR is highly dependent on the quality of data
  - The available documents are often too noisy

Future Work

- Optimizing the translation model
  - Back translation: produce synthetic data using back translation in order to enlarge the dataset
  - Transfer learning: train the model on a higher resourced but similar language first, such as Inuktitut, and then fine tune the model to Cherokee
- Optical Character Recognition
  - GAN model for image denoising
- Community collaboration
  - It is crucial that we work with the indigenous scholars and community members in order to meet community needs
- Children's books using image recognition and generation

References

- Shiyue Zhang, Ben Frey, and Mohit Bansal. 2022. How can NLP Help Revitalize Endangered Languages? A Case Study and Roadmap for the Cherokee Language.

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