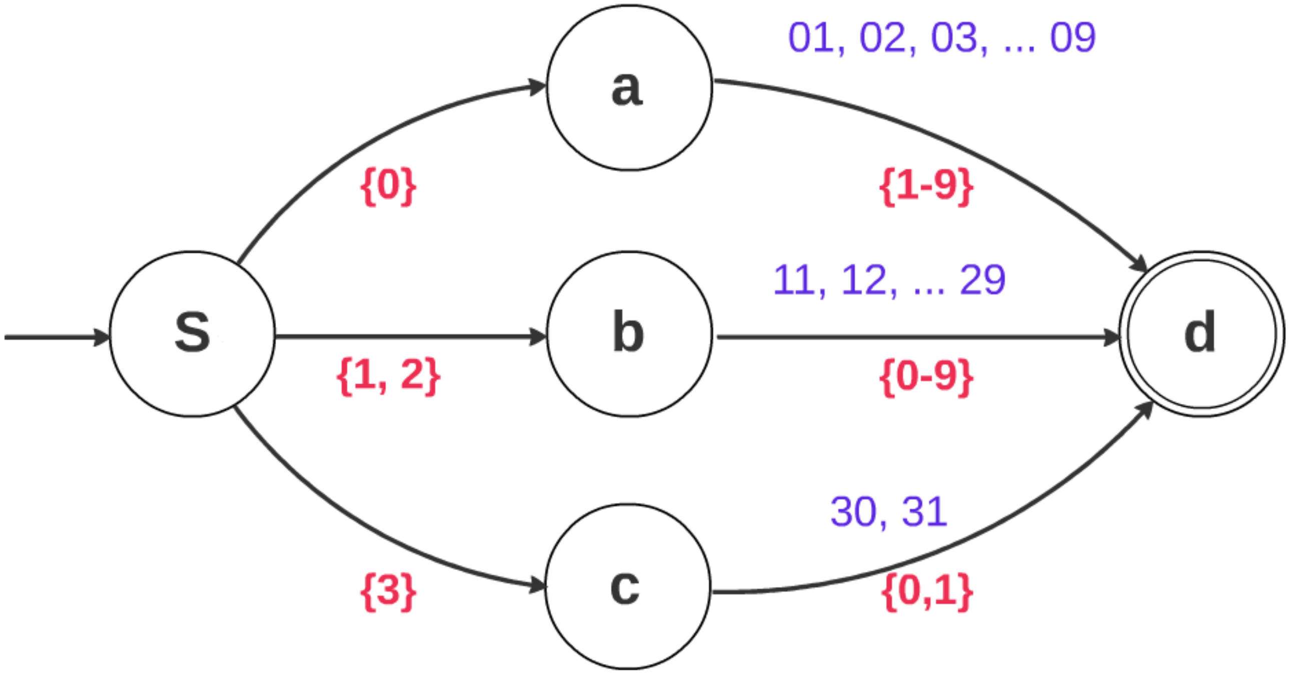
Serbian Unitex Day

Serbian NER

Dictionaries, Graphs and Cascades



Jelena Jaćimović

University of Belgrade, Faculty of Mining and Geology

March 11, 2019

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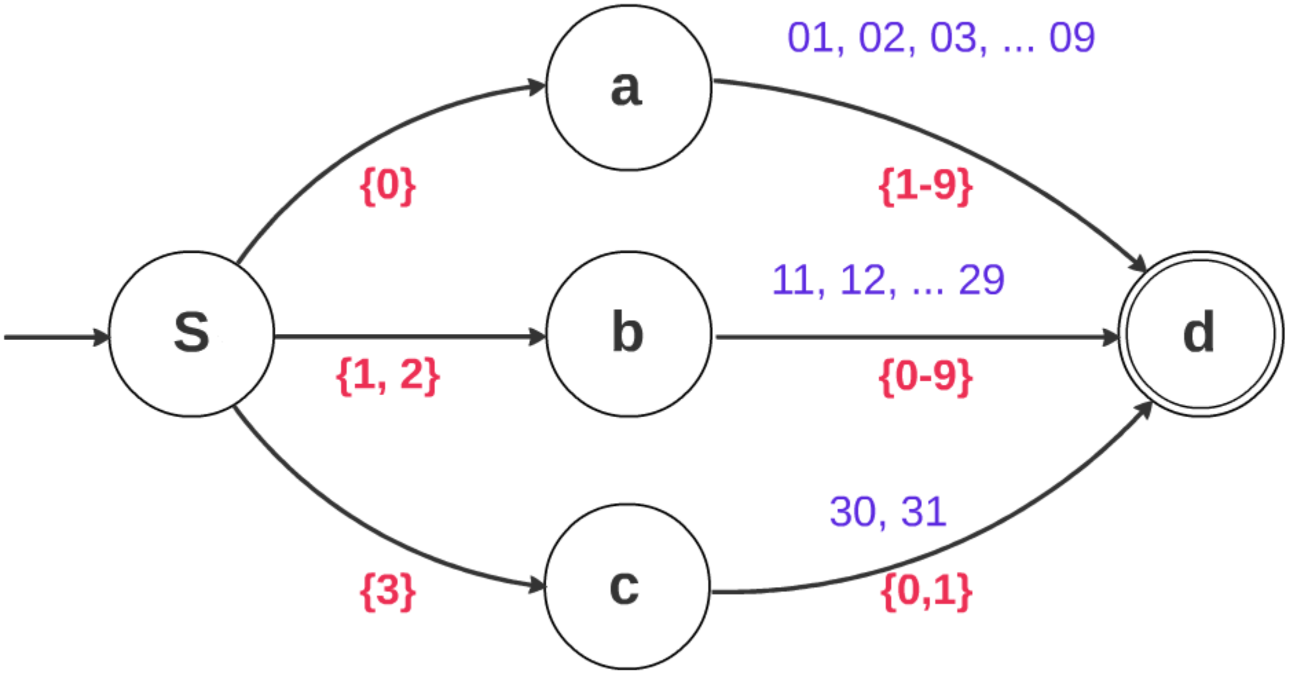

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NER for Serbian

Work on NER for Serbian started in 2006 with recognition of personal names

In 2010 the system was recognizing: full personal names, temporal expressions, amounts, subset of geopolitical names

Evaluation results were very good:

- **Precision 0.98**
- **Recall 0.94**
- **F-measure 0.96**

In 2012 NER system for Serbian was transformed from the collection of transducers to the cascade of transducers

New entities were added

What we are recognizing now?

- numerical expressions
- temporal expressions
- name expressions

numerical expressions

- currencies
  50 USD, 200 €
- measurement expressions
  10 kg, pet metara 'five meters'
- percentage
  35%, 20 procenata '20 percent'
- amounts
  jednom 'once'

temporal expressions

- date
  25.12.2018, marta 2007.
- time
  jutros u pet, oko 8 h
- duration
  nekoliko meseci, 2 nedelje
- sets of recurring times
  šest puta nedeljno, svakog dana

name expressions

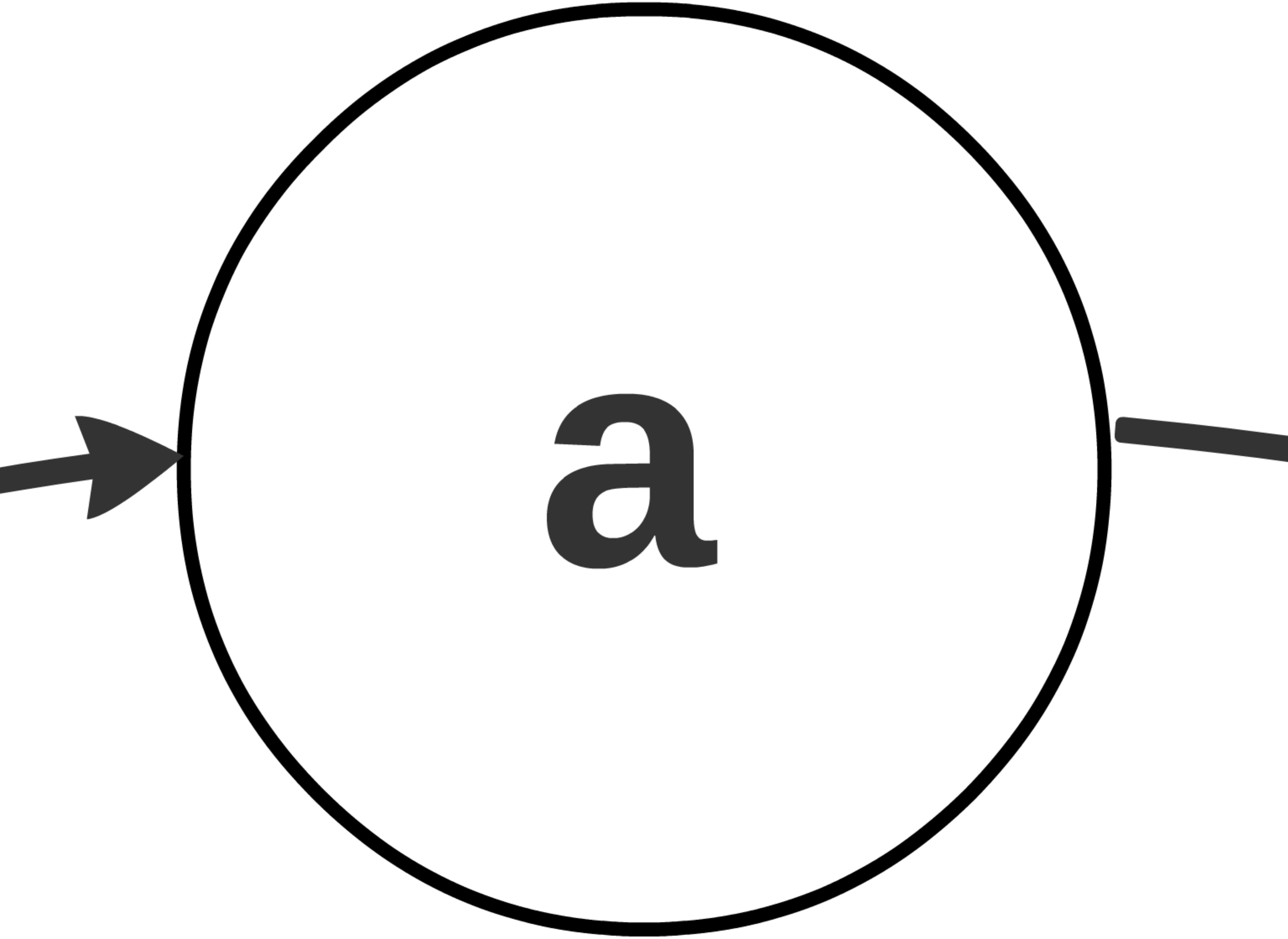
- geopolitical names
  - settlements (*Beograd* ‘Belgrade’)
  - countries (*Nemačka* ‘Germany’)
  - hydronyms (*Dunav* ‘Danube’, *Jadransko more* ‘Adriatic Sea’)
  - oronyms (*Alpi* ‘Alpes’)
  - regions (*Vojvodina*)
  - municipalities (*Savski venac*)
- personal names
  - full names
  - first names
  - surnames,
  - nicknames
  - names of distinguished persons
  - (functions and roles of recognized personal names)
- organizations (general and political)
- urban names

What we are using for NER?

e-dictionaries

graphs

cascades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Dictionaries

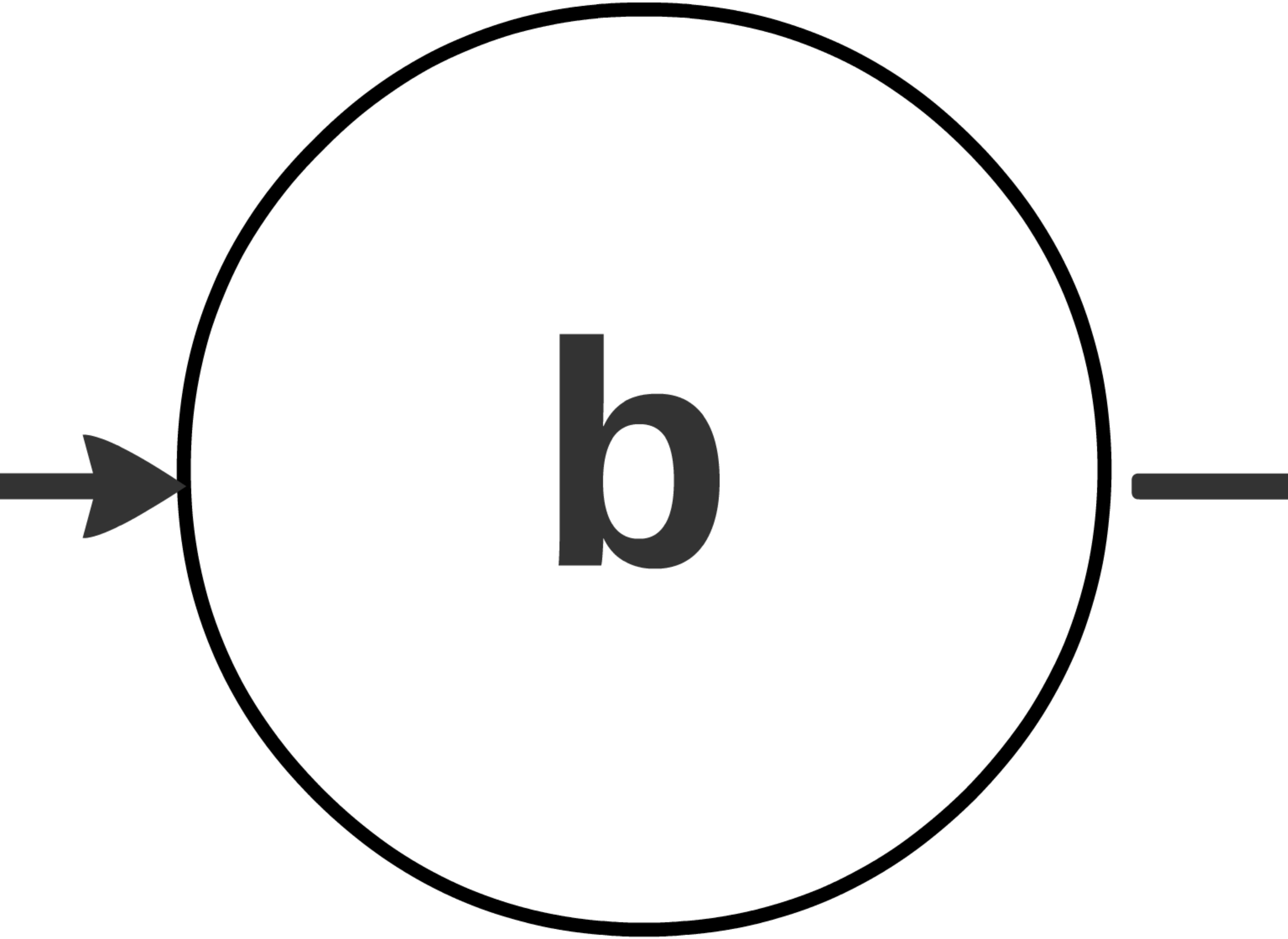
Comprehensive morphological e-dictionaries of Serbian in DELA/DELAF format:

- simple words
- compounds
- general lexica
- geographic names
- personal names

word form ➡ possible values of grammatical categories (case, number, gender, etc.) and lemma together with various additional markers that specify derivational, syntactic, semantic or usage features of lemma

Alena, Alen.N+NProp+Hum+First+EN+Val=Allen:ms2v

Beograđanina, Beograđanin. N+Hum+NProp+Inh+CC2=RS:ms2v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Graphs

Dictionary graphs / FSTs

recognition and morphosyntactic tagging of open classes of simple words and compounds generally not found in dictionaries

simple words → Roman numerals, interjections with repetition of one or more graphemes (e.g. *jaoooo* 'ouuuuch') and acronyms which are not generally known and regularly used

numerals → written with digits, words and their combinations

2,52 milijarde ‘2.52 billions’

compound nouns, adjectives and adverbs → derived from numerals and written with digits

adjective *18-dnevni* ‘18 days long’

21-godišnji, 21-godišnji.A+PosQ+C:adms1g:aems4q:aemp1g

Graphs

Transducers

- capture various structures of named entities, and
- disambiguate

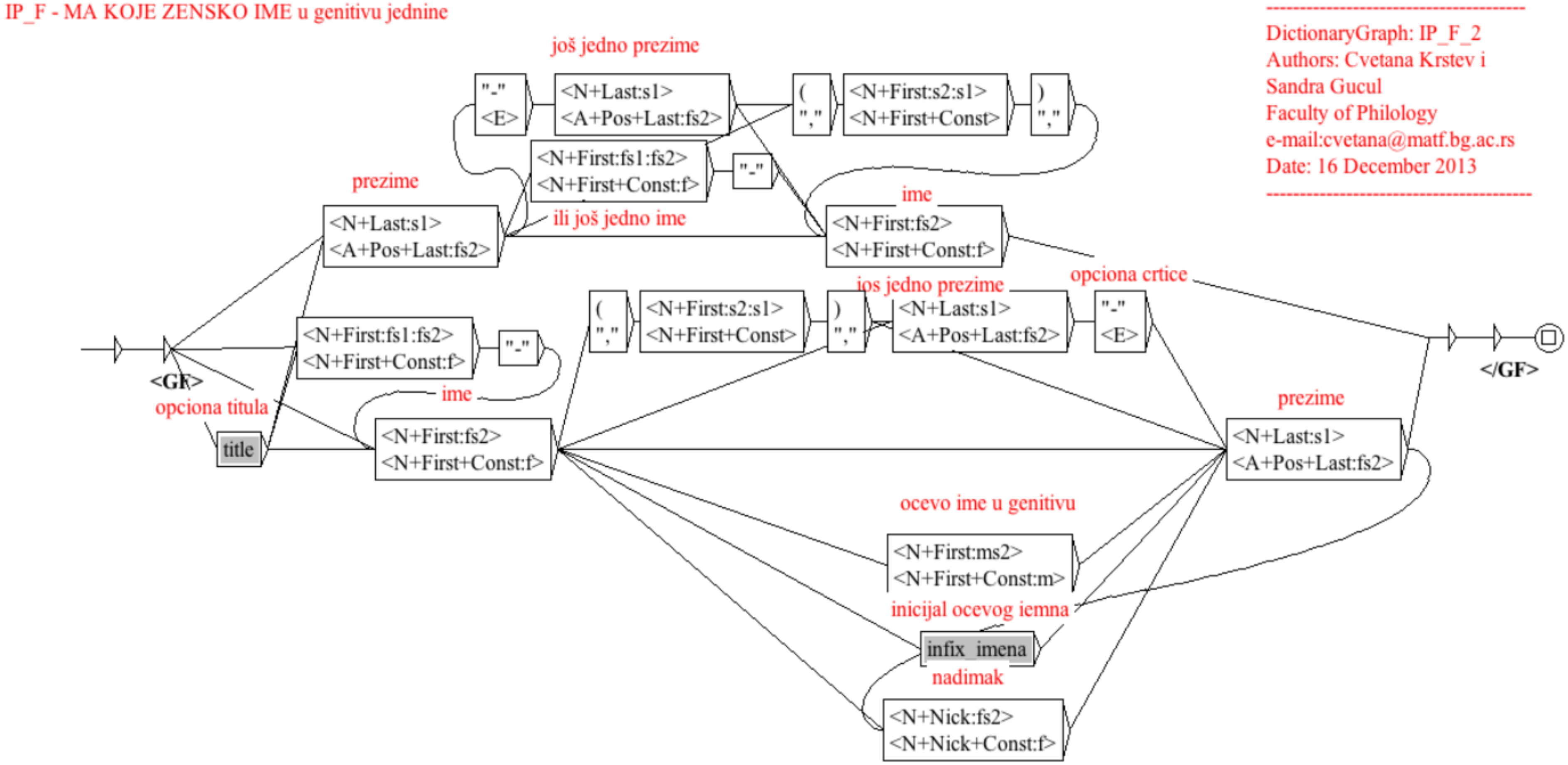
They rely on:

- general and specific e-dictionaries and
- semantic markers assigned to dictionary entries

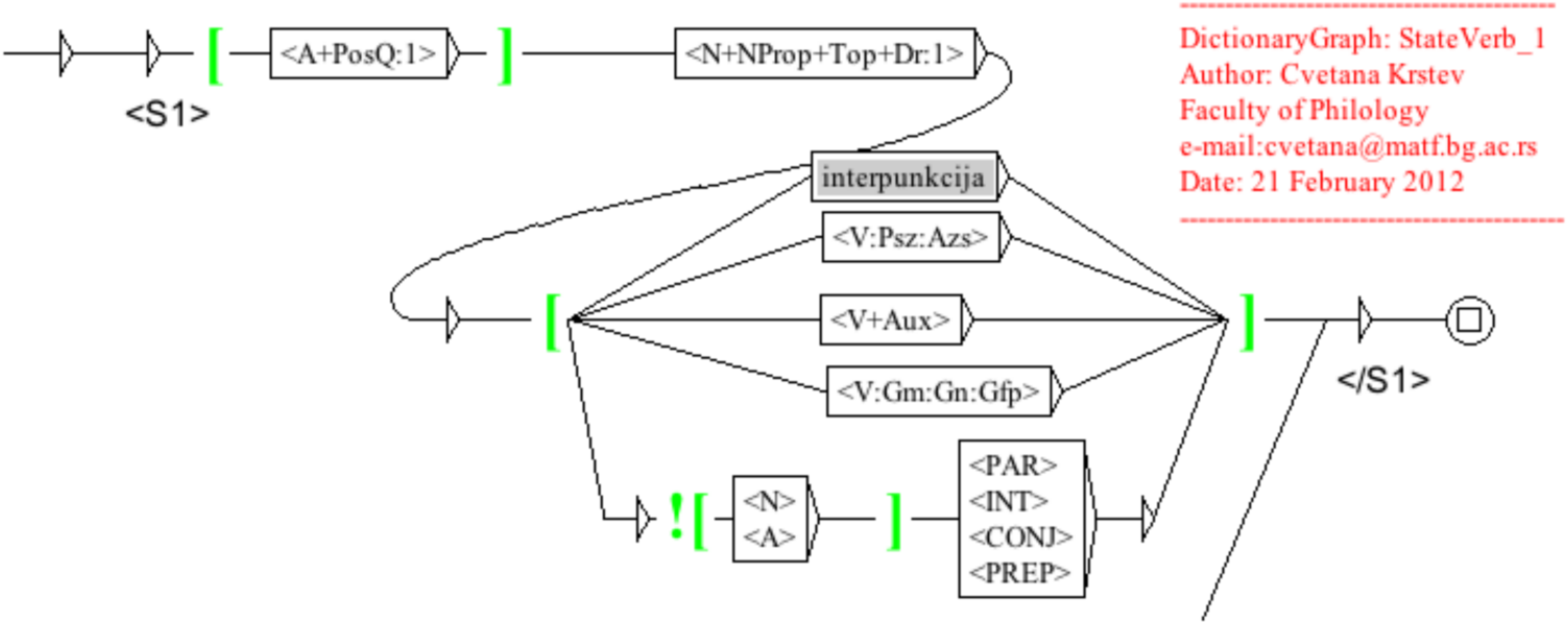
+Cur (currencies),
+Mes (measurement units),
+First (first names),
+Last (surnames),
+Nick (nicknames),

+Dr (states),
+Gr (settlements),
+Hyd (water bodies),
+Oro (elevations),
+Reg (regions), etc.

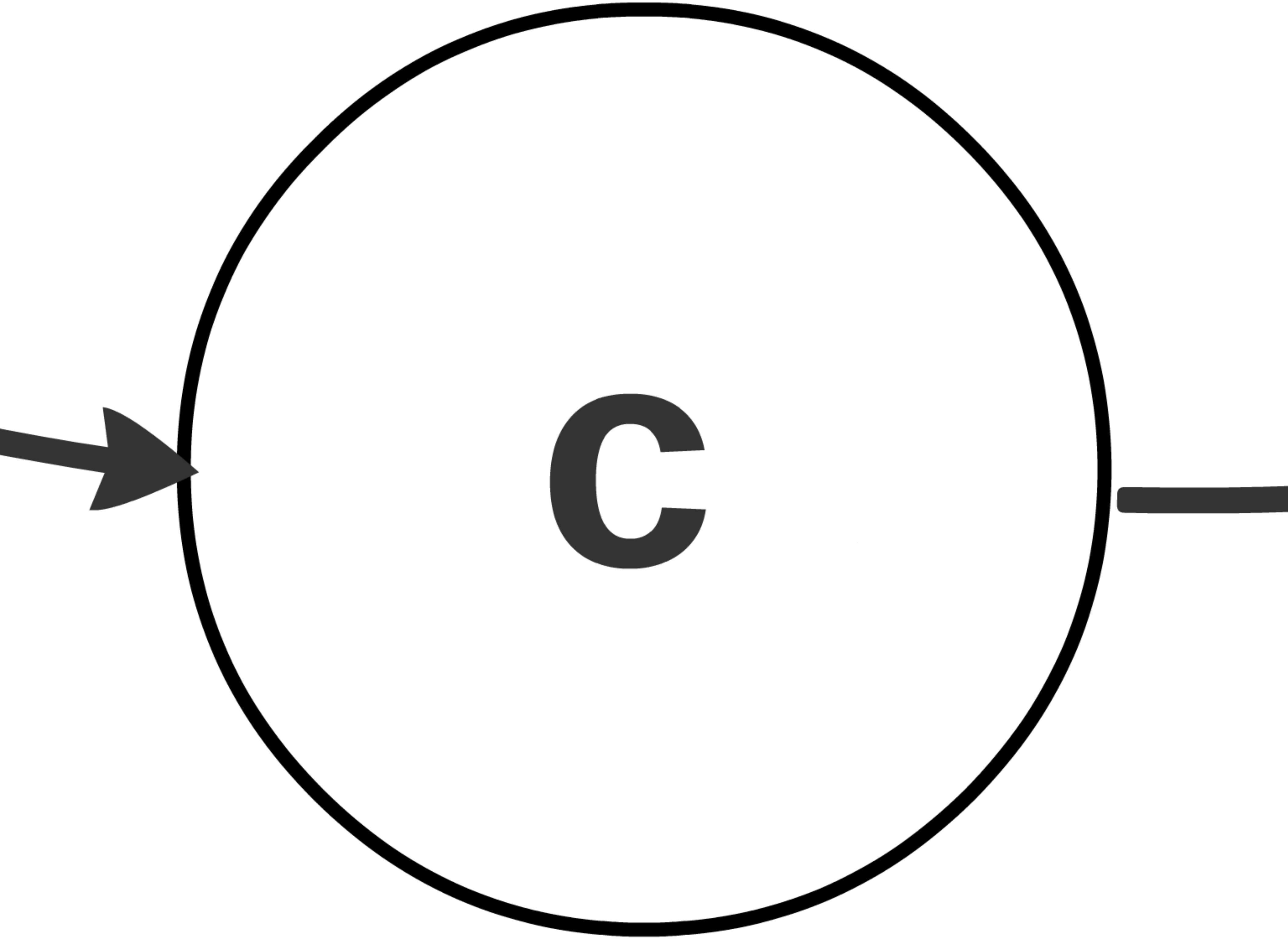
Various structures of full feminine names (the gentive case)



This graph recognizes as a name of a country form that coincide with the feminine gender relational adjectives if followed by a punctuation sign or an auxiliary verb



Hrvatska ('Croatia/Croatian'), *Francuska* ('France/French')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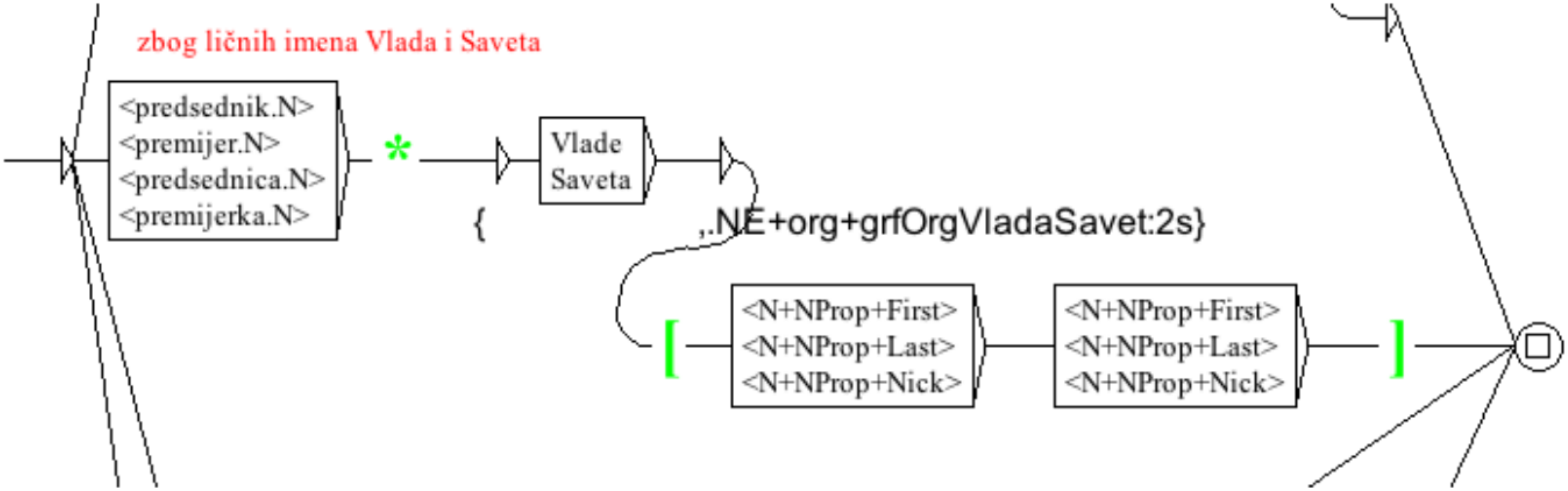
Cascade of transducers

- addressesID (phone number, url, email, twitter; personal citizens data - passport, ID card, index number, etc.) 1
- Foreign organization names (2)
- orgVlada Savet 1
- Amounts – basic and approx (2)
- Temporal expressions - date abs and rel (3), date period 1, set 1, duration 2, time 3, time period 1, duration basic and relative 1+1, date rel 1, duration period and rel date 1, time complex 1 (16)
- Amounts – approximation, basic and range (3)
- Full names – masculine (6), feminine (6) +2
- Amounts – approximation 1
- Geopolitical names – MWUs (6+1), unambiguous (1), simple (6+1), lists (6+1)
- Organizations (6+1)
- Distinguished persons (1)
- Lists of names with roles (6+1), full names with roles – masculine (6), feminine (6) +1, unknown names with roles - masculine (6), feminine (6) +1
- Surnames (7+1)
- Surnames list (6+1)
- Personal name 1
- Streets 1
- Masculine first name, surname and occupation 1

Vlade 'of the Government' / e.g. personal masculine first name Vlada in genitive case

Saveta 'of the Council' / e.g. personal feminine first name Saveta in nominative case



zbog ličnih imena Vlada i Saveta

<predsednik.N>
<premijer.N>
<predsednica.N>
<premijerka.N>

*

{

Vlade
Saveta

,.NE+org+grfOrgVladaSavet:2s}

[

<N+NProp+First>
<N+NProp+Last>
<N+NProp+Nick>

<N+NProp+First>
<N+NProp+Last>
<N+NProp+Nick>

]

predsednik Vlade Mirko Cvetković 'Prime Minister Mirko Cvetković'

predsednik {Vlade.NE+org:2s} Mirko Cvetković

Thank you!