Issue Topic based Argumentative structure extraction from Japanese judgment documents

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Goal of the project

- Summarization of Judgment documents
  - Information source: **judgment documents**
    - Long, complicated
    - Interleaved arguments
  - Target audience: legal professionals
    - Their task: construct and analyze legal cases
    - Information overload
  - Previous studies
    - Extractive summarization with Rhetorical status analysis approach
    - Hachey and Grover, 2006, Saravanan and Ravindran, 2010
      - Most sentences (or clauses,) are classified into "Argumentative" category and it was not so helpful in constructing summary.
      - We need the relation and roles among those argumentative sentences.
  - Our idea: **Argument** focused summarization
    - Argumenta extraction is required!
    - Application is not limited to summarization
      - Highlighting the important sentences in the documents
      - Enhance precedents search engines

Arguments in Japanese Judgment documents

- Structure
    - Hierarchical structure which is Issue Topic centered.
    - One argument is supported by its sub arguments (e.g. Lv.2 is supported by Lv.3).
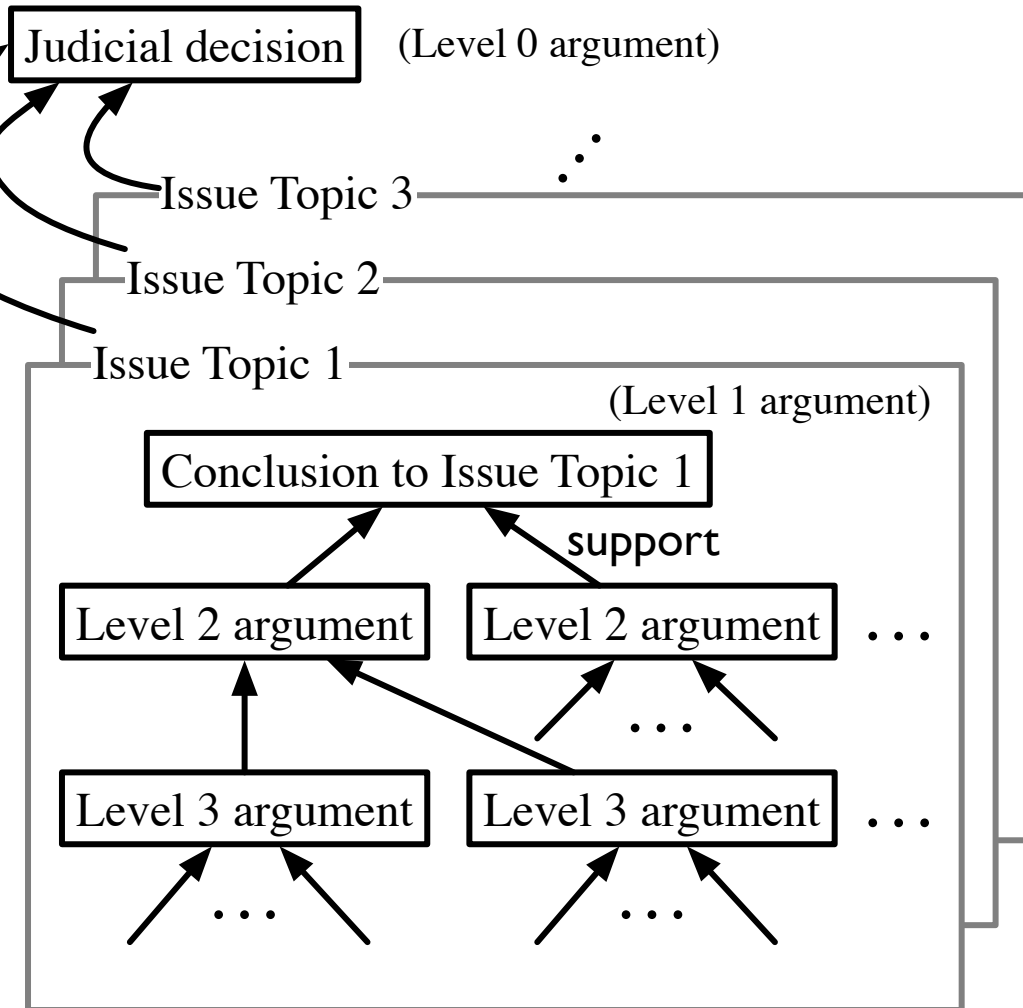
- Issue Topic:
    - Issue Topics are the main contentious items to be argued about between the interested parties.
    - Example:
        - **Case**: *Road safety in a bus travel sub-contract situation*
        - **Issue Topic 1**: *Details of damage incurred by plaintiff*
        - **Issue Topic 2**: *Comparative negligence [degree of plaintiff's own negligence]*

Judicial decision (Level 0 argument)

Issue Topic 3
Issue Topic 2
Issue Topic 1

(Level 1 argument)

Conclusion to Issue Topic 1

support

Level 2 argument   Level 2 argument . . .

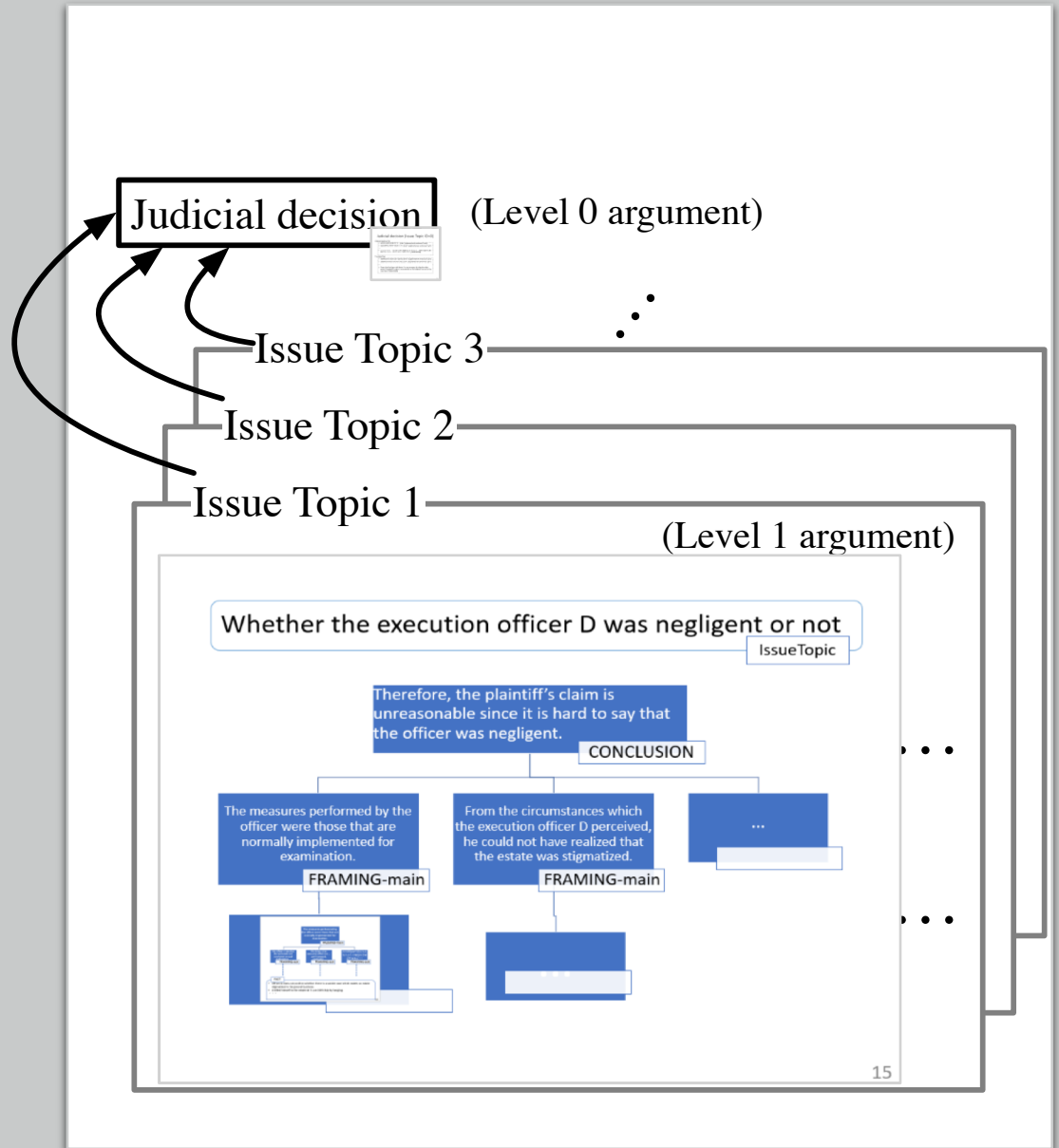Level 3 argument   Level 3 argument . . .

Example

http://www.courts.go.jp/app/files/hanrei_jp/301/037301_hanrei.pdf

Case: Estate compensation

The plaintiff insists that the court executing officer was negligent in that the officer didn't notice that a person had committed suicide in the real estate when he performed an investigation of the current condition of the real estate, and also insists that the execution court was negligent in that the court failed to prescribe the matter to be examined on the examination order. As a result, the plaintiff won a successful bid for the estate with a higher price than the actual value of the estate given that the plaintiff did not have the information that the property was stigmatized. The plaintiff claims compensation for damage and delay from the defendant.

Judicial decision   (Level 0 argument)

Issue Topic 3

Issue Topic 2

Issue Topic 1

(Level 1 argument)

Whether the execution officer D was negligent or not
IssueTopic

Therefore, the plaintiff's claim is unreasonable since it is hard to say that the officer was negligent.
CONCLUSION

The measures performed by the officer were those that are normally implemented for examination.
FRAMING-main

From the circumstances which the execution officer D perceived, he could not have realized that the estate was stigmatized.
FRAMING-main

Judicial decision (Issue Topic ID=0)

Original Japanese Text

- 1原告の請求を棄却する。[from "judgment(main sentences)" part]
- 2訴訟費用は原告の負担とする [from "judgment(main sentences)" part]

….

- 以上のとおり，その余の点を判断するまでもなく，原告の請求は理由がないから，主文のとおり判決する。[CONCLUSION]

Translated Text

- 1 Plaintiff's claims are rejected. [from "judgment(main sentences)" part]
- 2 Plaintiff bears all court costs. [from "judgment(main sentences)" part]

….

- Given what has been said above, it is not necessary to judge the other points; the plaintiff's claim is unreasonable so the judgment returns to the main text. [CONCLUSION]

Whether the execution officer D was negligent or not

Therefore, the plaintiff's claim is unreasonable since it is hard to say that the officer was negligent.

CONCLUSION

The measures performed by the officer were those that are normally implemented for examination.
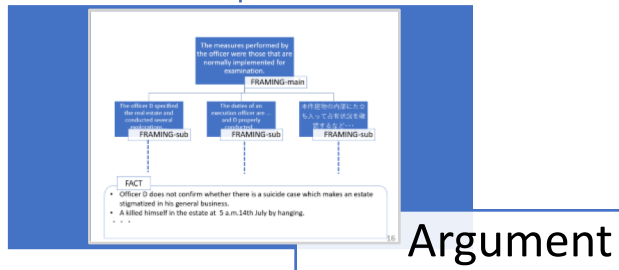
Argument

From the circumstances which the execution officer D perceived, he could not have realized that the estate was stigmatized.

Argument

...

Argument

Argument

The measures performed by the officer were those that are normally implemented for examination.

Argument

The officer D specified the real estate and conducted several explorations...

Argument

The duties of an execution officer are ... and D properly conducted...
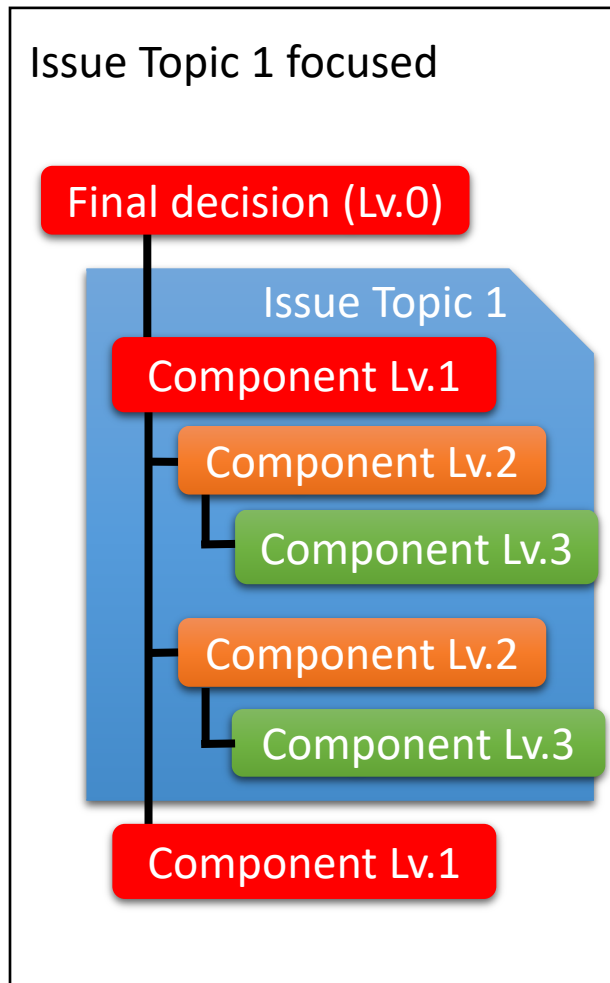
Argument

It is considered that officer D entered the real estate to confirm the circumstances....

Argument

Premises (usually facts)

- Officer D does not confirm whether there is a suicide case which makes an estate stigmatized in his general business.
- A killed himself in the estate at 5 a.m.14th July by hanging.
- • •

Argument-based summary

Issue Topic 1 focused

Final decision (Lv.0)

Issue Topic 1

Component Lv.1

Component Lv.2

Component Lv.3

Component Lv.2

Component Lv.3

Component Lv.1

Yamada et al. 2017a.

- Summary has structure
  - It presents each Issue Topic **separately**
    - One argument per Issue Topic
  - It shows **support** relationships
  - Focus on one Issue Topic
    - Selecting relevant components to the focused Issue Topic
  - More argument levels are covered

The plaintiff insists that the court executing officer was negligent in that the officer didn't notice that a person had committed suicide in the real estate when he performed an investigation of the current condition of the real estate, and also insists that the execution court was negligent in that the court failed to prescribe the matter to be examined on the examination order. As a result, the plaintiff won a successful bid for the estate with a higher price than the actual value of the estate given that the plaintiff did not have the information that the property was stigmatized. The plaintiff claims compensation for damage and delay from the defendant.

[Issue Topic 2]: Whether the execution officer D was negligent or not.

The measures performed by the officer were those that are normally implemented for examination. From the circumstances which the execution officer D perceived, he could not have realized that the estate was stigmatized. The officer cannot be regarded as negligent in that negligence would imply a dereliction of duty of inspection, which, given that there were sufficient checks, did not happen.

Concerning the question whether the officer had the duty to check whether the estate was stigmatized, we can observe various matters -- in actuality, the person who killed himself happened to be the owner of the estate and the legal representative of the Revolving Credit Mortgage concerned, the house then became vacant and was offered for auction, but we can also observe the following: other persons but the owner himself could have committed suicide in the estate, for instance friends and family; there was a long time frame during which the suicide could have happened; the neighbors might not have answered the officer's questions in a forthcoming manner, even if they were aware of the fact that the estate was stigmatized; there are several factors to affect the value of the estate beyond the fact that the estate was stigmatized, and it is not realistic neither from a time perspective nor an economic perspective to examine all such factors specifically; and the bidders in the auction were in a position to examine the estate personally as the location of the estate was known -- taking these relevant matters into consideration, it is a justified statement that the officer didn't have the duty to check in a proactive manner whether the estate was stigmatized.

Therefore, the plaintiff's claim is unreasonable since it is hard to say that the officer was negligent.

[Issue Topic 3]: Whether the examination court was negligent or not.

The plaintiff's claim is unreasonable for the additional reason that it is hard to say that the examination court was negligent.

Given what has been said above, it is not necessary to judge the other points; the plaintiff's claim is unreasonable so the judgment returns to the main text.

Lv0, Lv1, Lv2, Lv3, Lower

Tasks described

Yamada et al. 2017b.

1. Rhetorical status classification
   - Assign rhetorical status to each text span.

2. Issue Topic Identification
   - Find Issue Topics.

3. Issue Topic Linking
   - Link each rhetorical unit to the Issue Topic it belongs to.
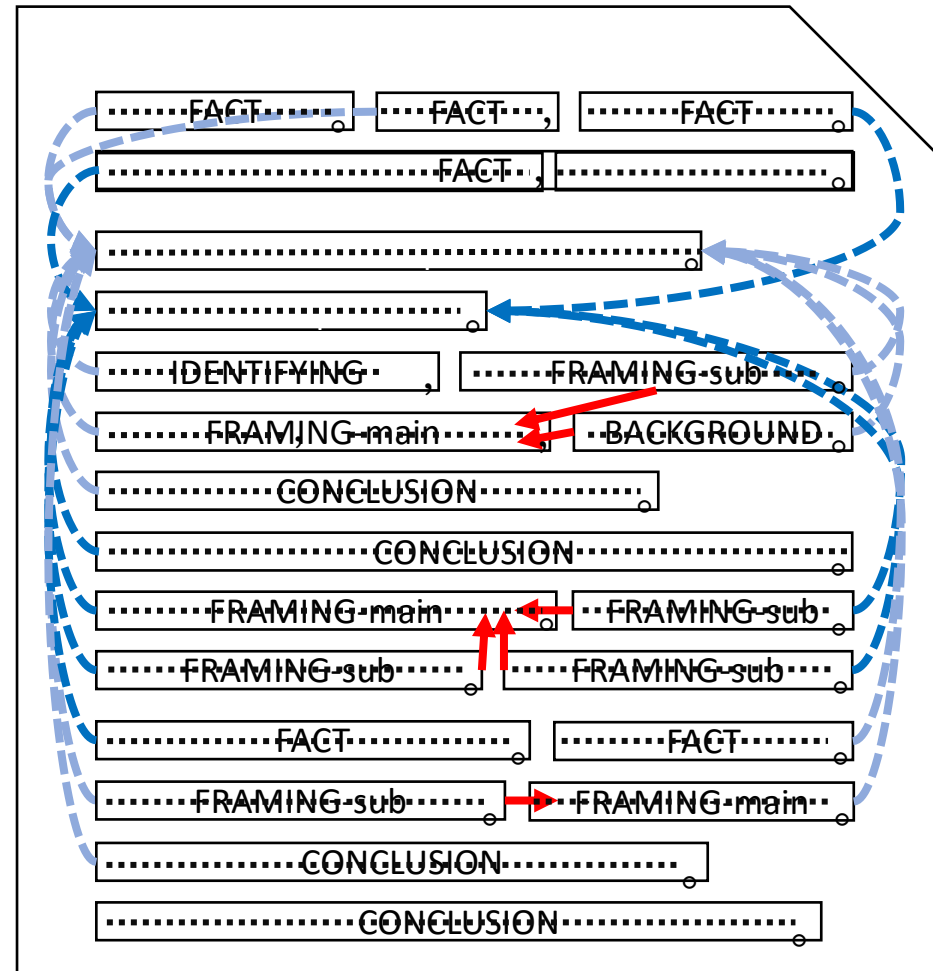
4. Argumentative relation extraction

Source	Destination
FRAMING-sub	FRAMING-main
BACKGROUND	
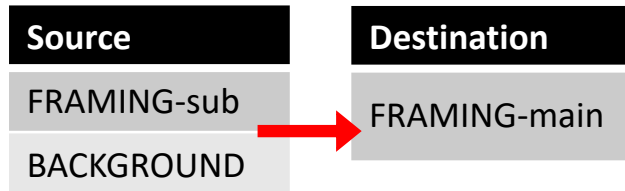
   - Only if argumentative support exists.
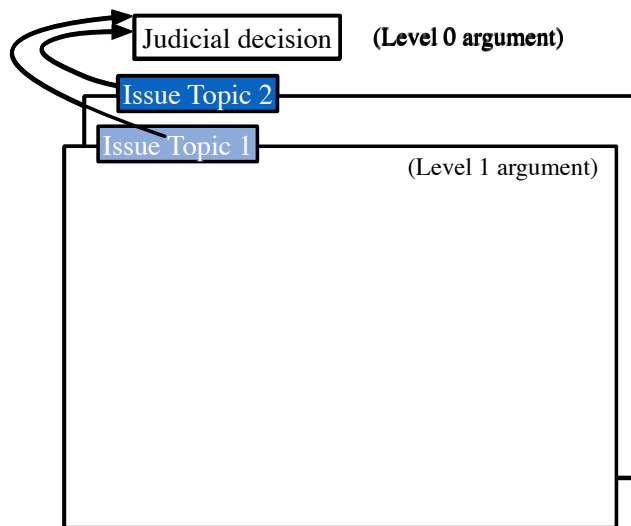
Text unit: comma-separated text piece
Span: sequence of text units

Rhetorical status categories

Categories adaptation from Hachey and Grover (2006) for Japanese judgement documents

Categories	Definition of rhetorical categories
FACT	The text unit describes a fact.
OTHER	The text unit does not satisfy any of the requirements above
BACKGROUND	The text unit gives a direct quotation or reference to law materials (law or precedent) and applies them to the present case.
CONCLUSION	The text unit clearly states the conclusion from argumentation or discussion
IDENTIFYING	The text unit identifies a discussion topic.
FRAMING-main	The text unit consists of argumentative material that directly support a CONCLUSION unit.
FRAMING-sub	The text unit consists of argumentative material that indirectly supports a CONCLUSION unit or that directly supports a FRAMING-main unit.

B. Hachey, C. Grover (2006): Extractive summarisation of legal texts. Artificial Intelligence and Law, 14(4).

Our corpus

- Source: http://courts.go.jp
  - Time frame: 2003/04/15 ~ 2016/12/31
  - General civil cases
  - Only documents which have manually generated summaries are extracted.
- Target documents
  - Documents exclusion criteria:
    - Exclude error documents(OCR errors)
    - Doc length<=400000
    - 150 <= summary length <= 450

Our corpus

Overview	
# of docs	89
# of units	136972
# of sentences	37590
# of characters	2528604

Distribution of labels (units)	
FACT	43022
FRAMING-main	36648
FRAMING-sub	28857
OTHER	16816
CONCLUSION	5841
IDENTIFYING	4565
BACKGROUND	791
IssueTopic	432

Preliminary experiments

by SVM and CRF with hand-crafted features

Issue Topic Identification

Experiment with simple binary classifier

Issue Topic Identification

- Identification:
  - Identify Issue Topics in the source documents

………..
This is a text span submitting a fact. This is a text span introducing the past results of the trials, "Precedents".
………..
This is a text span defining the Issue Topic.
This is a span which states judge's argumentation. This is a text span submitting a fact.
………..
This is a text span defining the Issue Topic
………..

Rhetorical status classification

Rhetorical status classification sample

- Assign rhetorical role to each sentence

FACT
BACKGROUND
FRAMING-main
CONCLUSION

陰影は鎖骨の幅を超えている．

....

かかる注意義務の基準となるべきものは，当時のいわゆる臨床医学の実践における医療水準であるが(最高裁昭和57年3月30日第三小法廷判決・裁民135号563項参照),　集団検診には，（1）で説示した制約・限界が内在することを照らせば，集団検診におけ胸部X線写真の読影に係る医療水準とは自ずと異なると言うべきである。

....

以上によれば，14年写真……以上ありとして指摘すべきかどうかの判断が異なりうると言わざるを得ないから，……注意義務に反するものということはできない。

Wrap-up

- The CRF is still the best among all models.
  - CRF is the only model that can consider the sentence level context.
  - I need to take the context into account in the NN models as well. (but LSTM like approaches were not effective so far. These results are not reported in this presentation. WIP.)
- Fine-tuning could improve the performance.
  - Weights that are trained with unlabeled judgment documents help models.
  - There might be some room for improvement.
  - Next, I extend the target of fine-tuning to deeper layers.

Current work

- Experiments for Rhetorical status classification
  - Pre-training approaches
  - Combined approaches with SVM/CRF and NNs
    - Ensemble or Connecting
- Assessment of extracted arguments by professionals
  - To evaluate the quality of extraction beyond numerical metrics (subjective evaluation by several retired judges)
- Extending corpus size
  - + 31 documents in next 3 months

References

- Ben Hachey and Claire Grover. 2006. Extractive summarisation of legal texts. Artificial Intelligence and Law, 14(4):305–345.

- M. Saravanan and B. Ravindran. 2010. Identification of Rhetorical Roles for Segmentation and Summarization of a Legal Judgment. Artificial Intelligence and Law, 18(1):45–76.

- Shinji Banno, Shigeki Matsubara, and Masatoshi Yoshikawa. 2006. Identification of Important parts in judgments based on Machine Learning (機械学習 に基づく判決文の重要箇所特定). In Proceedings of the 12th Annual Meeting of the Association for Natural Language Processing, pages 1075–1078. the Association for Natural Language Processing.

- Raquel Mochales and Marie Francine Moens. 2011. Argumentation mining. Artificial Intelligence and Law, 19(1):1–22.

- Christian Stab and Iryna Gurevych. Parsing argumentation structures inpersuasive essays. Computational Linguistics, 43(3):619–659, 2017.

- 益岡隆志, 『日本語モダリティ探究』, 2007年5月24日発行, くろしお出版刊, 2008 4 4 103-108

- Hiroaki Yamada, Simone Teufel and Takenobu Tokunaga. *Designing an annotation scheme for summarizing Japanese judgment documents*. Proceedings of the 9th International Conference on Knowledge and Systems Engineering (KSE 2017), 2017a.

- Hiroaki Yamada, Simone Teufel and Takenobu Tokunaga. *Annotation of argument structure in Japanese legal documents.* Proceedings of the 4th Workshop on Argument Mining (ArgMining2017), 2017b.

- Suguru Matsuyoshi, Satoshi Sati, and Takehiko Utsuro. A dictionary of japanese functional expressions with hierarchical organization. Journal of Natural Language Processing, 14(5):123–146, oct 2007. ISSN 1340-7619.