# A Free/Open-Source Morphological Analyser and Generator for Sakha

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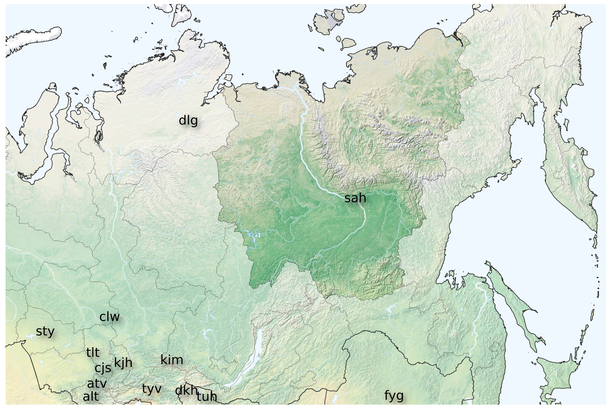
## Background

**Sakha** (sah)

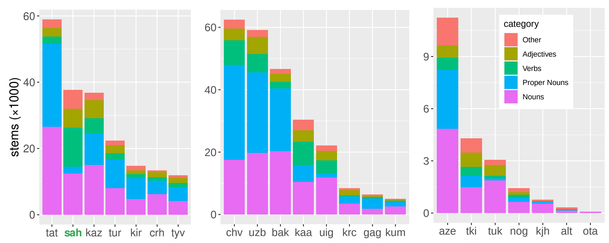
- Indigenous language of **Siberia**, official in Sakha Republic
- **Turkic** language: agglutinating, vowel harmony
- ~0.5M speakers, under pressure from Russian




**Morphological transducers**

- provide morphological **analysis** and **generation**:
  `атын` ↔ `ат<n><px3sg><acc>/атын<adj>/атын<post>`
- Useful in **language technology** and **downstream tasks**: spell checking, MT, CALL, text processing, etc.
- Only one development cycle!

## Existing Turkic transducers




**Production** 92%-98%

**Working** 88%-93%

**Prototype** <80% coverage

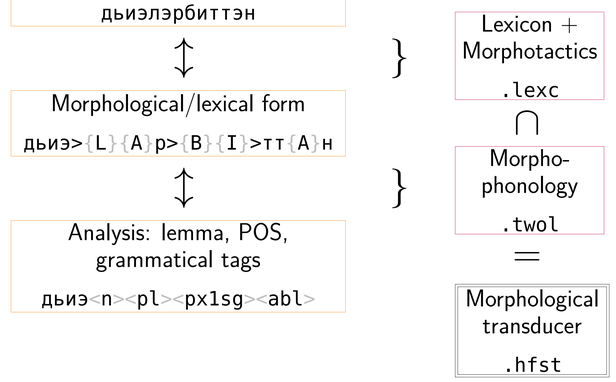
# The first ever published **morphological analyser & generator** for **Sakha**

**Scan with mobile camera** to view the code

https://github.com/apertium/apertium-sah

## Implementation

**Two-level** approach using HFST, entirely **hand-coded**




## Evaluation: naïve coverage

Number of stems that receive an analysis, correct or not

| Corpus | Tokens | Coverage |
|---|---|---|
| Newspapers | 16M | 91.04% |
| Wikipedia | 2.4M | 91.30% |
| New Testament | 188K | 94.53% |

## Evaluation: quality

- Selected 1000 random valid wordforms from Wikipedia corpus
- Manually annotated output of transducer over forms
- **Precision:** 98.52% (of provided analyses are correct)
- **Recall:** 75.42% (of correct analyses are provided)

## Future work

- Refine morphology and morphophonology
- Morphological and syntactic disambiguation

## Conclusion

- Robust transducer, >30k stems
  - high coverage
  - high precision (moderate recall)
- Usable in language technology applications, downstream tasks
- Creation contributed to documentation of Sakha grammar
- Free/Open Source Software (GNU GPL v3)

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