Predicting the Approval or Disapproval of each Faction in a Local Assembly Using a Rule-based Approach

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***Abstract*—This paper uses the meeting minutes of the Tokyo Metropolitan Assembly and the Ibaraki Prefectural Assembly to create a rule base for predicting the approval or disapproval of each faction, and to examine the effectiveness of methods for extracting opinions from the meeting minutes and methods for estimating when opinions cannot be obtained. In recent years, the voter turnout in Japan has been on a downward trend. In order to solve this problem, we conducted this research because we believe that it is necessary to present materials to judge the credibility of politicians' statements by clearly indicating in an easy-to-understand manner what kind of opinion each faction has on each proposition and the direction of its argument. In the Tokyo Metropolitan Assembly, we used the meeting minutes of the plenary sessions, and from the statements made during the meetings, we assumed that the opinion of the faction to which the speaker belonged was the opinion of "for" or "against" the proposal. As a method of estimating opinions, we created and verified several methods of estimating opinions when they could not be read. In addition to the method used in the Tokyo Metropolitan Assembly, the Ibaraki Prefectural Assembly implemented an estimation method that applied the opinions of the Assembly Steering Committee and an estimation method that used machine learning. As a result, in the Tokyo Metropolitan Assembly, the method that applied the opinions of the minority group obtained the highest value. For the Ibaraki Prefectural Assembly, the method that applied the members of the Assembly Steering Committee obtained the highest value. For the estimation of the Tokyo Metropolitan Assembly's opinion, there are similar studies that have recorded higher values, and further improvement in accuracy can be expected by using machine learning.**

Keywords- stance classification, Approval or disapproval forecast.

I. INTRODUCTION

In this paper, we develop a system that allows each party to decide whether to support or oppose each proposal in a local assembly.

In recent years, the voter turnout in Japan has been on a downward trend, with 51.28% in the last Tokyo Metropolitan Assembly election and only about 40% in the lowest years. The low voter turnout rate among people in their twenties is particularly noticeable, and in the Tokyo Metropolitan Assembly election of 2009, the turnout rate was 26.44%, the lowest of any generation. One possible reason for this is that it is difficult for young people to judge what kind of agenda, what kind of opinions, and what kind of discussions are going on in politics itself. It is not easy to watch all the meetings of the Diet or to read through the minutes, and we think this is the reason why people are not interested in politics. For this reason, we think that clearly indicating in an easy-to-understand manner what kind of opinion each faction has on each agenda item and showing the direction of their arguments would be a material for judging the credibility of politicians' statements. Looking at the minutes of a given meeting, it is not difficult to estimate the approval or disapproval of the major political parties, but it is difficult to estimate the opinions of the factions with a small number of seats, since they rarely make statements themselves. The goal of this research is to estimate the opinions of the political parties to which the politicians belong from their statements, and to calculate the approval or disapproval of each proposal.

In section Ⅱ, we describe the implementation method of each experiment we conduct. Section Ⅲ describes the experiments conducted in this paper, and the conclusion of this study is given in section Ⅳ.

II. RULE BASED FOR STANCE CLASSIFICATION

We talk about the rule based we used in the stance classification in this section

A. Whole picture

We scan the minutes of each meeting and detect whether the speaker agrees or disagrees with the proposal. If we are able to detect the approval or disapproval of a proposition, we take it as the opinion of the party to which the speaker belongs. If we are unable to obtain the approval or disapproval of the proposal being discussed, we assign an opinion to each group according to the rule base described below. We will take the approval or disapproval thus obtained as our response.

B. How to process text and classify agree and disagree

We input the plenary session minutes data and extract the remarks containing the bill number and their speakers. We use the minutes of the last day of each plenary session. We classify the minutes by speaker and content. We use

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MeCab(Ver.0.996.2) to morphologically analyze these statements and get a list of strings. We scan this list and investigate whether there is a word "agree" or "disagree". If we find one or the other, we divide the list into two parts based on the location of the word. If we find "○○bill" and the bill number in the first sentence, we judge the proposition to be the opinion of the found phrase. We then repeat the same action in the following sentence.

C. How to judge whether to agree or disagree of a proposal in the Tokyo Metropolitan Assembly

1) Batch processing of bills

There are some cases where a bill is described as " outside ○○ bill ".In this case, we convert the Chinese numerals in "○○" into alphanumeric characters. After that, we determine that the number plus one of the bills from the beginning of the bills whose Speaker is null in the minutes is an objection. For those proposals for which no opinion in favor or against was obtained by this method, we give the opinion of opposition to the Communist Party, which is often the opposition party, and the opinion of approval to the other parties provisionally.

2) Judgment of approval or disapproval by ruling party or opposition faction

In *1)*, we assigned affirmative opinions to the proposals on which no opinion was obtained. We now assign the labels of the ruling and opposition parties to the minority caucus and assign opinions accordingly. The minority group has very little to say during the assembly and it is difficult to extract approval or disapproval from the text of the meeting. For this reason, we collect the tendency of each minority group to agree or disagree with the opinion of the ruling party or the opposition party in advance, and assign opinions for or against each minority group accordingly. We estimated this tendency from Wikipedia's Tokyo Metropolitan Assembly page [9] and training data, and then we used the following data , a dictionary was created. We grant approval or disapproval if no approval or disapproval is obtained. For minority parties, we refer to the dictionary we created. A faction that is presumed to have "oppositional tendencies" is assigned the same opinion as the Communist Party, which is often the largest opposition party, as the opinion of that faction. This assigns an opinion to the minority party.

3) Decisions for and against by the ruling and opposition factions

We consider, as in *2*), the manner in which opinion is presumed for the minority group. At the first meeting of each year of the meeting minutes, there is a discussion of the proposed budget. This budget proposal includes the "General Fund" and "Water Utility Account" and often the same budget proposal is discussed each year. We also estimate that all political parties often have a same opinion on this budget proposal every year. We gather from the Training data which budget proposals the various factions disagree with each year and create a dictionary. Using this dictionary, we determine whether the parties in question have ever held opposing views on the budget proposal, and if so, we assign opposing views to it as well.

D. How to judge whether to agree or disagree of a proposal in Ibaraki Prefectural Assembly

1) Judgment of approval or disapproval by ruling party or opposition faction

We use the same method as in *2)* to estimate agree or disagree. We use the training data to estimate whether the various factions tend toward the ruling party or the opposition party. We assign the same approval or disapproval to parties that are estimated to be "opposition leaning" as to the Communist Party, which is often the largest opposition party. We thus assign an opinion to the minority party.

2) Judgment using the minutes of the Parliamentary Steering Committee

At the Steering Committee meeting, each faction expresses its opinion in favor of or against the proposal. The attitude of each faction is described in order to ask the faction in favor to raise their hands when the vote is taken in the plenary session. We infer approval or disapproval from the confirmation of attitudes after the phrase "the vote will be taken by division" in the meeting minutes. We first extract each part of the agenda that is being voted on. There are cases where many bills are voted on at once, and cases where only a few are voted on. When we see the notation "Bills No.○○or ○○.", we handle the whole series of propositions from the first to the last one. We assign an opinion to each of these proposals. If there is the word "abstaining from voting" we label the group in that sentence as having no opinion. If it contains the phrase " A summary of the decision " we will label all factions in favor. If the wording is "rejection " the Communist Party will be labeled as in favor, and all other parties will be labeled as against. If there is a " showdown vote " we give the label of "remove" to the party described before the "except" language, if any, and the label of "for" to the other parties. If there is no "Remove" language, we give the label "agree" to the faction described before the " raising one's hand " and the label "disagree" to all others.

3) Rule base for Predicting Pros and Cons Using BERT

In this section, we use Bidirectional Encoder Representations from Transformers (BERT) to find the cos similarity of the opposing proposals and predict the approval or disapproval based on it. BERT(Bidirectional Encoder Representations from Transformers))\ is a model announced by Google in 2018, in which a learning model

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pre-trains a large amount of text data and can be applied to various tasks such as text understanding and sentiment analysis. There are two types of pre-training: one is to use the representation vector obtained from the pre-training as one of the features, and the other is to use the parameters obtained from the pre-training as initial values for the weights. In this experiment, we use the BERT(Bidirectional Encoder Representations from Transformers) pre-trained model [cl-tohoku/bert-base-japanese-whole-word-masking]. We first collect the bills that are opposed by each faction. We then compare them with the names of the bills in the currently estimated assembly. Using a pre-trained model, we extract the features of each proposition name. We calculate the cos similarity of the extracted features. If the similarity is 0.98 and 0.99, we also label the proposition as opposed. We collect the opposing bills from the first meeting in 2019 to the second meeting in 2020 after the election in 2008. We compare the names of the bills by deleting the parts of the bills that are not related to the contents of the bills, such as "HEISEI ○○ Fiscal year". We will compare the opposing bills with the bills submitted by the legislative bodies that we are judging.

4) Rule base for Predicting pros and cons using machine learning for BERT with training data.

In this section, we will build a machine learning/deep learning model to train the tendency of dissenting opinions of the Communist Party, and estimate it using the training results. We first create training data, in order to grasp the tendency of opposition to a particular proposition when the opposition to that proposition is also opposition to a particular proposition. For each opposing proposition, we collect related opposing propositions and label them as correct, and for unrelated propositions, we label them as incorrect. This training data is then used for learning. We use BERT(Bidirectional Encoder Representations from Transformers) to do the training. We apply this learning result to output the probability value of the target proposition. We set a threshold value of 0.5, and label the proposals whose probability value exceeds this value as the opposite.

III. EXPERIMENTS

In this section, we describe the experiments we performed and their results.

E. Date

1) Tokyo Metropolitan Assembly

The data to be used are the Tokyo Metropolitan Assembly meeting minutes (from the fourth regular session in 1999 to the first regular session in 2019), the Test data question file (4551 questions), and the Training data question file (23321 questions), as given in the Stance classification task in NTCIR15. The question file of Training data (23321 questions) is used. In this question file, the information of the meeting and the name of the agenda are described.

2) Ibaraki Prefectural Assembly

The data to be input will be the minutes of the last day of each session of the Ibaraki Prefectural Assembly (the 4th session of 2011 to the 2nd session of 2020) and the Assembly Steering Committee (the 1st session of 2016 to the 2nd session of 2020). The training data will be created from the period from the 4th session in 2011 to the 2nd session in 2020. In addition, a dictionary of opposing bills of each group (the 1st session of 2019 to the 2nd session of 2020) will be used.

F. Result

1) Tokyo Metropolitan Assembly

Four experiments will be conducted. ① When no one votes for or against a proposal submitted by the governor, the Communist Party is given an opposition opinion and the other factions are given an affirmative opinion. ②In the case where the opinion of approval or disapproval is not obtained for a proposal submitted by the governor, the opinion of approval is given to all the factions. ③ In addition to ② above, if the process of " outside ○○ bill " is given. ④ In addition to ③ above, when the minority party is given information on the tendency of the ruling and opposition parties. ⑤ In addition to ③ above, when the minority party is given information on the proposed budget.

The experimental results are summarized in Table 1.

TABLE I. TOKYO METROPOLITAN ASSEMBLY EXPERIMENT

	accuary	total	match	miss
①	0.9457	4307	4073	234
②	0.8870	4541	4028	513
③	0.9604	4541	4361	180
④	0.9639	4541	4377	164
⑤	0.9604	4541	4361	180

The method in ① predicted that the Communist Party would often take the position of the opposition party and oppose proposals submitted by the governor. Comparing the results of ① with those of ②, there was an improvement in accuracy of 6.15%. This is a result of the fact that the Communist Party also often gives its opinion in favor of the proposals submitted by the governor. In method ③, there was an improvement of 1.19% in accuracy. In method ④, we predicted the tendency of minority groups that could not speak and assigned an opinion. As a result, the highest performance was obtained, with an improvement of 0.35% over ③. The accuracy of ⑤ was the same as the accuracy of ③. The combined accuracy of the functions of ④ and ⑤ was 96.39%. This result confirms that the performance of ④ and⑤ overlap or the usefulness of the method in ⑤ is low.

2) Ibaraki Prefectural Assembly

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Seven experiments will be conducted.(1) When the label of agree is given when agree or disagree is not obtained. (2) When the opinion of the minority group is given. (3) When the minutes of the Assembly Steering Committee are used. (4) (5) Using BERT (Bidirectional Encoder Representations from Transformers), with a threshold of 0.98 and 0.99 to predict approval or disapproval. (6) (7) In the case of predicting approval or disapproval with the results of machine learning with 20 and 100 EPOCs of BERT (Bidirectional Encoder Representations from Transformers) using training data.The experimental results are summarized in Table 2.

TABLE II. RESULTS OF THE IBARAKI PREFECTURAL ASSEMBLY BERTEXPERIMENT

	accuary	total	match	miss
①	0.8968	10312	9248	1064
②	0.8982	10312	9262	1050
③	0.9935	7190	7143	47
④	0.9122	10312	9407	905
⑤	0.9143	10312	9428	884
⑥	0.8958	10312	9237	1075
⑦	0.8964	10312	9244	1068

The highest accuracy and precision was obtained in experiment 2. It was found that the Parliamentary Steering Committee of the Ibaraki Prefectural Assembly could obtain the approval or disapproval of a proposal with a high probability. Among the methods used to estimate the approval or disapproval, the highest accuracy was obtained with the method set to 0.99 in (5). Compared to the formulation of 0.98, which used the same cos similarity, the number of wrong answers decreased by about 21. Since the number of correct objections has decreased, but the number of wrong objections has also decreased, we believe that 99% is an effective setting for the decision threshold.

IV. CONCLUSION

In this paper, we proposed a method for estimating the approval or disapproval of a faction for an agenda item from its statements, based on the minutes of the Tokyo Metropolitan Assembly and the Ibaraki Prefectural Assembly. In the Tokyo Metropolitan Assembly, we tested three techniques as estimation methods and compared their performance. One was to examine the way opinions were given when they were not obtained. The second was the estimation of opinions using a dictionary of the ruling and opposition parties to the minority party. Finally, we created a dictionary of budget proposals for the minority party and estimated opinions based on it. We examined the accuracy-of each method and investigated which method would result in the highest accuracy. As a result, the model with the highest accuracy was the one that used the ruling and opposition party dictionaries for the minority faction, which provided the highest performance with a correct answer rate of 96.39%.

For the Ibaraki Prefectural Assembly, we tested the method using our own rules and the method using BERT (Bidirectional Encoder Representations from Transformers). The method that collects opposing proposals in advance and directly asks for similarity to the proposals was effective.

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