### Temporal Expressions (TEs)

**Different types**
- Date: On May 22, 1995, Farkas was ...
- Time: ... in Brownsville around 7:15 p.m.
- Duration: He spent six days abroad ...
- Set: ... for liver transplants each year ...

**Different occurrences in documents**
- *explicit*: easy to normalize
- *implicit*: knowledge is needed
- *relative*: reference time is needed

**Annotation scheme**
- TimeML: ISO standard for temporal annotation (Timex3) [2]

### Main Challenges

**Disambiguation of:**
- the reference time of relative TEs
- underspecified relative TEs
- relations between underspecified TEs and reference time (which Thursday?)

**Document Creation Time:**

Today, King Hussein of Jordan arrived in Washington ... he had rejected in peace talks following the August 1988 cease-fire ...

**HeidelTime - Overview**
- **Rule-based system**: Realized as UIMA component [1]
- **Methods for Extraction**: regular expressions & NLP features
- **Methods for Normalization**: knowledge resources & linguistic clues
- **Two rule sets**: high precision (HeidelTime-1) and high recall (HeidelTime-2)

### HeidelTime – System Architecture

**Algorithm: ApplyRules**

```java
foreach sentence in document
  addDatesToCAS(date_rules,CAS)
  addTimesToCAS(time_rules,CAS)
  addDurationsToCAS(dur_rules,CAS)
  addDatesToCAS(rules,CAS)
end foreach
```

**Pattern Resources**

```java
... (July-August)...
```

**Normalization Phase**

```java
norm_r2 = UNDEF
normWday(g1) = "Thursday"
```

### Extraction Results

**Precision Recall F-score**

- HeidelTime-1: 90% 82% 86%
- HeidelTime-2: 82% 91% 86%

### Normalization Results

**Accuracy Type Acc.**

- HeidelTime-1: 85% 96%
- HeidelTime-2: 77% 92%

### Ongoing Work

- **Other languages**: new pattern resources (e.g., names of months, weekdays, ...)
- **new normalization resources**
- **new rules**

### Other types of corpora

- **TempEval-2 corpus**: news documents
- **adaptations for and evaluation on other types of corpora**

### References


### Contact information:

Jannik Strötgen
stroetgen@uni-hd.de

[http://dbs.ifi.uni-heidelberg.de/](http://dbs.ifi.uni-heidelberg.de/)