

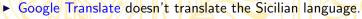
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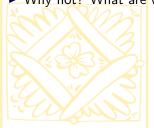


### Why don't we have a Sicilian Translator?





- Nor does Bing Translator, Yandex Translate or DeepL Translator.
- Why not? What are we going to do about it?









## What is the Sicilian Language?

- ► The Sicilian School of Poets at the imperial court of Frederick II:
  - created the first literary standard in Italy (13th century)
  - inspired Dante, the "father of the Italian language"
- Sicilian emerged as a literary language before Italian.
- ▶ The people of Sicily, Calabria and Puglia speak it everyday.
  - They speak Italian at work.
  - But at home with family and friends they speak Sicilian.
  - More precisely, their own dialect of the language.
- And Sicilian is a language spoken here in Brooklyn, NY.



### So why don't we have a Sicilian Translator?

- No one had assembled the parallel text to train a translator.
- ► There's plenty! For over 40 years, Arba Sicula has been:
  - organizing poetry recitals, concerts, cultural events and tours of Sicily
  - publishing books on Sicilian language, literature, history, cuisine, fiction, ...
  - translating Sicilian poetry and prose
  - publishing a bilingual journal, Arba Sicula.
- So we assembled the parallel text.



#### Sicilian Translator



#### How did we do it?

- ► We did **NOT** start with data collection.
- ► We started by collecting the rules of Sicilian vocabulary and grammar.
  - Arthur Dieli's Sicilian Vocabulary
  - Kirk Bonner's Introduction to Sicilian Grammar (2001)
  - Gaetano Cipolla's Mparamu lu sicilianu (2013)
- ► And we created the Chiù dâ Palora (More About the Word) dictionary.
  - vocabulary annotated with grammar, proverbs, poetry, prose and examples
  - provides a reference for standardizing Sicilian language text



#### More About the Word





### Then We Began Collecting Data

- Sources of parallel text:
  - the bilingual literary journal Arba Sicula
  - A. Dieli's translations of Sicilian poetry, proverbs and G. Pitrè's Folk Tales
  - examples from G. Cipolla's Mparamu and K. Bonner's Introduction
- Data Preparation
  - Selected Sicilian language text that could be edited to Standard Sicilian.
  - Used hunalign to identify translated sentence pairs.
  - Manually edited the text (both languages) for quality and standardization.
- Our parallel corpus (so far):
  - 12,357 lines of bilingual text 237,456 Sicilian words, 236,568 English words
  - 4,660 lines of trilingual textbook exercises Sicilian, English and Italian
  - 121 hand-selected lines for validation (in all three languages)
  - the Italian-English subset of Farkas' Books

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#### And We Began Modeling

- We trained our translation models with Sockeye.
- Adding parallel text always improves translation quality more than adjusting hyperparameters.
- But some ways of training a model are better than others.
- We avoid overfitting by training:
  - a self-attentional Transformer model (Vaswani et al., 2017)
  - a smaller network with fewer layers (Sennrich and Zhang, 2019)
  - with small subword vocabularies (Sennrich, Haddow and Birch, 2016)
  - with high-dropout parameters (Srivastava et al., 2014)
- Large empirical improvements when we added theoretical knowledge:
  - by pushing the subword distribution toward textbook desinences
  - by using textbook examples to give structure to the sequences

# Evaluation Metrics

- BLEU score measure of translation quality
  - Higher when sequences of words in the candidate translation match sequences in the reference translation.
  - Highly correlated with human judgements of translation quality.
- What's a good score?
  - In theory, BLEU score ranges from 0 to 100.
  - In practice, there are many ways to translate a sentence.
  - Scores reported by Vaswani et al. (2017):
    - 41.8 on English-to-French translation
    - 28.4 on English-to-German translation
- Our Tradutturi Sicilianu achieved BLEU scores of:
  - 35.0 on English-to-Sicilian, 36.8 on Sicilian-to-English
  - 36.5 on Italian-to-Sicilian, 30.9 on Sicilian-to-Italian



### **Comparing Models**

- Franslation quality improves with parallel text. As our dataset grew from 120,000 to 270,000 words, our BLEU scores increased:
  - from 11.4 to 25.1 on English-to-Sicilian translation
  - from 12.9 to 29.1 on Sicilian-to-English translation
- Within a given dataset, pushing the subword distribution toward textbook desinences increased BLEU scores:
  - from 20.3 to 22.4 on English-to-Sicilian translation
  - from 21.4 to 24.1 on Sicilian-to-English translation
- ► We also observed larger increases in BLEU scores when we added parallel text from textbook examples than from other sources.
  - We did not conduct any formal tests to confirm this observation.
  - With our eyes, we could see the structure that textbook examples added.

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### Multilingual Translation

- ► To further improve translation quality, we added the Italian-English subset of Farkas' Books (from the OPUS project) to our dataset.
- To enable multilingual translation, we added a directional token ex. <2it> ("to Italian") to the source sequence (Johnson et al., 2016).
- ► And we trained a larger model (Arivazhagan et al., 2019) with a "bridging strategy" (Fan et al., 2020).
- ► This further improved translation quality. Our BLEU scores increased:
  - from 25.1 to 35.0 on English-to-Sicilian
  - from 29.1 to 36.8 on Sicilian-to-English
- And it yielded good translation quality between Sicilian and Italian:
  - 36.5 on Italian-to-Sicilian
  - 30.9 on Sicilian-to-Italian

### Come to Napizia!

- ► So come to Napizia and try our Tradutturi Sicilianu:
  - https://translate.napizia.com
- ► To see how it works "behind the curtain," come Darreri lu Sipariu:
  - https://translate.napizia.com/cgi-bin/darreri.pl
- ► Read our "Introduction to Sicilian NLP"
  - https://www.doviak.net/pages/ml-sicilian/
- And check out our Sicilian Translator repository at Github:
  - https://github.com/ewdowiak/Sicilian\_Translator
- ► We hope you'll join us.



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