



Linking Japanese FrameNet with Kyoto University Case Frames Using Crowdsourcing

Kyoko Ohara, Daisuke Kawahara, Satoshi Sekine, Kentaro Inui

Keio University/
RIKEN AIP

Kyoto University/
RIKEN AIP

RIKEN AIP

Tohoku University/
RIKEN AIP

Research Goal

- To scale up the Japanese FrameNet (JFN)

Methods

- Link JFN with Kyoto University Case Frames (KCF)
 - Assign a JFN semantic frame to each KCF case frame of a predicate (verb/adjective/adjectival noun) that correspond to the same meaning of the predicate
- Crowdsourcing of example sentence selection tasks

Contributions

- Scaling up the JFN annotated corpus by orders of magnitude
- Facilitating identification of missing semantic frames in JFN
- Addition of new words to existing semantic frames in JFN

Japanese FrameNet (JFN)



- A sister project of English FrameNet (FN), sharing DBs, data formats, and tools with FN
- Semantic Frame: A script-like conceptual structure that describe a particular type of situation, object, or event along with its participants and props, i.e. Frame Elements (FEs)
- Lexical Units (LUs): Pairing of a word with a meaning

	FN	JFN
# of Semantic Frames	1223	979
# of LUs	13638	5029*
# of Annotated Sentences	202229	7899

(*: 1136 verbs, 132 adjectives, 154 adjectival nouns, 3307 nouns, etc.)

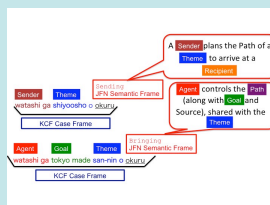
Kyoto University Case Frames (KCF)



- Case Frame: A predicate-argument structure, represented as a predicate and a set of case filler words
- Constructed by applying Chinese Restaurant Process-based clustering to 10 billion Japanese sentences
110,000 predicates; 5.4 case frames/predicate on average

KCF Case Frame ID	Case Slots	Instance Words
okuru (1)	ga (NOM) o (ACC) ni (DAT)	watashi 'I': 374, ... meeru 'mail': 211755, ... keitai 'cell phone': 30944, ...
okuru (2)	ga (NOM) o (ACC) ni (DAT)	josei 'women': 489, ... ceru 'yell': 70314, ... senshu 'athlete': 3478, ...
okuru (3)	ga (NOM) o (ACC) ni (DAT)	watashi 'I': 125, ... shitsuei 'application': 35477, ... kaisha 'company': 1367, ...

Partial list of KCF case frames for *okuru* 'send'

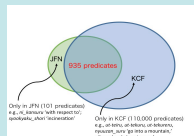


JFN Semantic Frames and KCF Case Frames

Experimental Settings

- 37 Predicates (27 verbs; 5 adjectives; 5 adjectival nouns)
 - That exist in JFN & in KCF; Defined in two semantic frames in JFN
 - 712 case frames in KCF
- 10 crowdworkers/case frame
 - Answers aggregated by majority voting; Used gold questions
- 272 crowdworkers in total; Completed in 2 hours and 10 minutes

Crowdsourced sentence selection task



Target Predicates

Experimental Results & Analyses

KCF Case Frame ID	KCF Target Sentence	JFN Semantic Frame with the largest # of votes
okuru (1)	watashi tachi ga imeeru o <u>okutta</u> (We <u>sent</u> email)	✓ Sending
okuru (2)	futari ga seien o <u>okuru</u> (Two people <u>SEND</u> cheers)	✓ "OTHER"
okuru (3)	watashi ga shiyooshu o <u>okuru</u> (I <u>send</u> a specification)	✓ Sending
okuru (4)	futari ga setsuyaku seikatsu o <u>okuru</u> (Two people <u>SEND</u> =live frugal lives)	✓ "OTHER"
okuru (5)	watashi ga senga o <u>okuru</u> (I <u>send</u> specification)	✓ Sending
okuru (6)	watashi ga tookyoo eki made sannin o <u>okuru</u> (I <u>SEND</u> =take three people to Tokyo Station)	✓ Bringing
okuru (7)	jibun ga seishun jidai o <u>okutta</u> (I <u>SENT</u> =spent [my] youth)	✓ "OTHER"
okuru (8)	watashi ga fakkusu de <u>okuri</u> mashoo ka (Shall I <u>send</u> [it] by fax?)	✓ Sending
okuru (9)	boku no noo ga kiken shingoo o <u>okuru</u> (My brain <u>sends</u> a danger signal)	× OTHER

Results of JFN semantic frame assignments to KCF case frames for *okuru* 'send' by crowdworkers

Classification of Predicates based on Results

- Category I (9 predicates) Accuracy: 83.9%**
The two JFN semantic frames are semantically distinct
e.g. *okuru* 'send' (Sending & Bringing JFN semantic frames)
- Category II (11 predicates) Accuracy: 57.9%**
The two JFN semantic frames are semantically close
e.g. *iku* 'go' (Motion & Self_motion JFN semantic frames)
- Category III (17 predicates) Accuracy: 26.3%**
The semantic frames assigned to the predicate in JFN do not correctly characterize its meanings
e.g. *tekisetsu-da* 'appropriate' (Suitability & Desirability JFN semantic frames)

Uses of the "OTHER" Option by Crowdworkers

- Support-predicate uses can be detected
e.g. KCF case frames *okuru* (2), (4) & (7)

Conclusion and Prospects

- Proposed a method to crowdsource assignment of JFN semantic frames to KCF case frames, to scale up the JFN annotated corpus
 - Category I Predicates with two JFN semantic frames: promising results
 - "OTHER": May be utilized to find support-predicate uses
- Next steps
 - Predicates with three or more JFN semantic frames
 - Assignment of JFN Frame Elements (FEs) to KCF case slots