JRIRD at the NTCIR-16 QA Lab-PoliInfo-3 Budget Argument Mining

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TASK OVERVIEW

Purpose
Find discussions in assemblies / the Diet on the budget, and then understand the intentions of utterances, in order to help review how the budget was determined

Task
Input:
A list of budget items + transcript of meetings
Output for each money expression:
[Related ID]   A related budget item
[Argument Class] An argumentative role (7 classes)

Challenges
- Speakers do not mention the names nor amounts literally

OUR APPROACH

Pre-processor
- Split into sentences (to avoid long inputs)
- Find occurrences of each monetary expression in the utterances

Argument Classifier
- A BERT model works for each occurrence:
  — Input: 3 sentences (around the occurrence) with a marker
  — Output: one of 7 classes
- The final output for the monetary expression:
  Chose one by a majority vote (if an expression occurs several times)

  #### Model Variants
  - Masked money expression (ID 302)
  - Longer input context length (ID 303)

Related ID Detector
- A BERT model works for each candidate pair:
  — Input: a budget item (name + description) + a sentence
  — Output: the likelihood of the validity
- The final output for the sentence:
  Chose the budget item with the highest likelihood

RESULTS

Results of the formal run

AC₃: 3 classes
(Premise, Claim, Other)

ID	Score	AC	AC$_3$	RID
299	**0.51064**	**0.58269**	0.85577	0.61702
302	0.48936	0.56538	0.84423	0.61702
303	0.40426	0.54423	0.83846	0.61702

- Best in AC among all the participants
- Numeral expressions are crucial in this task (IDs 299 vs. 302)
- Does not require a broad context (IDs 302 vs. 303)

Confusion matrix

Label		Prediction						Total
		Prem: Past	Prem: Future	Prem: Other	Claim: Opinion	Claim: Other	Not a money	Other	
Gold	Premise: Past	**43**	35	23	0	0	0	0	101
	Premise: Future	16	**161**	13	5	0	0	1	196
	Premise: Other	14	41	**84**	6	0	0	0	145
	Claim: Opinions	1	28	6	**7**	0	0	0	42
	Claim: Other	0	2	2	0	**0**	0	0	4
	Not a money	7	12	3	0	0	**8**	0	30
	Other	1	0	1	0	0	0	**0**	2
	Total	82	279	132	18	0	8	1	520

- Prefers majority classes

Per-government results

Government	Score	AC	AC$_3$	RID
The Diet	1.00000	0.47692	0.61538	1.00000
Fukuoka City	0.25000	0.63514	0.91892	0.25000
Ibaraki Pref.	0.66667	0.79412	0.95588	0.66667
Otaru City	0.51282	0.54633	0.86901	0.64103
Total	0.51064	0.58269	0.85577	0.61702

- Performance varies depending on the government

FUTURE WORKS

- Improvement in minor classes
  (context length, characteristics of each government)
- Better utilization of numerical representations
- Joint learning on the two objectives

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