

# Budget Argument Mining Dataset

## Using Japanese Minutes from the National Diet and Local Assemblies

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### Abstract

Budget argument mining attempts to identify argumentative components related to a budget item, and then classifies these argumentative components, given budget information and minutes. We describe the construction of the dataset for budget argument mining, a subtask of QA Lab-PoliInfo-3 in NTCIR-16. Budget argument mining analyses the argument structure of the minutes, focusing on monetary expressions (amount of money). In this task, given sufficient budget information (budget item, budget amount etc.), relevant argumentative components in the minutes are identified and argument labels (claim, premise and other) are assigned their components. In this paper, we describe the design of the data format, the annotation procedure, and release information of budget argument mining dataset, to link budget information to minutes.

**Keywords:** Japanese assembly minutes, budget, argument mining

## 1. Introduction

Politics has the important role of creating a budget that determines how government funds will be spent, considering income and expenditures. National and local budget deliberations are held in the National Diet and Local assemblies. The national budget is drafted by the cabinet and discussed in the National Diet before becoming the official budget. The budgets of local governments are proposed by the governors or mayors, and are discussed and approved in the assembly. However, most people will have difficulty understanding the background of the proposed budget, as well as the discussions that lead to the final budget.

In the field of natural language processing, argument mining has been studied to elucidate the discussion process of discussion<sup>1</sup>. Argument mining attempts to identify argumentative structures from natural language text. The identification of argumentation structures involves several sub-tasks such as separating arguments, classifying argument components into claims and premises, and identifying argumentative relations. Argument mining is a task that analyzes argument structures, which assigns labels (claims and premise) to discourse components such as sentences and clauses in essays (Kuribayashi et al., 2019)(Stab and Gurevych, 2017).

Budget information for national and local governments is available on the web. For example, the Global Open Data Index provides the most comprehensive snapshot available on the state of open government data publication<sup>2</sup> although the index did not apply any text mining tasks related to natural language processing. The study on the Malta Government Budget is an exam-

ple of studies on government budgets using text mining. Malta Government Budget 2018 dataset comprises over 500 online posts in English, and/or in the Maltese less-resourced language, gathered from social media platforms (Cortis and Davis, 2019). However these studies did not handle minutes of the National Diet and Local Assemblies.

Therefore, in this study, we attempt to develop a system that allows us to easily understand the background of a budget and the discussions that lead to the final budget of the national and local governments. Here, we designed a budget argument mining task that identifies and links budget items and corresponding discussions in the minutes, which are made public by the national and local governments. Moreover, we do not cover all minutes, but focus on argumentative components that include monetary expressions and perform analysis efficiently. The argumentative components that include monetary expressions are extracted by the Named Entity Recognition (NER) tool. Subsequently, we describe the design of the data format, the annotation procedure, and the results for the dataset construction, and then present the budget argument mining dataset<sup>3</sup>, to link budget information to minutes.

The following are the four contributions of this study.

1. We propose a task to link a budget item to the related argumentative component in different language resources (minutes and budget information).
2. We proceed the next higher data structure analysis by utilizing previous research. In this research, we

<sup>1</sup><http://acl2016tutorial.arg.tech/>

<sup>2</sup><https://index.okfn.org/dataset/>

<sup>3</sup><https://github.com/poliinfo3/PoliInfo3-FormalRun-BudgetArgumentMining>

Budget Information		Minutes
Budget item	Budget amount	In the current extraordinary meeting, six projects were selected as the second phase of the city's countermeasures against the <b>new coronavirus infection</b> , including one project for the improvement of the medical system, three projects for <b>economic measures</b> , and two projects for livelihood support measures. <b>Premise : Future</b> A total of <b>287 million yen</b> has been budgeted for these projects.
Temporary grant for regional revitalization for <b>new coronavirus infectious diseases</b>	¥ 287,108 thousand	

Figure 1: Image of budget argument mining task that links budget items to relevant discussions based on MONEY expressions.

automatically identify argumentative components, which includes MONEY expressions using NER.

3. We unify data formats among multiple local governments (Otaru City, Ibaraki Prefecture and Fukuoka City).
4. We develop a budget argument mining dataset, organize the shared task, and publish the dataset.

## 2. Related Work

### 2.1. Financial documents and MONEY

In financial research, monetary expressions are often the target. FinNum-2 is a fine-grained numeral understanding in financial social media data<sup>4</sup>. The task is called numeral attachment, which attempts to identify the attached target of the numeral. FinCausal 2020 is a Shared task that identifies causality in financial datasets (Mariko et al., 2020). FinCausal 2020 attempts to determine if a text section contains a causal scheme. Recently, NER tools have been optimized to recognize monetary expressions with high accuracy (Manning et al., 2014). Consequently, NER tools recognize the named entities, such a MONEY, in a given text (Cao et al., 2018).

### 2.2. Political information

Fake news and fact checking are often associated with political information such as public debates and meeting minutes. Fact checking tasks have been adopted in the U.S. Presidential debate articles of 2016 (Atanasova et al., 2018). Minutes of the National Diet and Local assemblies are also political information. Although National Diet minutes can be collected using Web API (JSON or XML), Local Assembly minutes need to be crawled and scraped. To solve this problem, the creation of a dataset that can be employed for research is underway. The corpus contains the local assembly minutes of 47 prefectures from April 2011 to March 2015 (Kimura et al., 2016).

### 2.3. Argument mining

Research on Argument mining has garnered considerable attention as an approach to natural language

processing based on logic, to capture the structure of arguments (Toulmin, 1958) (Freeman., 2011). Argument structure analysis is a task that analyzes argument structures, and is a typical task of argument mining that assigns labels (claim, premise) to discourse units of sentences and clauses (Kuribayashi et al., 2019). The common processes in argument mining analysis include the identification of argumentative components, clause attributes, and relationships between clauses (Lawrence and Reed, 2019).

## 3. Budget Argument Mining

### 3.1. Task description

Budget Argument Mining is a task that identifies argumentative components related to a budget item, and then classifies these argumentative components, given budget information and minutes.

Figure 1 presents an image of a budget argument mining task that links budget items to the discussions, using both the budget information and minutes of Japanese Local government (Otaru city) as examples. The budget information is expressed as the budget item of "Temporary grant for regional revitalization against the **new coronavirus infectious disease (COVID-19)**" and the amount of money is **¥ 287,108 thousand**. The discussion on this **¥ 287,108 thousand** is recorded in the minutes as "A total of **287 million yen** has been budgeted." The argumentative component containing "**287 million yen**" is labeled "Premise: Future" and the budget item is linked to the "287 million yen" component. In this task, the inputs and outputs are presented follows:

Input	1. Budget Information 2. Minutes (1) National Diet (2) Local Assembly
Output	1. Argument Classification 2. Related IDs Linking

The following three steps link the budget items to the relevant discussions.

<sup>4</sup><https://sites.google.com/nlg.csie.ntu.edu.tw/finnum2020/finnum-2>

1. **Argumentative Components Identifying:** The target components are units that contain monetary expressions. Target components can be identified using NER tools. In this task, we utilize GiNZA<sup>5</sup>, a Japanese NER tool.
2. **Argument Classification:** Argument classification is to classify Argumentative Components into **seven argument classes**.
3. **Related IDs Linking:** Related IDs are given to link a budget item to the relevant argumentative component.

### Seven argument classes

An argument class is mainly divided into three classes: claim, premise, and other. However, in our preliminary research, we verified that the number of premises is considerably larger than the number of Claims. Therefore, we divided the Premises into “past”, “future” and “other.” Claims summarize assertions based on opinions, suggestions, and questions, while other assertions are classified as “other.”.

The seven argument classes are:

1. Premise: Past and Decisions
2. Premise: Current and Future / Estimates
3. Premise: Other
4. Claim: Opinions, suggestions, and questions
5. Claim: Other
6. It is NOT a monetary expression.
7. Other

The following is a description including examples for argument classes in the minutes of the Otaru city assembly of 2019.

1. **Premise: Past and Decisions** refer to the location where the statement for the previous year’s budget, or the amount of money already executed, is described.

An example of Premise: Past

In terms of the amount reflected in the taxation for the fiscal year 2018, it is **approximately 45 million yen**.

2. **Premise: Current and Future/Estimates** include where the statement for the current year’s budget or estimate, including the monetary expression, is described.

An example of Premise: Future

The hometown tax-related expenses are estimated to be **46.7 million yen**.

3. **Premise: Other** is where the statement for not including the past or future is described, such as exemplifications and corrections.

An example of Premise: Other

Generally, the national model household for the levy limit, in terms of income, is even with pension **10 million yen**.

4. **Claim: Opinion, Suggestion, and Question** includes the statement for opinion, suggestion, and question related to the budget.

An example of Claim: Opinion

**Free** outpatient care at hospitals will support child-rearing.

5. **Claim: Other** refer to where the claim is described, including monetary expressions other than the above.
6. **It is NOT a monetary expression** implies a misrepresentation extracted by NER.

An example of Not a monetary expression

However, the entire City of Otaru now has only **180,000 cubic meters**, so ...

7. **Other**

### 3.2. Budget information

Several types of budget documents exist on the web for national and local governments. In this section, we discuss how we selected the budget information available for the task.

In budget argument mining, the following conditions are prioritized to select information on the budget.

- The department, year, and amount of the budget item are listed.
- The category (large, medium, or small) of the budget item is described.
- Information to link budget items to minutes is included.
- There are few differences among national or local governments.

Budget information needs to include the “date,” “budget item,” “previous year’s budget amount,” “current year’s budget amount,” etc. We decided to select “**Budget Summary**,” which includes the required information. “Budget Summary” is almost provided by the national and local governments. The only problem is that it’s a PDF file. We need to convert PDF files to JSON files to create budget information that does not differ among countries, prefectures, and cities.

<sup>5</sup><https://github.com/megagonlabs/ginza>

### 3.3. Minutes

#### Minutes of National Diet

The minutes of the National Diet are divided into the minutes of the House of Representatives and House of Councilors, respectively. To collect the minute, we used the Web API provided by the National Diet Library<sup>6</sup>. In study, only the minutes of the House of Representatives were targeted.

#### 3.3.1. Minutes of local assemblies

Japan has 47 prefectures, 792 cities, 23 special wards, 743 towns, and 183 villages, for a total of 1788 local governments. Each local government publishes assembly minutes in different formats. In this research, we focused on the minutes for the local assemblies of three municipalities (Otaru City of the Hokkaido prefecture, Ibaraki Prefecture, and the Fukuoka City of the Fukuoka Prefecture) using different Web publication formats, with a aim of expanding to all municipalities.

## 4. Data format

### 4.1. Budget information

Table 1 presents the data format for budget information. In this study, budget information from different municipalities is manually converted into the same format.

Table 1: Data format of budget information

Field name	Example
budgetId	"ID-2019-012033-00-000001"
budgetTitle	"Initial Budget Proposal"
typesOfAccount	"Childcare services"
department	"Social Welfare Department"
url	"https://www.city.otaru.lg.jp"
budgetItem	"Childcare centers in the city"
categories	"Children and child-rearing"
budget	"4,275 thousand yen"
budgetLastYear	null
description	"Activities to raise children in the ..."
budgetDifference	null

### 4.2. Minutes

#### Linking budget information to minutes

In this study, we obtained the budget items of budget deliberations in the National Diet and local governments from the "Budget Summary," and then linked them to the politicians' discussions on the budget items included in the meeting minutes. Here, the discussion of budget items is defined as the discussion of these items in the minutes of the National Diet and the local governments. Specifically, the following items are added to map the monetary expressions in the minutes

of the National Diet and local assemblies to the budget items.

- moneyExpression
- relatedID (RID)
- argumentClass (AC)

The data format of the minutes of the National Diet and Local assemblies is explained in the next section.

#### 4.2.1. Minutes of National Diet

The minutes of the National Diet meetings are collected using the Web API, which is an externally provided interface for retrieving the meeting minutes. By adopting the search API, it is possible to retrieve data in JSON format in response to a search request. The data format of the Diet was based on the Web API format, and necessary items (moneyExpression, relatedID, and argumentClass) were added. Table 2 presents the data format of the National Diet minutes based on a Web API format.

Table 2: Data format for National Diet minutes

Field name	Example
speechID	"T120105261X02520200608_002"
speechOrder	2
speaker	"麻生" (Chinese character)
speakerYomi	"あそう" (Japanese cursive syllabary)
speakerGroup	"Liberal Democratic Party"
speakerPosition	"Minister of Finance"
speakerRole	null
startPage	1
createTime	"2020-06-23 20:41:47"
updateTime	"2020-06-24 10:24:07"
speechURL	"https kokkai.ndl.go.jp"
speech	"The supplementary budget for .."
└ moneyExpressions	
└└ moneyExpression	"459 billion yen"
└└ relatedID	"R2-MHLW-BUDGET-02-..."
└└ argumentClass	"Premise"

Table 3: Data format for local assembly minutes

Field name	Example
date	"2019-02-20"
localGovernmentCode	"011002"
localGovernmentName	"Otaru"
proceedingTitle	"First regular meeting"
url	"https://www. ..."
proceeding	
└ speakerPosition	"Chair"
└ speaker	"Suzuki"
└ utterance	"I admitted that ..."
└└ moneyExpressions	
└└└ moneyExpression	"46.8 million yen"
└└└ relatedID	"ID-2019-012033-00-000001"
└└└ argumentClass	"Premise"

<sup>6</sup><https://kokkai.ndl.go.jp/api.html>

#### 4.2.2. Minutes of local assemblies

National and local governments have different formats for their public meeting minutes. In this task, the minutes for the meetings of the three municipalities are converted into a data format, as presented in Table 3, and then converted into a JSON file with a unified data format. The minutes of local assembly contains date, localGovernmentCode, localGovernmentName, proceedingTitle, url, and proceeding. Furthermore, the proceedings are divided into speakerPosition, speaker, and utterance. The utterance contains moneyExpression, relatedID, and argumentClass.

### 5. Annotation

#### 5.1. Procedure

The annotation of budget argument mining is to identify budget-related argumentative components in the meeting minutes, to classify **seven argument classes** such as “Claim” and “Premise” to them, and then links their components to **budget items**.

Annotation fills in the values of “**relatedID**” and “**argumentClass**” in the JSON file of the meeting minutes. Follow the steps below to perform the annotation.

1. Target components, which include **moneyExpression**, are automatically extracted by GiNZA, and the **relatedID** and **argumentClass** are blank.
2. To annotate utterances containing monetary expressions with “**argumentClass** (Premise, Claim, etc)” in the minutes of National Diet and local assemblies.
3. Identify the “**budgetId**” of the budget information corresponding to the amount of MONEY included in the Minutes, and fill in the “**relatedID**” field of the Minutes JSON.

#### 5.2. Target governments and time period

The target time period includes the years 2019 and 2020. By choosing 2019 and 2020 as the target years, it is possible to compare “before” and “after” COVID-19. The local assembly minutes are for the Otaru City, Ibaraki Prefecture, and Fukuoka City, including the first regular meetings of 2019 and 2020. The budget information of the local assembly is the budget summary of each municipality. The minutes of the National Diet session are those of June 2020, when the Budget Committee of the House of Representatives was deliberating on the second supplementary budget in the 201st session. In the National Diet, budget information exists for each ministry. In this study, we first focus on the budget information of the Ministry of Health, Labor, and Welfare.

#### 5.3. Annotation tool

The annotation tool runs in a browser and is built using Vue, which comprises a JavaScript framework. By utilizing the JavaScript framework, we provide the latest

version of the tool to the annotators in actual time. In addition, the annotation tool does not record the annotated data on the server, that the file management can be handled by the annotators.

Figure 2 presents an example that includes tagging “hometown tax-related expenses” using the annotation tool. The annotation tool reads the JSON files of the meeting minutes and budget information, respectively, and displays the meeting minutes on the left and the budget information on the right. In this example, the argumentClass “Premise: Future (after present), Estimate” is assigned to the amount of MONEY “46.7 million yen” related to “hometown tax-related expenses.”

#### 5.4. Annotated data

The results of the annotation using multiple annotators are calculated by using Kappa coefficient. The Kappa coefficient is adopted as a measure to evaluate the degree of agreement between the annotated data (Cohen, 1960). The Kappa coefficient is calculated by the following equation after eliminating the possibility of coincidence by comparing the measured and expected values.

$$\kappa = \frac{P_o - P_e}{1 - P_e}$$

The annotators are undergraduate students, graduate students, and university faculty. To calculate the Kappa values, the annotators are identified by A J. Table 4 presents the Kappa values among the annotators. As a result of the annotation, the municipality, year, target parliament, number of targets with monetary expressions, annotators, and Kappa value are described. The following table presents the annotators for the National Diet and local governments.

- Otaru city : A, B, C
- Ibaraki prefecture : D, E, F, G, H
- Fukuoka city : B, C, I
- National Diet : A, J

In cases where the annotators did not agree on a decision, the argumentClasses and relatedIDs were finally agreed upon via discussions among the annotators. The overview of the gold standard data is presented in Table 5.

#### 5.5. Discussion

##### Monetary expressions tend to be Premise

We confirmed that “premise” is more common than the “claim” for locations that contain monetary expressions. We consider that the components containing monetary expressions tend to be “premise” and the following sentences become “claim.” For example, in the following example, the statement “**ten billion yen**” that contains the monetary expression “**ten billion yen**” becomes “Premise” and “Is it true?” would be a “claim.”

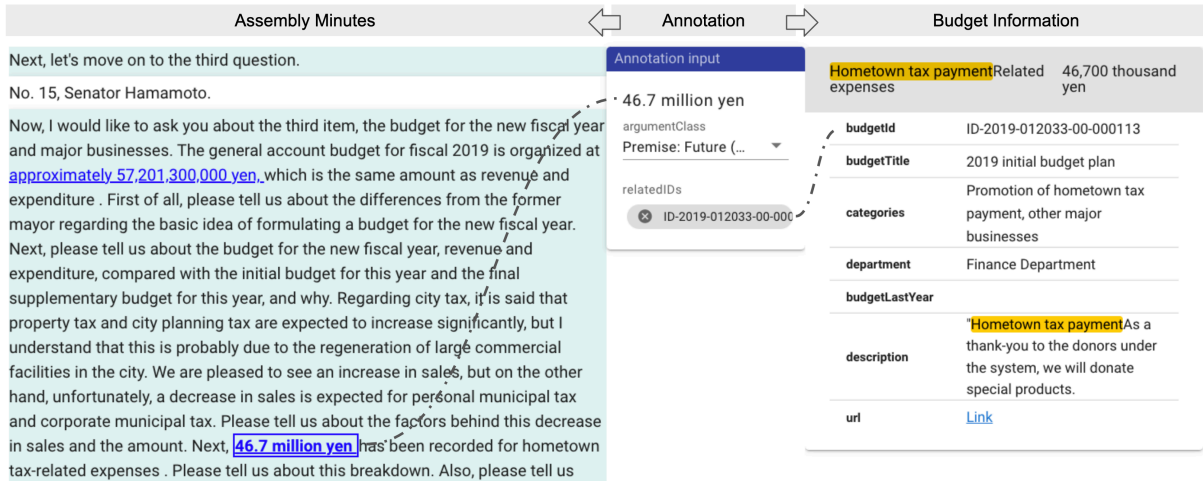


Figure 2: An example of the annotation tool for the argument label “Premise : Future” to the monetary expression “46.7 million yen” in the meeting minutes displayed on the left side, and then assigned to the budget item “Hometown tax payment related expenses” included in the budget information on the right side.

Table 4: Results of annotations for the first regular sessions of 2019 and 2020 for Otaru City, Ibaraki Prefecture, and Fukuoka City.

Municipality	Year	Number	Annotator	Kappa
Otaru	2019	334	A,B	0.539
Otaru	2019	334	B,C	0.591
Otaru	2019	334	C,A	0.568
Otaru	2020	208	A,B	0.506
Otaru	2020	208	B,C	0.561
Otaru	2020	208	C,A	0.469
Ibraki	2019	181	D,E	0.656
Ibraki	2019	181	E,F	0.577
Ibraki	2019	181	F,D	0.497
Ibraki	2020	163	D,G	0.755
Ibraki	2020	163	G,H	0.885
Ibraki	2020	163	H,D	0.747
Fukuoka	2019	334	B,C	0.491
Fukuoka	2019	334	B,I	0.314
Fukuoka	2019	334	C,I	0.391
Fukuoka	2020	318	B,C	0.542
Fukuoka	2020	318	B,I	0.456
Fukuoka	2020	318	C,I	0.453

Example of National Diet session minutes

You said earlier that **ten billion yen** is still with Dentsu Live. Is that true?

In the future, we will consider extracting “claims” that do not contain monetary expressions, considering the combination of “premise” and “claims.”

### Governor’s or mayor’s claim is implicit

As mentioned in the introduction, the budget of a local government is proposed by the governor and, discussed, and approved in the assembly. Therefore, it

is evident and common knowledge that the governor wants the budget proposal to be approved. In such a situation, it is not necessary to imply the governor’s opinion. In other words, the governor’s statement could be considered to contain a claim, because he is explaining the amount of money and proposing a budget plan. In the future, we will examine the labels for the governor’s statement.

### Difficulty of the scope required for annotation

We defined that the scope for annotation is a clause or sentence, containing monetary expression. However, annotators exhibited difficulty in determining the scope of the annotation in some situations. It is necessary to clarify the scope in the future.

## 6. Dataset and Evaluation

### 6.1. Dataset

The data sizes are as follows:

- Training data: 1,248 moneyExpressions
- Test data: 520 moneyExpressions
- References: Budget information and minutes (National Diet, Otaru city, Ibaraki prefecture, and Fukuoka city)

In the training data, the total number of money expressions (moneyExpressions) is 1,248, and 1,083 and 165 for the local governments and National Diet, respectively. Table 5 and Table 6 present the number of argumentClasses and relatedIDs in the training and test data. In the test data, the total number of money expressions (moneyExpressions) is 520, and 484 and 36 for the local governments and the National Diet, respectively.

Table 7 presents the number of monetary expressions in the minutes. Table 8 presents the number of budget items in the budget information.

Table 5: Number of argumentClasses and relatedIDs in Training dataset

Year	National/local government	argumentClass							relatedID		
		Premise			Claim		Other	Not Money	Total	Non-empty	Count
		Future	Past	Other	Opinion	Other					
2019	Otaru City	23	84	15	18	0	0	4	144	31	38
	Ibaraki prefecture	26	80	39	0	0	0	2	147	5	13
	Fukuoka City	63	138	40	29	12	3	9	294	211	286
2020	National Diet	45	92	14	10	0	0	4	165	11	13
	Otaru City	4	55	9	16	0	0	1	85	16	17
	Ibaraki prefecture	21	70	31	3	0	0	4	129	12	12
	Fukuoka City	78	103	64	22	11	3	3	284	64	83
	Total	260	622	212	98	23	6	27	1,248	350	462

Table 6: Number of argumentClasses and relatedIDs in Test dataset

Year	National/local government	argumentClass							relatedID		
		Premise			Claim		Other	Not Money	Total	Non-empty	Count
		Future	Past	Other	Opinion	Other					
2019	Otaru City	43	74	49	9	2	1	12	190	18	20
	Ibaraki prefecture	5	3	25	1	0	0	0	34	1	1
	Fukuoka City	8	13	13	1	2	0	3	40	3	3
2020	National Diet	11	25	4	21	0	0	4	65	1	1
	Otaru City	31	53	25	9	0	1	4	123	21	26
	Ibaraki prefecture	2	8	21	0	0	0	3	34	2	2
	Fukuoka City	1	20	8	1	0	0	4	34	1	5
	Total	101	196	145	42	4	2	30	520	47	58

Table 7: Number of monetary expressions in minutes

	2019	2020
National Diet	-	165
Otaru city	144	85
Ibaraki prefecture	147	129
Fukuoka city	294	284

Table 8: Number of budget items in budget information

	2019	2020
National Diet	-	36
Otaru city	113	116
Ibaraki Prefecture	76	103
Fukoka city	156	168

## 6.2. Evaluation

We designed the score of budget argument mining to consider both argument class labeling (AC) and linking relatedID (RID). The score is calculated by the following equation.

$$\text{Score} = \frac{1}{|S_{RID}|} \sum_{x,y} \{ACC(x,y) \times RIDC(x,y)\}$$

$x$  and  $y$  mean the same monetary expressions of input and the gold standard data respectively.  $S_{RID}$  means

a set of monetary expressions in the gold standard data whose RIDs is not null, as shown in the following equation.

$$S_{RID} = \{y | y.RIDs \neq null\}$$

$ACC$  means whether an AC of monetary expressions is correct or not, as shown in the following equation.

$$ACC(x,y) = \begin{cases} 0 & (x.AC \neq y.AC) \\ 1 & (x.AC = y.AC) \end{cases}$$

$RIDC$  means whether an input RID is included in the RIDs of the gold standard data or not.

$$RIDC(x,y) = \begin{cases} 0 & (x.RID \notin y.RIDs) \\ 1 & (x.RID \in y.RIDs) \end{cases}$$

The leaderboard score is calculated on the website of QA Lab-Poliinfo-3<sup>7</sup> based on the Score formula described above.

## 7. Conclusion

We described the design of the data format, annotation procedure, and the results for the dataset construction, and then presented a budget argument mining dataset to link budget information to minutes. We created the

<sup>7</sup><https://poliinfo3.net>

dataset that links a budget item to the related argumentative component in different language resources (minutes and budget information). In this research, we automatically identified argumentative components, which includes the MONEY expression using NER. Subsequently, we unified data formats among multiple local governments (Otaru City, Ibaraki Prefecture, and Fukuoka City). Finally, we released a budget argument mining dataset.

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