

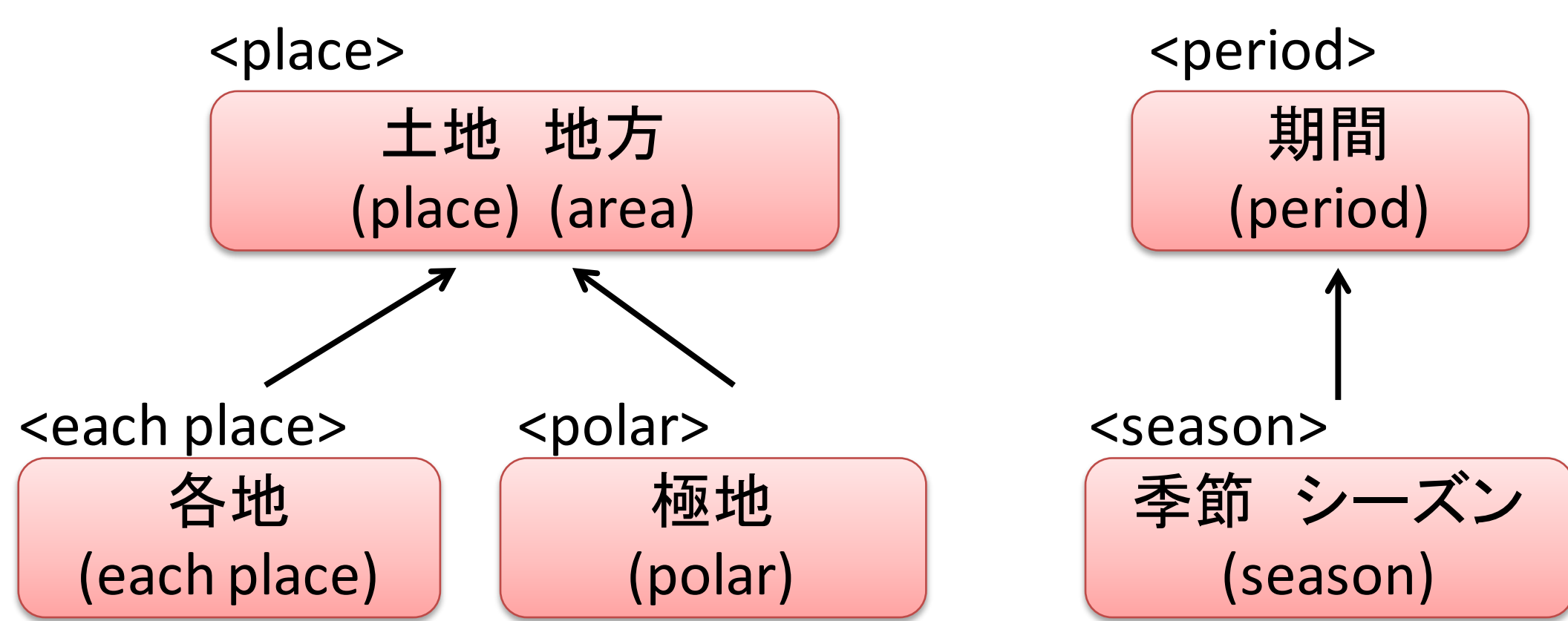
Overview

- ◆ 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

Resource

Relations between words/phrases

- Extract synonym, is-a, and antonym relations automatically from a dictionary and Wikipedia
- Assign synonymous groups to IDs (SYNID)



Distributional similarity between verbs

- Distributional similarity is calculated using a large Web corpus
- Feature vector: a set of “noun + case marker”
- Calculate similarity between two vectors



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)

開く (hold)	
ヲ (acc)	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 / SYNID
 - Distributional similarity between predicates > threshold
 - Arguments or predicate 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
 - Overlap ratio of characters (1-gram, 2-gram, 3-gram, 4gram)
 - Result of PA-matching method (Y/N)
 - ...

Experiments

- We participated in Japanese BC, MC, EXAM, and RITE4QA
- Resources
 - Reikai-shogaku dictionary (30,000 entries)
 - Japanese Wikipedia
 - Japanese Web page (100 million pages)

	BC dev	BC test	MC dev	MC test
PA-matching method	0.550	0.492	0.216	0.214
SVM-based method	0.536	0.516	0.498	0.480
Two-stage method	0.536	0.516	0.495	0.484

	EXAM dev	EXAM test	RITE4QA
PA-matching method	0.593	0.593	0.889
SVM-based method	0.655	0.656	0.684
Two-stage method	0.655	0.656	0.684

Two-stage method first applies PA-matching method, and if “Y” is obtained, the result is adopted; otherwise the SVM-based method is applied.

	BC dev	BC test	MC dev	MC test
PA-matching method	0.550	0.492	0.216	0.214
w/o SynID	0.542	0.496	0.214	0.216
w/o distributional similarity	0.532	0.494	0.205	0.207
SVM-based method	0.536	0.516	0.498	0.480
w/o PA-matching method result	0.512	0.570	0.493	0.482

	EXAM dev	EXAM test	RITE4QA
PA-matching method	0.593	0.593	0.889
w/o SynID	0.589	0.593	0.890
w/o distributional similarity	0.593	0.588	0.889
SVM-based method	0.655	0.656	0.684
w/o PA-matching method result	0.651	0.665	0.362