Temponym Tagging: Temporal Scopes for Textual Phrases

Erdal Kuzey, Jannik Strötgen, Vinay Setty, Gerhard Weikum

jannik.stroetgen@mpi-inf.mpg.de

TempWeb – Montréal, April 12, 2016
Why temporal information extraction?
Why temporal information extraction?

temporal information is frequent

Greece Makes ‘Good Progress’ in Payment Talks

News articles.

Narrative documents.

Biographies.
Why temporal information extraction?

Temporal information is frequent

- News articles.
- Narrative documents.
- Biographies.

Temporal information can be normalized

- "today", "April 12, 2016" → 2016-04-12

Temporal information extraction in different types of texts:
- Greece Makes ‘Good Progress’ in Payment Talks
  (September 20, 2011)
- Travels and work in Europe
  (June 7, 1794)
Why temporal information extraction?

Temporal information is **frequent**

- News articles.
- Narrative documents.
- Biographies.

Temporal information can be **normalized**

- "heute", "aujourd'hui", "today", "April 12, 2016" \(\rightarrow\) 2016-04-12
goal of this work

temporal enrichment of documents
So far addressed: temporal tagging
So far addressed: temporal tagging

**two tasks** of a temporal tagger

1. **extraction** of temporal expressions

---

Greece Makes ‘Good Progress’ in Payment Talks

By Maria Perakis and Natalie

Sep 20, 2011 10:39 PM GMT+0200

Greek Finance Minister Evangelos Venizelos made “good progress” in a second round of talks with the European Union and International Monetary Fund aimed at staving off default, the EU said.

The telephone meetings, which follow were intended to dampen concerns that Greece will miss its current targets and that the way for a sixth installment of rescue funds. The EU statement said a “full mission” will return to Athens in coming days at the IMF’s annual meeting in Washington.

Staying in the euro area is an “irreversible and fundamental national choice,” Venizelos said in a statement, adding that the nation’s fiscal and economic situation is a problem for the eurozone.

The European Union is determined to tackle once and for all.
So far addressed: temporal tagging

two tasks of a temporal tagger

1. extraction of temporal expressions
2. normalization of temporal expressions

Greece Makes ‘Good Progress’ in Payment Talks

By Maria Perakis and Natale

Sep 20, 2011 10:39 PM GMT+0200

Greek Finance Minister Evangelos Venizelos made "good progress" in a second round of talks with the European Union and International Monetary Fund aimed at staving off default, the EU said.

The telephone meeting which followed was intended to dampen concerns that Greece has reduced targets to clear the way for a sixth installment of rescue funds. The EU statement said a "full mission" will return to Athens in coming days at the IMF’s annual meeting in Washington.

Staying in the euro area is an "irreversible and fundamental national choice," Venizelos said in a statement. "We’ve acknowledged that our fiscal, data and economic situation is a problem for the euro zone and determined to tackle once and for all."

The EU payment for Greece is on track to be released next month, Venizelos said. Earlier today, he said, "Progress, but we are still in the starting blocks of our difficult recovery, but Greece is on track to be released next month, Venizelos said.

- tonight → 2011-09-20TNI
- yesterday → 2011-09-19
- next week → 2011-W39
- Sept. 20, 2011 → 2011-09-20
- next month → 2011-10
So far addressed: temporal tagging

Addressed types of temporal expressions

TimeML standard:
[Pustejovsky et al. ’10]

- **dates** ("May 1, 2015", "today")
- **times** ("9 pm", "last night")
- **durations** ("three years")
- **set expressions** ("twice a day")
So far addressed: temporal tagging

Addressed types of temporal expressions

TimeML standard:
[Pustejovský et al. ’10]

- **dates** ("May 1, 2015", "today")
- **times** ("9 pm", "last night")
- **durations** ("three years")
- **set expressions** ("twice a day")

- **dates and times may be:**
  - **explicit** ("May 1, 2015")
  - **implicit** ("Christmas 2012")
  - **relative** ("last night")
  - **underspecified** ("Monday")
So far addressed: temporal tagging

Addressed types of temporal expressions

TimeML standard:
[Pustejovsky et al. ’10]

- dates (“May 1, 2015”, “today”)
- times (“9 pm”, “last night”)
- durations (“three years”)
- set expressions (“twice a day”)

dates and times may be:
- explicit (“May 1, 2015”)
- implicit (“Christmas 2012”)
- relative (“last night”)
- underspecified (“Monday”)

normalization difficulty varies between types, but:
all are obvious temporal expressions
So far ignored: free-text temporal expressions

Idea
standard text phrases may be associated with temporal scopes
Outline

- Temponyms
- WWW’16 Approach
- The Temporal Tagger HeidelTime
- Temponym Tagging with HeidelTime
So far ignored: free-text temporal expressions

Idea

- temponyms
  refer to arbitrary kinds of named events or facts
So far ignored: free-text temporal expressions

Idea

standard text phrases may be associated with temporal scopes

- temponyms
  refer to arbitrary kinds of named events or facts with temporal scopes
So far ignored: free-text temporal expressions

Idea

standard text phrases may be associated with temporal scopes

- temponyms

  refer to arbitrary kinds of named events or facts with temporal scopes that are merely given by a text phrase but have unique interpretations given the context and background knowledge.
So far ignored: free-text temporal expressions

**Idea**

standard text phrases may be associated with temporal scopes

- temponyms
  refer to arbitrary kinds of **named events or facts with temporal scopes** that are merely given by a text phrase but have unique interpretations **given the context and background knowledge**.

- temponym tagging
  is the **detection** and **normalization** of temponyms.
Examples of temponyms

John F. Kennedy’s death marked a watershed in the memories of almost every American.

President Obama awarded the nation’s highest military honor to a Union soldier who was killed more than 150 years ago during the Battle of Gettysburg.
Examples of temponyms

John F. Kennedy’s death marked a watershed in the memories of almost every American.

President Obama awarded the nation’s highest military honor to a Union soldier who was killed more than 150 years ago during the Battle of Gettysburg.

publication date: 2014-11-06

normalized temporal information (temporal tagging)

1864
**Examples of temponyms**

**John F. Kennedy’s death** marked a watershed in the memories of almost every American.

**Publication date: 2014-11-06**

President Obama awarded the nation’s highest military honor to a Union soldier who was killed *more than 150 years ago* during the **Battle of Gettysburg.**

**Normalized temporal information**

(temporal tagging, temponym tagging)

- 1963-11-22
- 1864
  - [1863-07-01, 1863-07-03]
Examples of temponyms

phrases with temponyms

The Cuban Revolutionary War
The second inauguration of Bill Clinton
2008 Mexico City plane crash
2016 WWW Conference
Examples of temponyms

temporal tagging

- The Cuban Revolutionary War
- The second inauguration of Bill Clinton
- 2008 Mexico City plane crash
- 2016 WWW Conference
Examples of temponyms

temporal tagging vs. temponym tagging

— vs. [1953-07-26,1959-01-01]
The Cuban Revolutionary War

— vs. 1997-01-20
The second inauguration of Bill Clinton

2008 vs. 2008-11-04
2008 Mexico City plane crash

2016 vs. [2016-04-11,2016-04-15]
2016 WWW Conference
Examples of temponyms

**temporal tagging vs. temponym tagging**

- **vs.**
  - [1953-07-26, 1959-01-01]
  - The Cuban Revolutionary War

- **vs.**
  - 1997-01-20
  - The second inauguration of Bill Clinton

- **vs.**
  - 2008-11-04
  - 2008 Mexico City plane crash

- **vs.**
  - [2016-04-11, 2016-04-15]
  - 2016 WWW Conference

Temponyms add new or more precise temporal information.
Our WWW’16 paper

- all temponyms, not only explicit ones, e.g., “during his presidency”
- often year-level temporal scopes
Our WWW’16 paper

- all temponyms, not only explicit ones, e.g., “during his presidency”
- often year-level temporal scopes
- approach with ILP for joint inference
- approach requires deep analysis → not very scalable
Our WWW’16 paper

- all temponyms, not only explicit ones, e.g., “during his presidency”
- often year-level temporal scopes
- approach with ILP for joint inference
- approach requires deep analysis → not very scalable
Our WWW’16 paper

- all temponyms, not only explicit ones, e.g., “during his presidency”
- often year-level temporal scopes
- approach with ILP for joint inference
- approach requires deep analysis → not very scalable

Friday, April 15, 2016

As Time Goes By: Comprehensive Tagging of Textual Phrases with Temporal Scopes

Today

- explicit temponyms, day-level temporal scopes
- completely other approach than WWW’16 approach: temponym tagging with HeidelTime
The temporal tagger HeidelTime

HeidelTime’s characteristics

rule-based, multilingual, domain-sensitive
The temporal tagger HeidelTime

HeidelTime’s characteristics
- rule-based, multilingual, domain-sensitive

Four domains \([\text{LRE}'13]\)
- news, narrative, colloquial, autonomic
The temporal tagger HeidelTime

HeidelTime’s characteristics
- rule-based, multilingual, domain-sensitive

Four domains [LRE’13]
- news, narrative, colloquial, autonomic

13 languages [TALIP’14, EACL’14, EVALITA’14, Camp & Christiansen ’12, Moriceau & Tannier ’14, Skukan et al. ’14]
- English, Spanish, French, Italian, Portuguese, German, Dutch,
- Arabic, Russian, Croatian, Chinese, Vietnamese, Estonian
The temporal tagger HeidelTime

HeidelTime’s characteristics
rule-based, multilingual, domain-sensitive

Four domains [LRE’13]
- news, narrative, colloquial, autonomic

13 languages [TALIP’14, EACL’14, EVALITA’14, Camp & Christiansen ’12, Moriceau & Tannier ’14, Skukan et al. ’14]
- English, Spanish, French, Italian, Portuguese, German, Dutch,
- Arabic, Russian, Croatian, Chinese, Vietnamese, Estonian

200+ languages [EMNLP’15]
- with automatically developed resources
Domain-sensitivity is crucial

normalization of relative and underspecified expressions
Domain-sensitivity is crucial

normalization of relative and underspecified expressions

Example:

**News** 1998-04-18

... for the United States, he said today...

... However, cited by police in December for driving under the influence of alcohol ...
Domain-sensitivity is crucial

(normalization of relative and underspecified expressions)

**News** 1998-04-18

... for the United States, he said today...

... However, cited by police in December for driving under the influence of alcohol ...

**Narrative** 2009-12-19

1979: Soviet invasion

... land in Kabul on December 25...

Afghanistan from the north on December 27. In the morning
Domain-sensitivity is crucial

**normalization of relative and underspecified expressions**

---

### News 1998-04-18

... for the United States, he said today. ...

... However, cited by police in December for driving under the influence of alcohol ...

### Narrative 2009-12-19

1979: Soviet invasion

... land in Kabul on December 25 ...

Afghanistan from the north on December 27. In the morning

---

**cross-domain evaluation**

<table>
<thead>
<tr>
<th>corpus</th>
<th>temporal tagger</th>
<th>extraction</th>
<th>extr. &amp; normalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>news (TempEval3)</td>
<td>HeidelTime-news</td>
<td>SUTime*#</td>
<td></td>
</tr>
<tr>
<td>Wikipedia (WikiWars)</td>
<td>HeidelTime-narratives</td>
<td>SUTime*#</td>
<td></td>
</tr>
</tbody>
</table>

*official TempEval-3 results

---

© Jannik Strötgen – Temponym Tagging
Domain-sensitivity is crucial

normalization of relative and underspecified expressions

- **News** 1998-04-18
  - ... for the United States, he said today.
  - ... However, cited by police in December for driving under the influence of alcohol ...

- **Narrative** 2009-12-19
  - 1979: Soviet invasion
  - ... land in Kabul on December 25...
  - Afghanistan from the north on December 27. In the morning

---

cross-domain evaluation

<table>
<thead>
<tr>
<th>corpus</th>
<th>temporal tagger</th>
<th>extraction</th>
<th>extr. &amp; normalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>news (TempEval3)</td>
<td>HeidelTime-news</td>
<td>90.3*</td>
<td>77.6*</td>
</tr>
<tr>
<td></td>
<td>SUTime</td>
<td>90.3*</td>
<td>67.4*</td>
</tr>
<tr>
<td>Wikipedia (WikiWars)</td>
<td>HeidelTime-narratives</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SUTime</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* [Chang & Manning ’12]

*official TempEval-3 results

© Jannik Strötgen – Temponym Tagging
Domain-sensitivity is crucial

normalization of relative and underspecified expressions

**News** 1998-04-18

... for the United States, he said today.

... However, cited by police in December for driving under the influence of alcohol...

**Narrative** 2009-12-19

1979: Soviet invasion...

... land in Kabul on December 25...

Afghanistan from the north on December 27. In the morning...

cross-domain evaluation

<table>
<thead>
<tr>
<th>corpus</th>
<th>temporal tagger</th>
<th>extraction</th>
<th>extr. &amp; normalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>news (TempEval3)</td>
<td>HeidelTime-news</td>
<td>90.3*</td>
<td>77.6*</td>
</tr>
<tr>
<td></td>
<td>SUTime#</td>
<td>90.3*</td>
<td>67.4*</td>
</tr>
<tr>
<td>Wikipedia (WikiWars)</td>
<td>HeidelTime-narratives</td>
<td>87.9</td>
<td>78.7</td>
</tr>
<tr>
<td></td>
<td>SUTime#</td>
<td>88.2</td>
<td>48.1</td>
</tr>
</tbody>
</table>

*official TempEval-3 results

© Jannik Strötgen – Temonym Tagging
Temponym tagging with HeidelTime

Temponym creation process

- YAGO 2/3 [Hoffart et al. ’13, Mahdisoltani et al. ’15]
  - temporal predicates
    holdsPosition, isMarriedTo, diedOn
    startedOnDate, endedOnDate, happenedOnDate
  - e.g., John F. Kennedy – diedOn – 1963-11-22
Temponym tagging with HeidelTime

Temponym creation process

- **YAGO 2/3** [Hoffart et al. ’13, Mahdisoltani et al. ’15]
  - temporal predicates
    holdsPosition, isMarriedTo, diedOn
    startedOnDate, endedOnDate, happenedOnDate
  - e.g., John F. Kennedy – diedOn – 1963-11-22

- **AIDA** [Hoffart et al. ’11]
  - alias names for entities
    e.g., “John F. Kennedy” – “John Fitzgerald Kennedy”
Temponym tagging with HeidelTime

Temponym creation process

- **YAGO 2/3** [Hoffart et al. ’13, Mahdisoltani et al. ’15]
  - temporal predicates
    holdsPosition, isMarriedTo, diedOn
    startedOnDate, endedOnDate, happenedOnDate
  e.g., John F. Kennedy – diedOn – 1963-11-22

- **AIDA** [Hoffart et al. ’11]
  - alias names for entities
    e.g., “John F. Kennedy” – “John Fitzgerald Kennedy”

- temponym pattern dictionary
  - (noun / verb) phrases mapped to Yago’s predicates
    e.g., diedOn – <X>’s death – <X> was killed – <X> died
Temponym tagging with HeidelTime

Fact and event-style temponyms

- with time points or intervals
- due to imprecise intervals in YAGO:
  re-extraction of temporal scopes from Wikipedia info boxes
Motivation

Temponyms

WWW’16 Approach

HeidelTime

Temponym Tagging with HeidelTime

Temponym tagging with HeidelTime

Fact and event-style temponyms

- with time points or intervals
- due to imprecise intervals in YAGO: re-extraction of temporal scopes from Wikipedia info boxes

how are temponyms handled in HeidelTime?
Temponym tagging with HeidelTime

HeidelTime’s simplified architecture

In the source code:
- domain-dependent normalization strategies
- resource interpreter
  → language-independent

In the resources:
- pattern files
- normalization files
- rule files
  → language-dependent
Temponym tagging with HeidelTime

HeidelTime’s temporal tagging resources – examples
Temponym tagging with HeidelTime

HeidelTime’s temporal tagging resources – examples

<table>
<thead>
<tr>
<th>reMonth</th>
<th>normMonth</th>
</tr>
</thead>
<tbody>
<tr>
<td>April</td>
<td>&quot;April&quot;,&quot;04&quot;</td>
</tr>
<tr>
<td>May</td>
<td>&quot;May&quot;,&quot;05&quot;</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>
Temponym tagging with HeidelTime

HeidelTime’s temporal tagging resources – examples

<table>
<thead>
<tr>
<th>reMonth</th>
<th>normMonth</th>
<th>rule1, (&quot;April 2016&quot; → &quot;2016-04&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td>April</td>
<td>&quot;April&quot;,&quot;04&quot;</td>
<td>extract=&quot;%reMonth\textsubscript{g1} %reYear4D\textsubscript{g2}&quot;</td>
</tr>
<tr>
<td>May</td>
<td>&quot;May&quot;,&quot;05&quot;</td>
<td>norm=&quot;g2-%normMonth(g1)&quot;</td>
</tr>
</tbody>
</table>
Temponym tagging with HeidelTime

HeidelTime’s temponym tagging resources – examples

Starting point:
- YAGO 2/3 output
- AIDA synonyms
- temporal pattern dictionary
Temponym tagging with HeidelTime

HeidelTime’s temponym tagging resources – examples

YAGO 2/3 output

```
normDeath
"Che Guevara","1967-10-09"
"John F. Kennedy","1963-11-22"
...
```
Temponym tagging with HeidelTime

HeidelTime’s temponym tagging resources – examples

YAGO 2/3 output + AIDA synonyms

normDeath
"Che Guevara","1967-10-09"
"John F. Kennedy","1963-11-22"
"John Fitzgerald Kennedy","1963-11-22"
...

© Jannik Strötgen – Temponym Tagging
Temponym tagging with HeidelTime

HeidelTime’s temponym tagging resources – examples

<table>
<thead>
<tr>
<th>reDeathPer</th>
<th>normDeath</th>
</tr>
</thead>
<tbody>
<tr>
<td>Che Guevara</td>
<td>&quot;Che Guevara&quot;,&quot;1967-10-09&quot;</td>
</tr>
<tr>
<td>John F. Kennedy</td>
<td>&quot;John F. Kennedy&quot;,&quot;1963-11-22&quot;</td>
</tr>
<tr>
<td>John Fitzgerald</td>
<td>&quot;John Fitzgerald Kennedy&quot;,&quot;1963-11-22&quot;</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>
Temponym tagging with HeidelTime

HeidelTime’s temponym tagging resources – examples

- **reDeathPer**
  - Che Guevara
  - John F. Kennedy
  - John Fitzgerald Kennedy...

- **normDeath**
  - "Che Guevara","1967-10-09"
  - "John F. Kennedy","1963-11-22"
  - "John Fitzgerald Kennedy","1963-11-22"

- **temporal pattern dictionary**
  - death
  - suicide
  - ...

- **reDeathN**

© Jannik Strötgen – Temponym Tagging
Temponym tagging with HeidelTime

HeidelTime’s temponym tagging resources – examples

<table>
<thead>
<tr>
<th>reDeathN</th>
<th>reDeathPer</th>
<th>normDeath</th>
</tr>
</thead>
<tbody>
<tr>
<td>death</td>
<td>Che Guevara</td>
<td>&quot;Che Guevara&quot;,&quot;1967-10-09&quot;</td>
</tr>
<tr>
<td>suicide</td>
<td>John F. Kennedy</td>
<td>&quot;John F. Kennedy&quot;,&quot;1963-11-22&quot;</td>
</tr>
</tbody>
</table>
## Temponym tagging with HeidelTime

### HeidelTime’s temponym tagging resources – examples

<table>
<thead>
<tr>
<th>reDeathN</th>
<th>reDeathPer</th>
<th>normDeath</th>
</tr>
</thead>
<tbody>
<tr>
<td>death</td>
<td>Che Guevara</td>
<td>&quot;Che Guevara&quot;,&quot;1967-10-09&quot;</td>
</tr>
<tr>
<td>suicide</td>
<td>John F. Kennedy</td>
<td>&quot;John F. Kennedy&quot;,&quot;1963-11-22&quot;</td>
</tr>
</tbody>
</table>

#### rule2a, e.g., "John F. Kennedy’s death" → "1963-11-22"

extract="%reDeathPer_{g_1}’s %reDeathN_{g_2}"
norm="%normDeath(g1)"
### Temponym tagging with HeidelTime

#### HeidelTime’s temponym tagging resources – examples

<table>
<thead>
<tr>
<th>reDeathN</th>
<th>reDeathPer</th>
<th>normDeath</th>
</tr>
</thead>
<tbody>
<tr>
<td>death</td>
<td>Che Guevara</td>
<td>&quot;Che Guevara&quot;,&quot;1967-10-09&quot;</td>
</tr>
<tr>
<td>suicide</td>
<td>John F. Kennedy</td>
<td>&quot;John F. Kennedy&quot;,&quot;1963-11-22&quot;</td>
</tr>
</tbody>
</table>

**rule2a**, e.g., "John F. Kennedy’s death" → "1963-11-22"

- extract="%reDeathPer_{g1}’s %reDeathN_{g2}"  
  - norm="%normDeath(g1)"

**rule2b**, e.g., "death of John F. Kennedy" → "1963-11-22"

- extract="%reDeathN_{g1} of %reDeathPer_{g2}"  
  - norm="%normDeath(g2)"
Temponym tagging with HeidelTime

HeidelTime’s temponym tagging resources – examples

<table>
<thead>
<tr>
<th>reDeathN</th>
<th>reDeathPer</th>
<th>normDeath</th>
</tr>
</thead>
<tbody>
<tr>
<td>death</td>
<td>Che Guevara</td>
<td>&quot;Che Guevara&quot;,&quot;1967-10-09&quot;</td>
</tr>
<tr>
<td>suicide</td>
<td>John F. Kennedy</td>
<td>&quot;John F. Kennedy&quot;,&quot;1963-11-22&quot;</td>
</tr>
</tbody>
</table>

rule2a, e.g., "John F. Kennedy’s death" → "1963-11-22"
extract="%reDeathPer_{g_1}\text{’s } %reDeathN_{g_2}\text{", fast="%reDeathN"}
norm="%normDeath(g1)"

rule2b, e.g., "death of John F. Kennedy" → "1963-11-22"
extract="%reDeathN_{g_1} \text{ of } %reDeathPer_{g_2}\text{", fast="%reDeathN"}
norm="%normDeath(g2)"
Temponym tagging with HeidelTime

Postprocessing

- all temponyms converted into 4-tuple intervals [Berberich et al. ’10] to address uncertainty of temporal expressions
Temponym tagging with HeidelTime

Postprocessing
- all temponyms converted into 4-tuple intervals [Berberich et al. ’10] to address uncertainty of temporal expressions
- [earliest begin, latest begin, earliest end, latest end]
Temponym tagging with HeidelTime

Postprocessing

- all temponyms converted into 4-tuple intervals [Berberich et al. ’10] to address uncertainty of temporal expressions
- [earliest begin, latest begin, earliest end, latest end]
e.g., April 2016 to May 2016
[2016-04-01, 2016-05-31]
Temponym tagging with HeidelTime

Postprocessing

- all temponyms converted into 4-tuple intervals [Berberich et al. ’10] to address uncertainty of temporal expressions
- [earliest begin, latest begin, earliest end, latest end] e.g., April 2016 to May 2016
TEMponym tagging with HeidelTime

Postprocessing
- all TEMponyms converted into 4-tuple intervals [Berberich et al. ’10] to address uncertainty of temporal expressions
- [earliest begin, latest begin, earliest end, latest end]
  e.g., April 2016 to May 2016

TEMponyms in HeidelTime
- 496k birth TEMponyms
- 161k death TEMponyms
- 26k event TEMponyms (battles, wars, awards, ...)
- with a variety of formulations for many TEMponyms
Motivation Temponyms WWW’16 Approach HeidelTime Temponym Tagging with HeidelTime

Temponym tagging with HeidelTime

temporal enrichment analysis

- WikiWars corpus [Mazur & Dale ’10]
  - Wikipedia articles about famous wars in history
  - with manually annotated temporal expressions
  - 2,681 temporal expressions
**Motivation**

Temponyms

**WWW’16 Approach**

HeidelTime

**Temponym Tagging with HeidelTime**

---

**Temponym tagging with HeidelTime**

**temporal enrichment analysis**

- **WikiWars corpus** [Mazur & Dale ’10]
  - Wikipedia articles about famous wars in history
  - with manually annotated temporal expressions
  - 2,681 temporal expressions

- **temponym tagging of WikiWars**
  - 212 extracted temponyms
  - many provide additional / more precise temporal information
  - all addressed temponyms are explicit,
    \[\text{correct normalization is very likely}\]
After Benito Juárez’s death in 1872, Porfirio Díaz wanted to take over as Mexico’s leader. As allies, the two men had fought against the French in the Battle of Puebla, but once Juárez rose to power, Díaz tried to unseat him.

[WikiWars, Mexican Revolution]
After Benito Juárez’s death in 1872, Porfirio Díaz wanted to take over as Mexico’s leader. As allies, the two men had fought against the French in the Battle of Puebla, but once Juárez rose to power, Díaz tried to unseat him.

[WikiWars, Mexican Revolution]
After Benito Juárez’s death in 1872, Porfirio Díaz wanted to take over as Mexico’s leader. As allies, the two men had fought against the French in the Battle of Puebla, but once Juárez rose to power, Díaz tried to unseat him.

[WikiWars, Mexican Revolution]
HeidelTime as temporal and temponym tagger

Publicly available:
- UIMA version
- JAVA standalone version (API)
- online demo
- soon: within GATE [LREC’16]

Feedback is appreciated, thank you for your attention!
References I


References II


