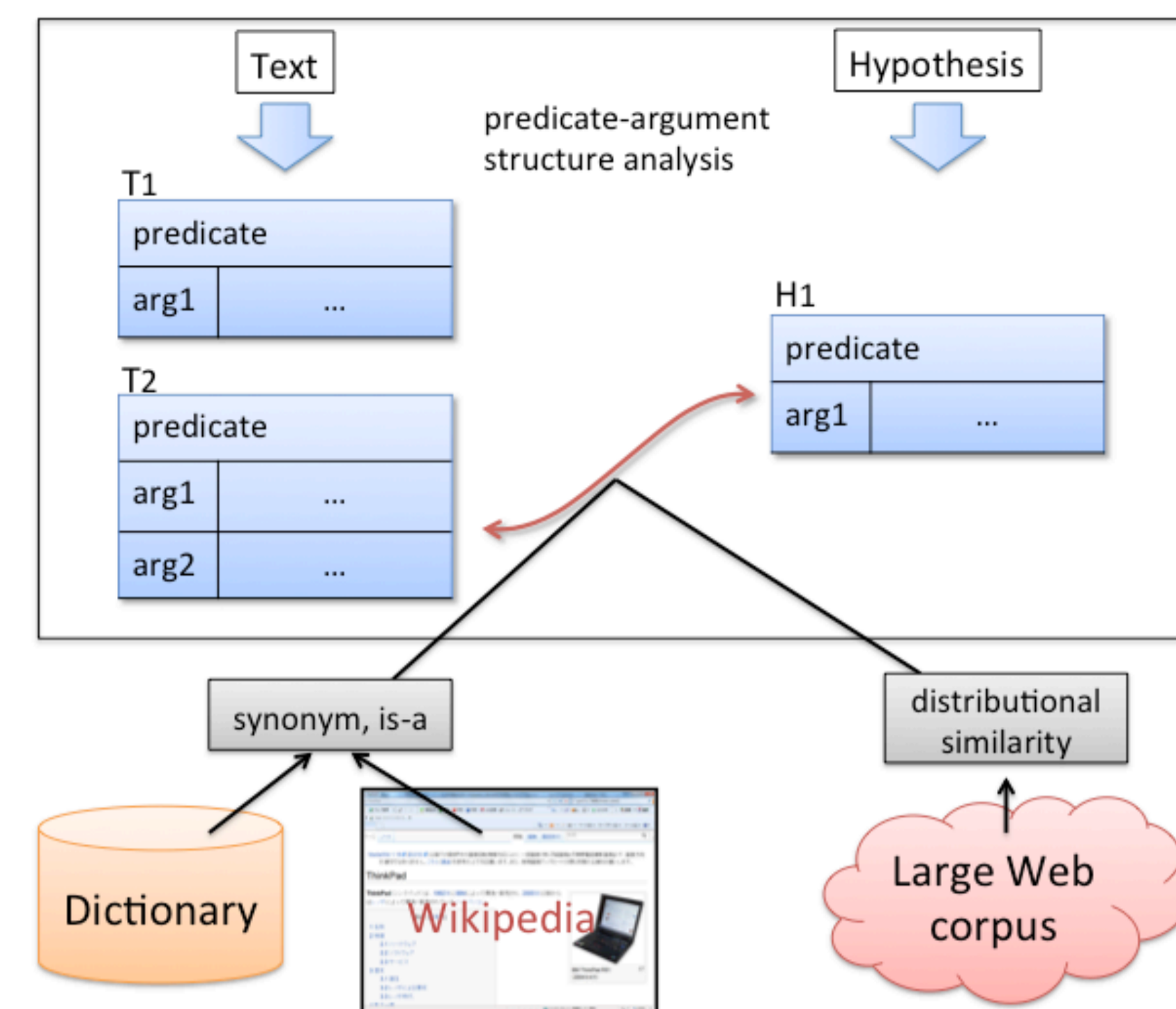


Predicate-argument Structure based Textual Entailment Recognition System of KYOTO Team for NTCIR-10 RITE-2

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Overview

- ◆ Regard predicate-argument (PA) structure as a basic unit of handling the meaning, and perform the matching between text (T) and hypothesis (H) on PA structure
- ◆ Utilize wide coverage relations between words/phrases, which are automatically acquired from a dictionary, Wikipedia, and a Web corpus
- ◆ Participated in Japanese BC, MC, EXAM, and Search subtasks.



PA Structure Analysis

東京都西多摩地区では、各地で季節を楽しむイベントが開かれる。
(In Tokyo West Tama area, the event, where people enjoy the season every place, is hold.)

| | |
|-------------|-----------------|
| 楽しむ (enjoy) | |
| [syn] | <enjoy> |
| ヲ (acc) | 季節 (season) |
| | [syn] <season> |
| デ (loc) | 各地 (each place) |
| | [is-a] <place> |

| | |
|----------------|--------------------------------|
| 開かれる (be held) | |
| ガ (nom) | イベント (event) |
| | [syn] <event> |
| デ (loc) | 地区 (area) |
| | [syn] <area> |
| | [mod] 東京都西多摩 (Tokyo West Tama) |

PA-matching Method

- If all the PAs in H are matched to a PA in T, the system judges "T entails H"
- Entailment of PAs is defined as follows:
 - The predicate and all the arguments in H are matched to those in T
 - Correspondence of surface form / synonym
 - Distributional similarity between predicates > threshold
 - Args/pred in H are more "general" compared to those in T

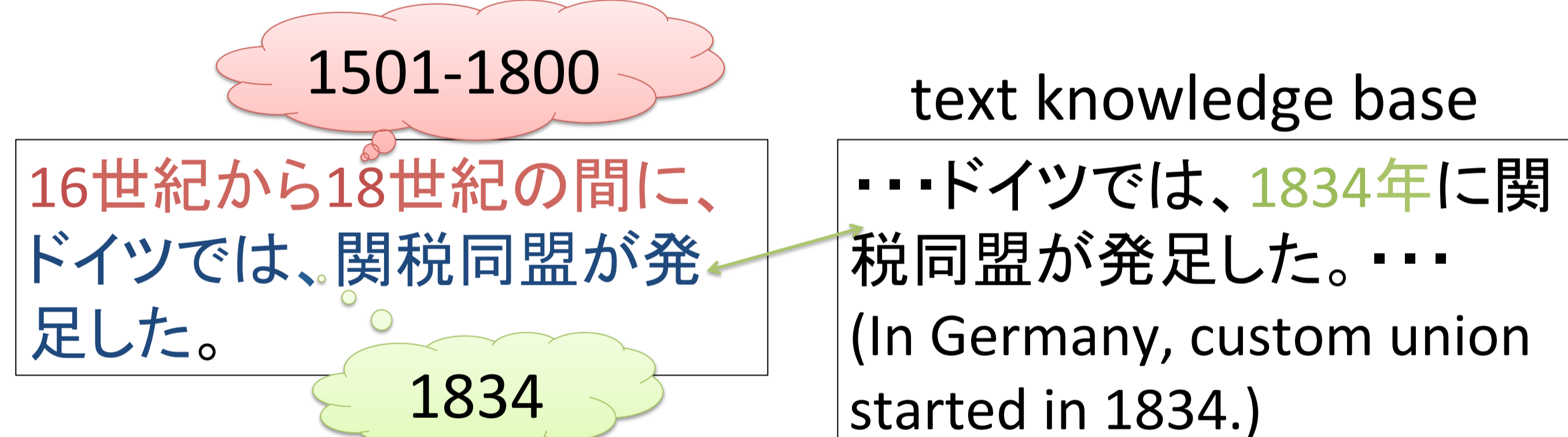
SVM-based Method

- Take a machine learning approach (SVM) to consider relatively shallow clues
- Features
 - Overlap ratio of morphemes and characters
 - Result of PA-matching method (Y/N)
 - ...

Search SubTask

- Given a statement, the system judges the truth or falsity of the statement based on text knowledge base (KB)
- The tasks can be classified into two types:
 - whether a time expression and the time when an event occurred are consistent or not (30%)

16世紀から18世紀の間に、ドイツでは、関税同盟が発足した。
(In Germany, custom union started between the 16th and 18th century.)
 - whether an event is true or not (70%)



check the consistency of the year the event occurred with the time expression

Experiments

| | BC dev | BC test | MC dev | MC test | EXAM dev | EXAM test |
|--------------------|--------|---------|--------|---------|----------|-----------|
| PA-matching method | 42.84 | 41.97 | 16.95 | 17.04 | 39.50 | 37.86 |
| SVM-based method | 78.18 | 74.50 | 49.13 | 50.12 | 62.06 | 56.82 |
| Baseline | -- | 62.53 | -- | 26.61 | -- | 54.77 |

| Search SubTask | dev | test |
|----------------|------------------|-------|
| KB: Wikipedia | 45.74 (59.38) | 46.57 |
| KB:textbook | 45.46 (59.38) | 45.41 |

(containing a time expression only)

| | | correct | | |
|--------|-----|---------|-----|-----|
| | | Y | N | all |
| system | Y | 13 | 1 | 14 |
| | N | 243 | 353 | 596 |
| | all | 256 | 354 | 610 |

| | | correct | | |
|--------|-----|---------|-----|-----|
| | | Y | N | all |
| system | Y | 168 | 61 | 229 |
| | N | 88 | 293 | 381 |
| | all | 256 | 354 | 610 |

- Correct example in PA-matching method (BC)
 - t1: アシガバート空港は、トルクメニスタンの首都アシガバートにある空港である。
(Ashgabat Airport is an airport that is located in Ashgabat, which is a capital of Turkmenistan.)
 - t2: アシガバートは、トルクメニスタンの首都である。
(Ashgabat is a captal of Turkmenistan.)
- PA-matching method could not recognize the following synonymous/entailment relation:
 - 連隊長となった = 連隊長に就任した (became a regimental commander)
 - 張り付けにされた → 罰を受けた (crucified → take the rap)