World Atlas of Language Structures

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Multilingual Natural Language Processing

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Variability of Languages in Time and Space



- NPFL100
- Sister course of this one
  - You have attended ⇒ advantage
  - You haven't ⇒ no disaster... but take it next year :-)
- They: more linguistics, less computation
- We: less linguistics, more computation
  - ... today is an exception :-)

Why Multilingual Processing?

- A blatantly incomplete study:
  - ACL main conference proceedings
  - Paper title contains “parsing”
- ACL-COLING 1998 (Montréal, Canada) 
  - 9 papers
  - 3 languages: English (4×), Spanish (1×), German (1×)
  - 4× no evaluation/language
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- ACL 2007 (Praha, Czechia) 
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- ACL 2016 (Berlin, Germany) 🇩🇪
  - 24 papers
  - 24 languages: en (18×), de (6×), zh (5×); ar, bg, ca, cs, da, el, es, eu, fr, he, hu, it, ja, ko, ml, nl, pl, pt, sl, sv, tr
  - Max 18 langs/paper; average 3.1 langs/paper

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- Trend:
  - No evaluation on data
  - Evaluation on English (usually Penn Treebank)
    - Rarely something else
    - But usually one language per paper
  - Evaluation on multiple languages
    - Still skewed towards a few families
    - "Big languages" of Eurasia
    - Indo-European, Uralic, Turkic, Semitic, Chinese, Japanese, Korean
  - Resource-poor languages

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- Is my algorithm language-independent?
  - Not likely!
  - Test on 4 IE languages does not prove it!
  - Many families missing or underrepresented
  - Some with hundreds of millions of speakers (Austronesian, Niger-Congo)
  - Those languages behave quite differently!

How Many Languages?

- Often cited: 7000 (Ethnologue / SIL)
  - Criticized (Dixon): SIL's aim is translating the Bible
  - Language vs. dialect? Living vs. extinct?
- More realistic: about 4000?
- Many of them endangered

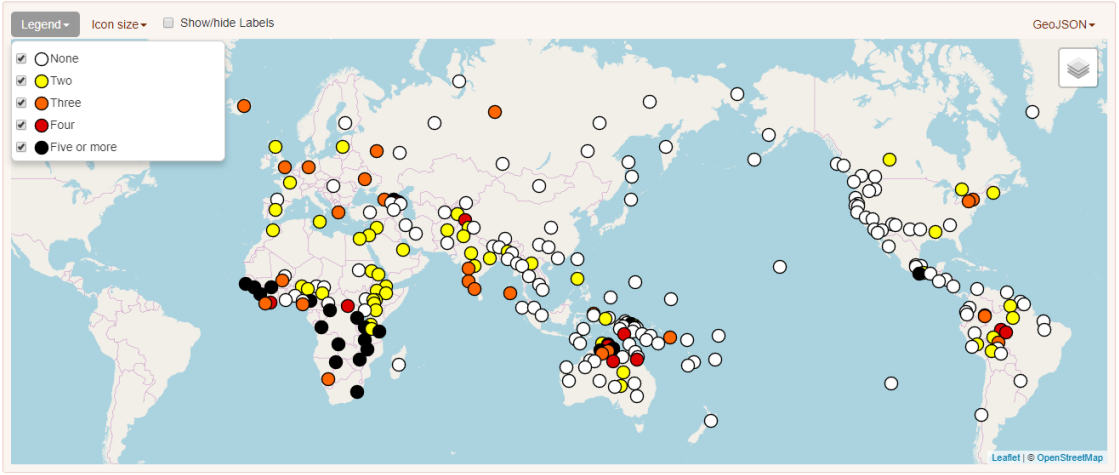
Language Codes

- ISO standard (paid; but unofficial lists are easily obtainable)
- ISO 639-1: two-letter; only major languages
- ISO 639-2: three-letter; more languages; a mess, don't use :-)
  - T-codes: ces, deu, fra, nld, zho, ...
  - B-codes: cze, ger, fre, dut, chi, ...
  - group codes: sla (Slavic), ine (Indo-European), ...
- ISO 639-3: three-letter
  - copy from 639-2/T if exists
  - for other languages: Ethnologue
  - special: mul (multiple langs), mis (langs without code), und (undetermined/unknown), zxx (no linguistic content, e.g. animal sounds)
- Some people/tools use always 639-3
- RFC4646: use 639-1 if available, use three-letter otherwise (e.g. Wiki)

- Glottolog codes: four letters + four digits
  - 8475 entries (`http://glottolog.org/glottolog/language`)

WALS: World Atlas of Language Structures

Number of Genders



WALS: Is It Useful for NLP?

- Yes!
- Database of language features is downloadable
  - Currently 192 features (WALS chapters)
- Similar languages – needed in cross-lingual projection
- But not all features are helpful everywhere!
  - We process text
  - Features 1A to 19A are about phonology
    - E.g. 1A: Consonant Inventories = Moderately small
  - Features 129 to 138 are about lexicon
  - Those that matter may not all have the same weight
- Some features are useful but sparsely annotated
  - Writing system: only indicated for 5 languages

Gender in WALS

- Lexical category of nouns
- Agreement or cross-reference elsewhere:
  - Pronouns
  - Adjectives, determiners (inflection)
  - Verbs (inflection)
  - … or a subset thereof

- Data:
  - Ukrainian and Russian: 3 genders (not 4, with animacy)
  - Czech and Slovak not shown at all
  - English: 3 genders; although only in pronouns!
  - 2 is more similar to 4 than 0 is to 2

Potentially Important Features

- Word order features (18)
- Verbal person marking (4)
- Locus of marking (head marking vs. dependent marking)
- Case (7)
- Endemic function words
  - Copula
  - Question particles in polar questions

SIGTYP 2020 Shared Task

- **Prediction of typological features**
- `https://sigtyp.github.io/st2020.html`

- ⇒ ÚFAL team (from this course) won the task!
- `https://www.aclweb.org/anthology/2020.sigtyp-1.4/`

Other Typological Databases

- Grambank (`https://grambank.clld.org/`)
- … to be expanded …