Heat of Discussion: A New Approach to Understanding Parliamentary Discussion

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Summary

This paper offers an overview of the video retrieval system we have developed for the Japanese Diet. With our video retrieval system one can directly retrieve the video feed segment of interest, gain a visual understanding of the flow of parliamentary debate, and check the facial expressions and body language of the speaker. In this paper, we demonstrate how one can retrieve video streaming on user terminals that do not support Japanese language input, and suggest a variety of ways in which our video retrieval system can be utilized. Also, we report a first systematic analysis on the correspondence between the official minutes and the results of speech recognition of recordings of parliamentary meetings. Departing from tradition of focusing on written official minutes, we investigate the variation in the rate of correspondence and understand complex and multifaceted nature of parliamentary discussion. We believe that our system encourages research on the utilization of visual information in policy-making and marks a step toward the provision of universal access to policy information.

Introduction

Seeking innovative ways to provide universal access to policy information, we have launched an internet video retrieval system for the Japanese Diet.[1] Although many parliaments offer online video streaming of speech and debate, those video library systems merely provide a search engine for retrieval of videos by date and by parliamentary meeting theme. However, even if we successfully retrieve the parliamentary video we want, we need to watch the video from the beginning to the point in the speech or debate we are particularly interested in. Using the latest sound recognition techniques to create timestamp data to match parliamentary video feeds and the minutes of proceedings, we have developed an internet video retrieval system for Diet deliberations, in which one can pinpoint and play the parliamentary video clips corresponding to the minutes of proceedings by means of keyword search.

With our video retrieval system one can directly retrieve the video feed segment one is particularly interested in, gain a visual understanding of the flow of parliamentary debate, and check the facial expressions and body language of the speaker. Our system captions the videos, so it offers an alternative means of accessing parliamentary deliberation clips for those who have visual and hearing impairments. Since it is easy to share the URL identifying a moment in a video feed via SNS, our system has great potential to boost the usage of Diet deliberation videos by researchers and ordinary citizens as well.

In this paper, we offer an overview of the video retrieval system we have developed, and demonstrate how one can retrieve video streaming on user terminals that do not support Japanese language input. We also suggest a variety of ways in which our video retrieval system can be utilized, and report a first systematic analysis of the correspondence between the official minutes and the results of speech recognition of recordings of parliamentary meetings.

Video Retrieval System for Diet Deliberations

The Japanese Constitution stipulates that each house of the Diet shall keep a record of proceedings and put it into general circulation. The Diet Library currently provides via internet the digitized minutes of parliamentary meetings since the opening of the Imperial Diet in 1890. Although those are not considered as "official" records, they are amenable to keyword searching. On the other hand, we can watch the online live streaming of proceedings at the secretariat website of each house. We can also search the video library and watch video streaming of parliamentary proceedings. Both houses originally made video streaming of plenary and committee meetings available for only one year, but the House of Representatives alone changed its policy so that the videos of proceedings since 2010 are currently available for viewing.

http://www.shugiintv.go.jp/index.php

http://www.webtv.sangiin.go.jp/webtv/index.php

Diet deliberation videos can be searched by meeting date, meeting title, subject and speaker, although only the first two search options are offered in the English interface. However, even if we successfully retrieve the desired Diet deliberation video, we need to watch the video streaming from the beginning to the speech or debate segment we are particularly interested in. It is not uncommon for a committee meeting

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[1] Masuyama (2016a, 2016b), Masuyama and Takeda (2014, 2015).

to last more than 7 hours. While the breakdown of the video by questioner is available in the Japanese interface, streamed video segments are usually 30 to 60 minutes long. No such breakdown is available in the English interface. Moreover, replies to parliamentary questions are included in the video, arranged by questioner. Thus, we have no way to search the Diet deliberation videos of prime ministers and cabinet ministers answering parliamentary questions.

By linking the Diet Library's proceedings database and the Diet secretariats' deliberation video libraries, our "Video Retrieval System for Diet Deliberations" makes it possible to retrieve the deliberation video clips corresponding to the minutes of the proceedings through keyword searching:

http://gclip1.grips.ac.jp/video/

For instance, our system allows us to pinpoint and play the related video clip when we see an item such as "MP X made remark Y during parliamentary debate." With our system we can directly retrieve the portion of the video feed we are particularly interested in, gain a visual understanding of the flow of parliamentary debate and check the facial expressions and body language of the speaker, all of which are not possible from a simple reading of the minutes of parliamentary proceedings.

Unlike the Diet secretariats' websites, our system creates and adds subtitles to the Diet deliberation videos, and thus offers those suffering from hearing impairment a means of accessing the deliberation video library. At present the Diet Library's website is not compatible with the screen readers used to assist blind and visually impaired users. Even if we can successfully search the proceedings database and reach the speech or debate of particular interest, we need to use text vocalizing software that produces synthetic voices which do not resemble that of the original speaker. In contrast, our video retrieval system allows us to see instantly video of what was actually spoken in the Diet.

Technically speaking, our video retrieval system consists of two sub-systems. As illustrated in Figure 1, one of the sub-systems uses the latest sound recognition techniques to create timestamp data to match the Diet Library's proceedings database (Minute DB) and the Diet secretariats' deliberation video databases (Video DB). The second sub-system uses the timestamp data to search the Diet proceedings and retrieve the Diet deliberation videos corresponding to the minutes of the proceedings by means of keyword search (Web-based Search Interface). The results of keyword searches are deliberation video links, and the portion of video we are particularly interested in can be played partially by clicking the URL link for the deliberation video stored in the Diet secretariats' databases.

"Video Retrieval System for Diet Deliberations" has been in operation and publicly available since November 2012. It is possible to keyword search all the plenary and committee meetings in the House of Representatives since January 2010 and those in the House of Councillors since December 2012. Below, we briefly describe how our video retrieval system works. Figure 2 shows the top page of our web-based search interface that allows us to search for deliberation video segments by typing keywords. The Japanese interface will appear when the user clicks on "Japanese" in the upper right hand corner.
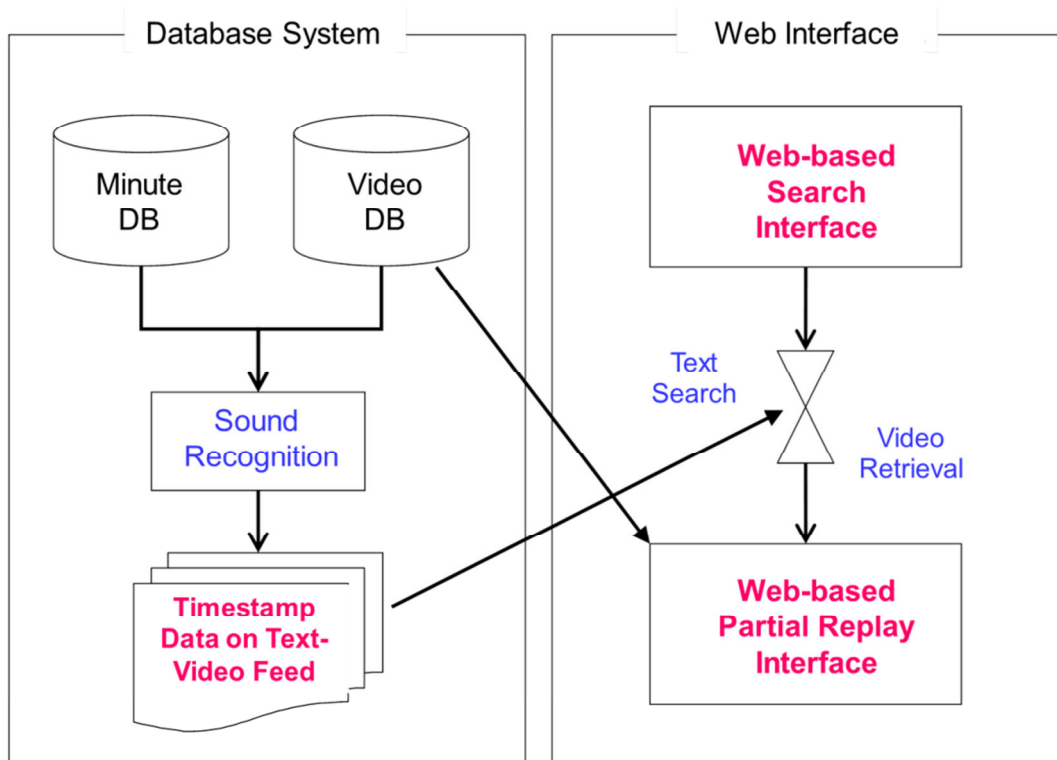
Figure 1

Database System

Minute DB

Video DB

Sound Recognition

Timestamp Data on Text-Video Feed

Web Interface

Web-based Search Interface

Text Search

Video Retrieval

Web-based Partial Replay Interface

Figure 1: Process for Linking Diet Proceedings and Deliberation Videos

Figure 2

国会審議映像検索システム
Video Retrieval System for Diet Deliberations
GRIPS

Click here for switching the English/Japanese interfaces

Settings   Japanese

Tweet   Follow @clipa402   Like 75

Input Search Keywords for Speeches

Search option   keyword

Or, select one of the speech, meeting, Diet member, or bill and enter search keywords

🎤 List of Speeches   📹 List of Meetings   👤 List of Diet Members   📄 List of Bills   🖼 List of Panels

News   Keyword search is available in the official minutes for the videos with 📹 and in the speech recognition results of recording for the videos with ⚡ .

Info   Since the default search range is assumed to be one year from today's date, if you want to search a period before it, please try specifying the date from the search form of "List of Speeches" or "List of Meetings".

New Videos

Meeting recently held

⚡ 第196回 [参] 厚生労働委員会 2018/07/12 28号
⚡ 第196回 [参] 内閣委員会 2018/07/12 26号
⚡ 第196回 [参] 東日本大震災復興特別委員会 2018/07/11 6号
⚡ 第196回 [参] 政治倫理の確立及び選挙制度に関する特別委員会 2018/07/11 8号
⚡ 第196回 [参] 本会議 2018/07/11 35号
⚡ 第196回 [衆] 厚生労働委員会 2018/07/11 35号
⚡ 第196回 [参] 政治倫理の確立及び選挙制度に関する特別委員会 2018/07/10 7号

Keyword Ranking

集団的自衛 ブロック塀 集団的自衛権 卸売市場 埼玉県選挙区 仲卸業者 日本海事協会 ギャンブル オリンピック 日本エレベータ協会 代替フロン 受動喫煙 イレブン 東埼玉道路 ウイッグ

The "Keyword Ranking" is displayed according to the searched string of characters and to the contents of the minutes. The size of the keywords increases with the number of searches, and keywords appear in descending order of frequency. We apologize if the English translations, which are done automatically, might look odd.

Words frequently appearing in recent meeting And words searched frequently

Figure 2: Keyword Search Interface in English

As shown in Figure 2, one can type English keywords separated by spaces in the search field, and they will be translated automatically into Japanese and used in

keyword searching. Any combination of keywords can be used. For instance, one could type "Shinzo Abe" (the name of the current Prime Minister of Japan) and "constitution amendment" in the search field. Alternatively, one could first select one of the four categories (speech, meeting, Diet member, and bill) from "search option" and type keywords in the search field. If one selects "Diet member" from "search option" and types "Shinzo Abe constitution amendment" in the search field, each of the keywords will be first considered as the name of a person and then as either a word in a speech, the title of a meeting, or the agenda of a meeting, giving priority to search results where Shinzo Abe uttered 'constitution' and 'amendment' in his speech, over results where some Diet members uttered 'Shinzo' 'Abe' 'constitution' and 'amendment' in their speeches.

The search results are listed as URL links. Once we hit the search button a screen similar to Figure 3 is displayed, listing the search results in order of date (keywords "constitution amendment" in the House of Representatives for the period September through December 2015). In addition to specifying AND/OR search options by selecting one of the boxes under the search field, we can filter the search results by date and limit the search to one or both of the two houses, or to joint meetings of the two houses. As shown in Figure 3, additional search options include speakers (top 5) and meetings (top 10) with words with utterances matching the search text, and allow us to further narrow the search results by selecting one of the meetings and one of the speakers.
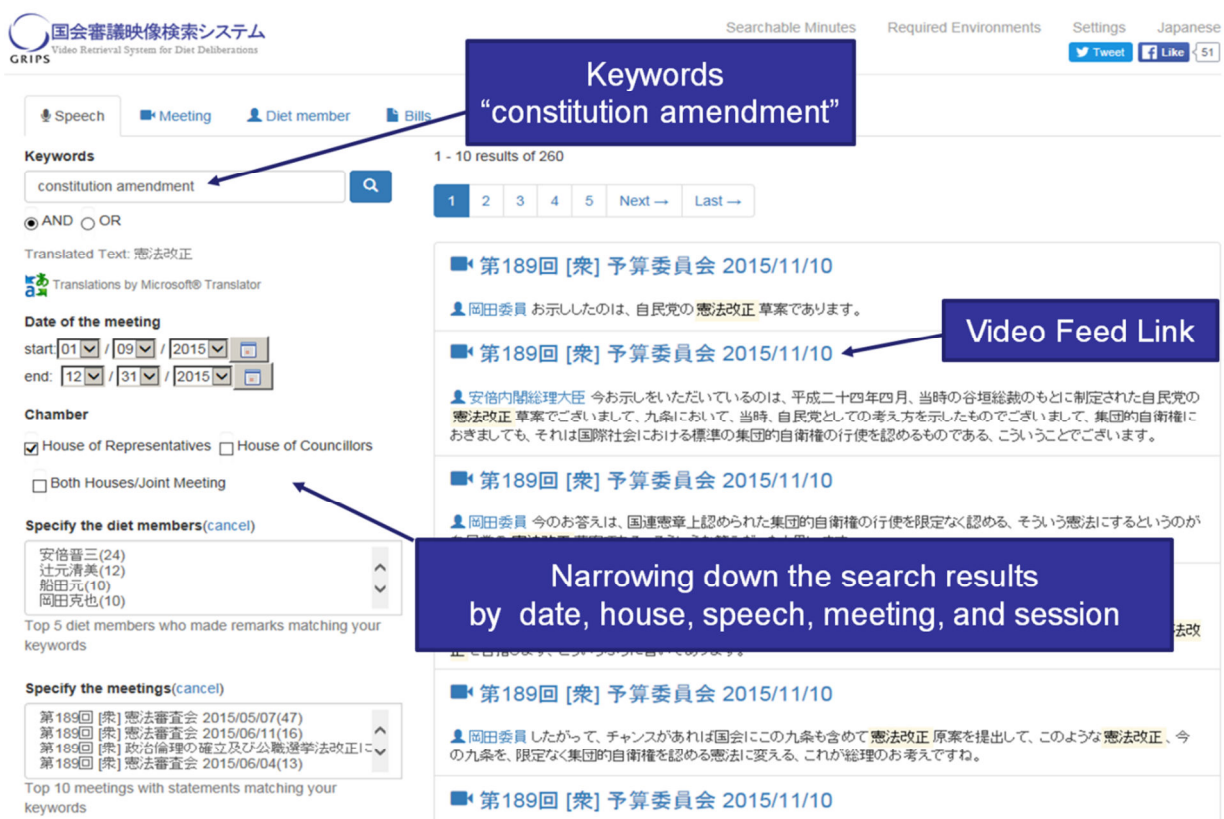

Figure 3: Video Feed Link

If we click one of the video feed links, the screen content will be similar to that in Figure 4. Subtitles are shown under the video. The speech list is shown on the

right side, and speech currently playing is highlighted. The video will play for either one minute or for three speeches. Alternatively, we can keep playing the video by clicking the play button in the toolbar under the video. By double-clicking any speech in the list on the right side, we can instantly watch the video stream of the speeches before and after the speech found by keyword search. Once the user has moved on to another speech, the original speech found by keyword search remains highlighted in yellow.

Figure 4: Video Replay Interface

Further, the URL for the corresponding segment of video streaming is shown below the video, and we can easily share the URL via SNS by clicking the tweet button while the video stream is playing. The text of the speech and the URL will immediately appear in the tweet box after the tweet button is clicked. At the bottom of the page the profile of the speaker is provided, followed by a list of agendas and a list of the Diet members attending the meeting (not shown in Figure 4)

To assist keyword searching, "Keyword Ranking" on the right side of the top page lists 15 words uttered in the Diet proceedings, in descending order of frequency, placing more weight on frequency in later parliamentary meetings than earlier and more weight on single meetings than multiple meetings. The font-size of the words increases with the number of searches, reflecting the attention given to Diet deliberation videos. An English translation pops up when the mouse hovers over any word.

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Usage beyond Keyword Search

Our video retrieval system can be utilized in a variety of ways. For instance, we can create a list of search results with the query "constitution amendment" and the name of the speaker, "Abe Shinzo." By clicking one of the video links in the list we can instantly retrieve video of the speeches by Prime Minister Shinzo Abe, with his own voice, facial expressions and body language, where he mentioned constitutional amendment.

Diet members are increasingly posting information about their activities on the websites. Some use their websites to display the minutes of parliamentary proceedings, and some even edit and upload deliberation videos on their websites. In contrast, our video retrieval system allows us to obtain the URL for a moment of video streaming and to create a list of video links without downloading and editing the video files.

Furthermore, we can use Twitter to create a list of parliamentary speeches.[2] For instance, prime ministers customarily begin answering questions in plenary meetings by saying "There is a question regarding X." Thus we can narrow the above-mentioned search results to speeches beginning with "There is a question regarding constitutional amendment," and tweet the speeches and their video links to create a list of Prime Minister Abe's plenary speeches on the issue of constitutional amendment.

Another way of utilizing the interfaces for keyword searching and partial replay is to post deliberation video links to internet news.

> *On February 13, 2014, Shinzo Abe told a Lower House Budget Committee that he is the "ultimate arbiter" of affairs concerning the constitutional interpretation.*

For instance, if we find a report like the above in an internet newspaper, featuring the remarks made by Prime Minister Abe in the Diet, we can enhance the internet news visually by using our video retrieval system and inserting the video link (below) for the moment of video streaming in question. Clicking on the link will result in the instant playing of the video of the moment of Prime Minister Abe's controversial remark (Figure 5).

http://gclip1.grips.ac.jp/video/video/1117?t=45m18s

The minutes of the proceedings are an important source of the content of discussion in the Diet, but they are not the whole story. For instance, supplementary materials are often used in parliamentary meetings, and discussions refer extensively to graphic materials such as figures and tables. Such supplementary materials are not included as part of the minutes unless a Diet member attending the meeting requests that they be included. Although the secretariats and the library of the Diet keep the supplementary materials used in parliamentary meetings, the existence of those materials is not widely known and they are hardly used.

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[2] Masuyama (2017b).

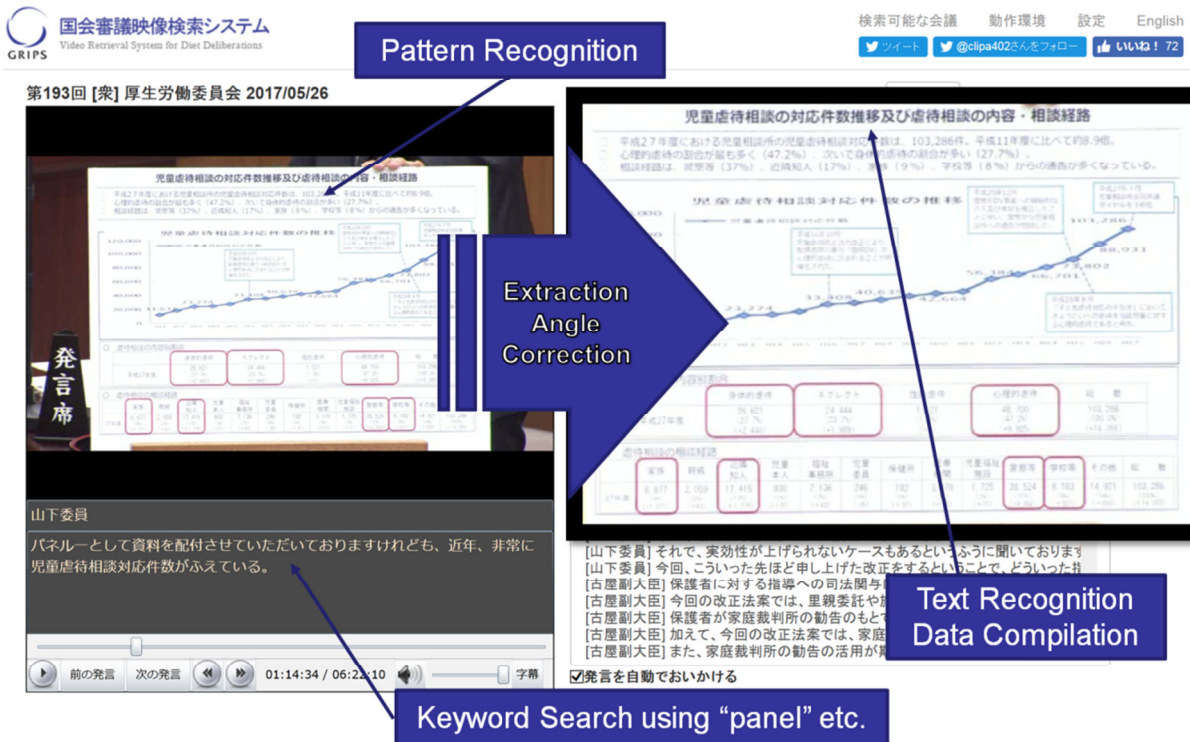**Figure 5: Shinzo Abe on Constitutional Interpretation**

Figure 6: Supplementary Materials Found by Keyword Searching

We are working on combining sound and pattern recognition techniques to distinguish between the portions of videos that do or do not focus on the speaker and

automatically extract video clips including the moments focusing on supplementary materials used in committee meetings. Moreover, the minutes are silent with regard to non-verbal communication, and we are developing a web-based program to automatically extract and analyze facial expressions and body language of the speaker. Figure 6 illustrates the supplementary materials found by means of keyword searching and pattern recognition, compiled into the database using text recognition in video images. Figure 7 shows an example of the results of emotion recognition and analysis.
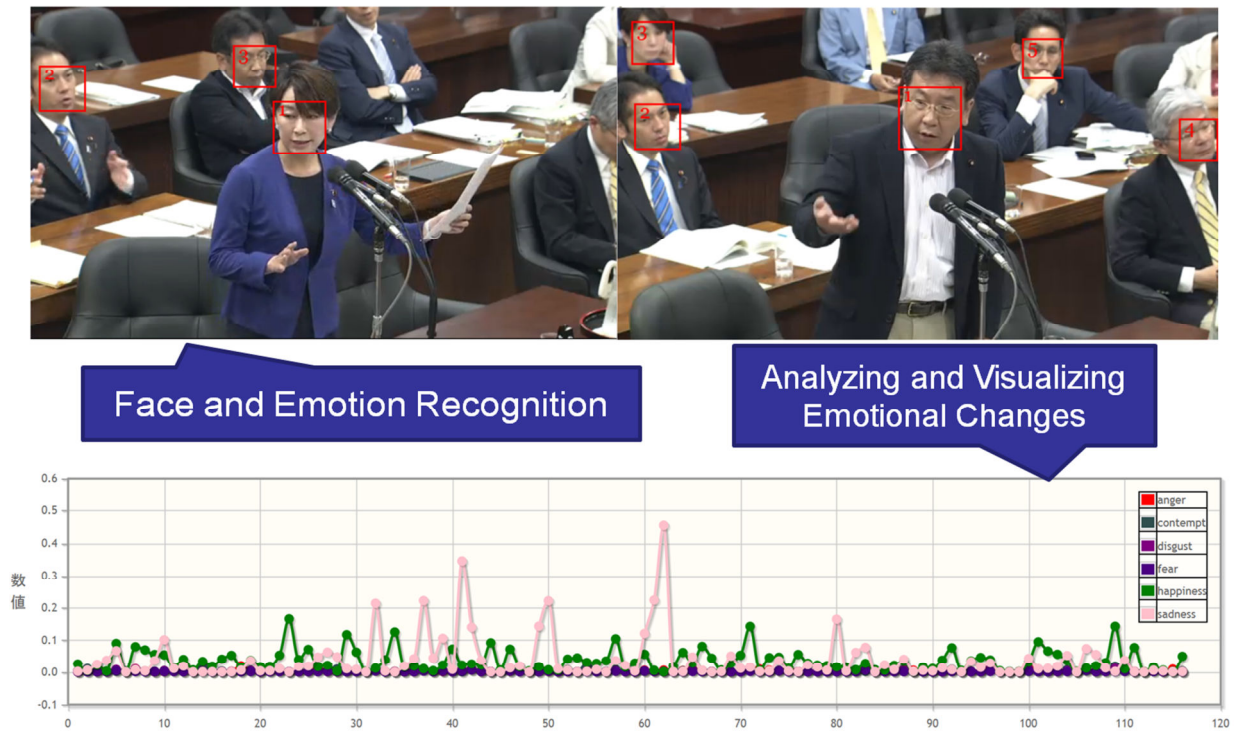

Figure 7: An Example of Emotion Recognition and Analysis

By taking advantage of our system's combining of the interfaces for keyword searching and partial replay, we may be able to conduct experimental studies to determine how visual information affects the understanding of Diet deliberations.[3] We can think of the informatics of Diet deliberations as a multidisciplinary scientific approach to parliamentary deliberations, involving analysis not only of textual information, but also of audio-visual information.[4]

A unique aspect of our video retrieval system is that we use sound recognition techniques to create timestamp data to match Diet proceedings and deliberation videos. In other words, we deal with two types of text information related to parliamentary meetings. Both are written versions of speeches made in the Diet. The information derived from speech recognition is "correct" in the sense that it captures 100 percent of

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[3] Masuyama (2017a, 2018a, 2018b and 2018c).

[4] Our video retrieval system offers a particularly useful tool for scholars interested in the differences between spoken and written language. Matsuda (2016) used our system to check whether Diet members say "Ba'ai" or "Bayai," which are written with the same Chinese characters. The minutes of parliamentary proceedings do not enable us to check if the two words are pronounced differently.

what was actually spoken in the Diet, although it may contain irrelevant filler and words wrongly recognized due to both individual speaker factors such as intonation and pronunciation and technical and environmental factors such as recording quality and noise. On the other hand, the proceedings of the Diet meetings become "official" after transcription to eliminate filler, correct inappropriate wording, and add commas and periods so that the speech in the Diet can make sense as a written language.[5]

With a web-based program to automatically calculate correspondence rates as part of the standard procedure for creating timestamp data to match proceedings and deliberation videos (Figure 8), we can systematically analyze the correspondence between the official minutes and speech recognition results by meeting, speaker, etc. in cross-sectional and longitudinal manners.
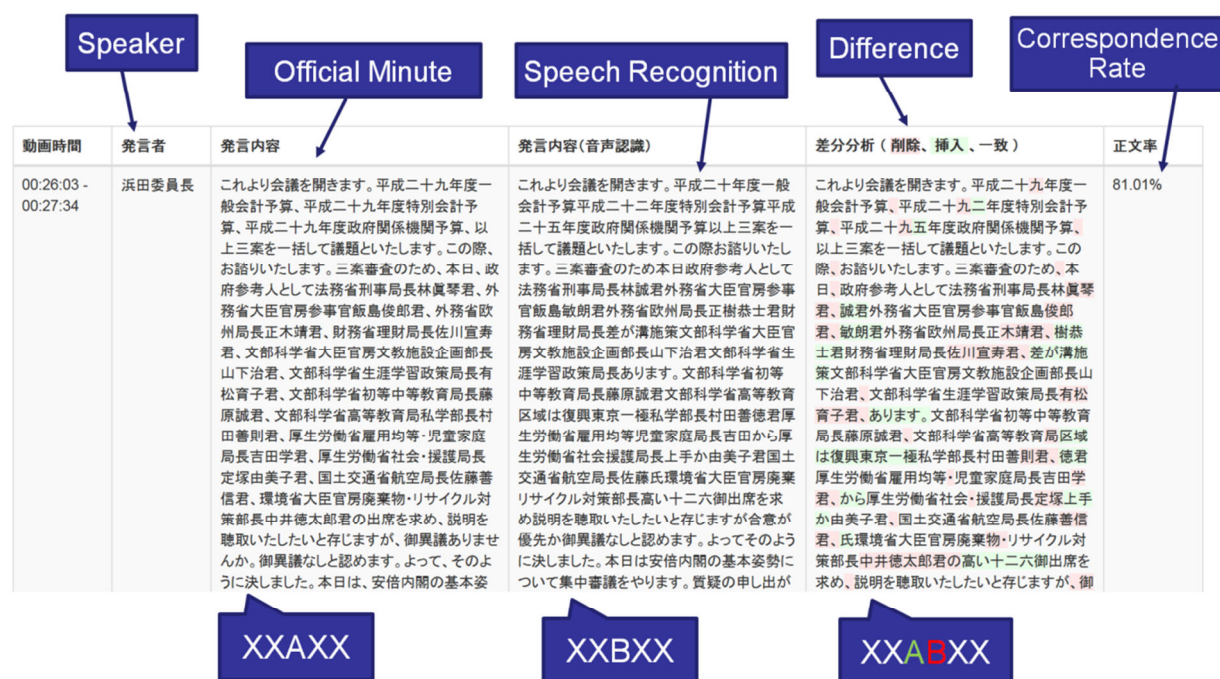

Figure 8: How Minutes and Speech Recognition Results Differ

As a first systematic analysis, we compiled data on the correspondence between the official minutes and the results of speech recognition of parliamentary videos for the 193rd Diet session.[6] To see if there is any substantial difference between the two houses

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[5] The House of Representatives Secretariat in 2011 started using speech recognition to create a draft for meeting transcripts. A statistical model showed that the content of the minutes of the House of Representatives meetings matches approximately 87 percent of actual utterance. A language model was constructed to predict the actual utterance from minutes consisting of approximately 200 million words over a 10-year period, and was applied to more than 500 hours of recordings of parliamentary meetings to create an acoustic model. In the process of speech recognition, these models are used and updated in a semi-automatic manner. See Kawahara (2012) and Akita and Kawahara (2013) for the details. The House of Councillors Secretariat relies solely on stenographic transcripts.

[6] There are three types of Diet sessions. An ordinary session is convened once per year for a term of 150 days by law, subject to extension by Diet resolution or to early termination due to parliamentary dissolution. Important legislative and budgetary matters are deliberated in

or among policy areas, Table 1 reports statistics summarizing the correspondence rates for the plenary and major standing committee meetings of both houses during the 193rd session. For a total of 59,474 utterances, the number of characters in the minute ranges from 3 to 1,889, with an average at 387.4.[7]

Table 1: Correspondence Rates for the 193rd Diet Session (Jan. 20 – Jun. 18, 2017)

| | # Characters | | | | % | | N |
| | Minutes | | Recognition | | Correspond | | |
	Mean	Std	Mean	Std	Mean	Std	
Total	387.4	344.6	350.7	320.7	74.7	19.2	59,474
H. of Representatives	404.1	349.1	364.2	324.5	75.1	18.9	27,658
Plenary	999.8	523.7	896.4	484.3	72.2	17.7	495
Land-Transportation	397.6	311.0	369.4	294.6	78.5	16.5	1,301
Welfare-Labor	535.2	377.3	488.7	354.4	78.3	17.1	2,667
Education-Science	376.1	310.3	342.4	288.5	78.0	17.3	950
Agriculture	398.6	331.7	361.0	305.7	77.2	17.9	1,592
Audit-Oversight	417.2	333.6	383.4	313.7	76.7	14.7	534
Foreign Affairs	363.7	312.1	331.2	293.7	75.8	17.0	2,304
Interior	416.3	331.0	374.3	312.3	75.7	19.3	1,569
Cabinet	379.8	321.9	346.4	306.7	75.5	18.2	488
Security	275.5	257.0	248.7	237.6	75.2	19.2	1,208
Justice	322.8	297.6	292.2	280.0	74.4	18.5	1,977
Environment	341.8	284.3	307.3	263.2	74.3	17.4	1,334
Budget	351.0	321.7	317.0	303.8	73.6	19.5	4,014
Economy-Industry	493.3	358.5	409.9	316.4	72.9	22.2	1,032
Finance	419.7	334.8	368.7	303.0	71.2	17.5	1,454
H. of Councillors	372.9	340.0	338.9	316.8	74.4	19.5	31,816
Plenary	997.6	561.7	917.2	534.4	81.0	16.3	713
Education-Science	427.8	309.2	399.6	289.9	81.8	13.7	903
Welfare-Labor	412.0	310.6	381.1	293.2	78.5	15.0	3,327
Audit-Oversight	448.1	347.9	413.1	323.4	78.5	14.3	1,695
Economy-Industry	507.1	353.2	455.8	326.3	78.1	18.1	1,112
Land-Transportation	378.6	287.1	353.8	272.8	78.0	18.2	1,400
Agriculture	331.8	313.1	302.5	293.7	75.9	18.5	2,536
Justice	347.8	304.6	318.4	284.9	75.0	17.1	2,403
Foreign Affairs & Defense	313.8	261.5	281.8	241.2	74.2	18.9	2,920
Cabinet	364.4	340.1	326.2	316.0	74.0	18.8	1,833
Interior	413.3	321.2	370.3	295.6	73.7	19.8	1,592
Environment	344.3	309.6	309.4	289.7	71.9	16.9	945
Budget	272.0	280.6	243.3	259.5	71.4	21.3	5,462
Finance	390.3	381.7	345.3	344.4	69.5	19.5	1,612

ordinary sessions. The 193rd Diet session is an ordinary session, held during the period January 20 to June 18, 2017. Cf. Masuyama (2016a and 2016b).

[7] The parliamentary speech data set includes no procedural remark by the Speaker/President of the House and committee chairpersons.

As indicated in the top row of Table 1, the overall average is 74.7 percent for the matching rate of characters between the official minutes and speech recognition results, with a standard deviation of 19.2 (see also Figure 9 that depicts distributions of the correspondence per speaker for each of 588 parliamentary meetings by the two houses). Although the overall difference between the two houses is not substantial, the correspondence between the official minutes and speech recognition results seems slightly higher for the House of Representatives.

Nonetheless, the average matching rates of plenary meetings, and Economy-Industry as well as Education-Science Committees are relatively high for the House of Councillors (as indicated by the shaded cells in Table 1). The comparison between the two houses suggests that the matching rates of plenary and Economy-Industry Committee meetings are the lowest (72.2 and 72.9 respectively) in the House of Representatives, with the exception of Finance Committee (71.2), but higher in the House of Councillors (81.0 and 78.1 respectively). Unlike these, the average matching rate of Education-Science Committee is relatively higher in both houses, while they differ by 3.8 percentage points. On the other hand, the matching rates of Finance Committee are the lowest in both houses (71.2 for the House of Representatives and 69.5 for the House of Councillors), and those of Budget Committee meetings are relatively low in both houses (73.6 and 71.4 respectively).
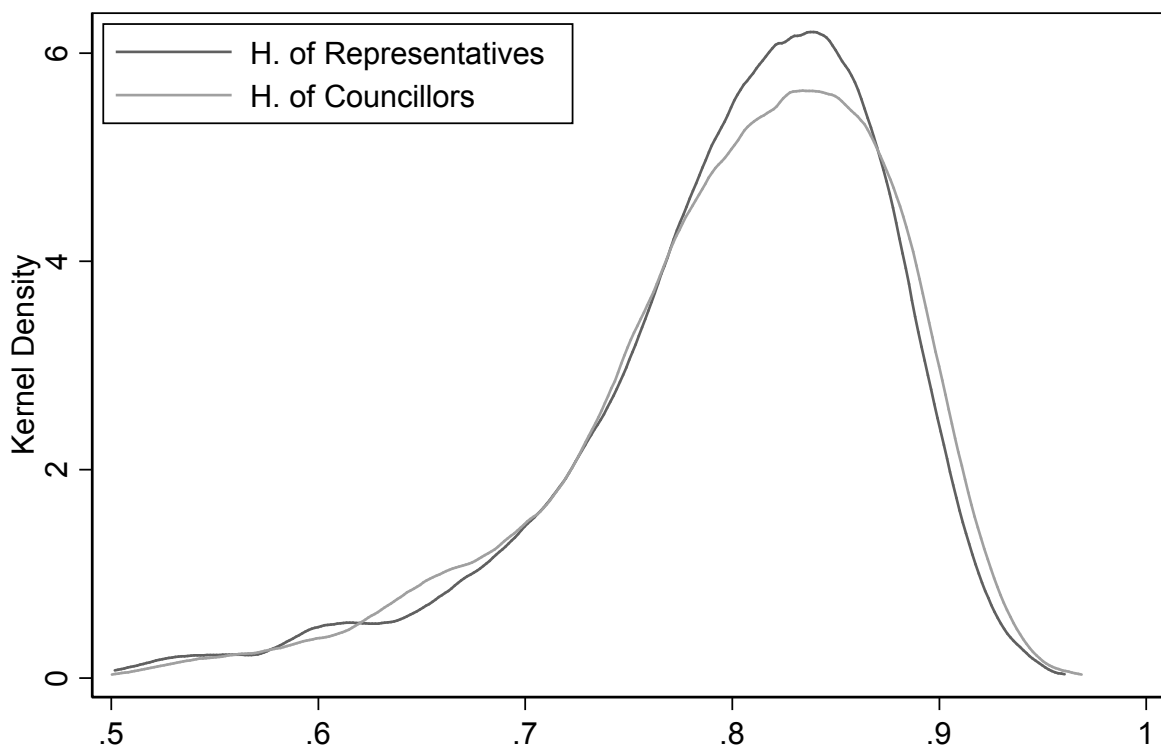

Figure 9: Correspondence Rates by Speaker-Meeting

Although it is understandable that the correspondence rates are lower for the Budget and Finance Committees, the differences between the two houses, in particular those of plenary and Economy-Industry Committee meetings are somewhat unexpected and constitute a potentially important finding, which may lead us to move from simply

reading the official minutes towards a multifaceted understanding of parliamentary discussion. Not surprisingly, heated discussion usually takes place between Prime Minister and opposition party leaders during Budget Committee meetings. Prime Minister and cabinet ministers are hooted and jeered through much of their policy speeches in the plenary meetings. However, the average matching rate of the official minutes and speech recognition results is 77.1 percent with a standard deviation of 19.2 for the 18,377 utterances made by Prime Minister and cabinet ministers during the 193rd Diet session. For the 41,097 utterances made not by cabinet members, the average matching rate is 73.6 with a standard deviation of 19.2.

Table 2: GLM Estimation of Correspondence Rates

	B	Robust SE	P
Characters	0.409	0.005	0.000
Utterances	0.008	0.005	0.143
HC	0.102	0.010	0.000
Plenary	−0.278	0.030	0.000
Budget	0.002	0.014	0.871
Cabinet	0.016	0.022	0.448
Interior	0.031	0.020	0.118
Justice	0.086	0.017	0.000
Foreign	0.077	0.016	0.000
Finance	−0.144	0.018	0.000
Education	0.226	0.022	0.000
Welfare	0.130	0.016	0.000
Agriculture	0.157	0.018	0.000
Economy	−0.120	0.026	0.000
Land	0.164	0.021	0.000
Environment	0.005	0.020	0.815
Audit	0.108	0.020	0.000
Ministers	0.207	0.014	0.000
Age	−0.006	0.000	0.000
CGP	0.117	0.017	0.000
DP	0.027	0.014	0.050
JCP	0.110	0.016	0.000
JIP	−0.293	0.018	0.000
MIN	0.020	0.018	0.281
PR- HR	0.035	0.012	0.004
PR- HC	−0.131	0.012	0.000
Constant	−0.958	0.043	0.000

N59,470. Log pseudolikelihood: −23494.884
Residual Deviance: 8596.435. Pearson Deviance: 8264.321.

The results of regression analysis for the rates of correspondence between the official minutes and speech recognition results are presented in Table 2. We use a generalized linear model (GLM) with a logit link and the binomial family to analyze the correspondence rates with values between zero and one. To take into account the length and frequency of parliamentary utterances, we incorporate Characters, measured as the number of characters in a logarithmic scale in each of the parliamentary utterances, and

Utterances, measured as the number of utterances in a logarithmic scale by each of the speakers who either ask questions or answer questions in each of the parliamentary meetings during the 193rd Diet session. As Table 1 suggests, there are some organizational and cross-sectional factors that may systematically change the nature of parliamentary meetings. Each of dummy variables included in the estimation model is respectively assigned a value of one for meetings in the House of Councillors, of plenary and of the standing committees listed in Table 1, and zero otherwise..

As shown in Table 2, the length of parliamentary utterances (Characters) is estimated to have a statistically significant positive impact on the correspondence rate, implying that the longer a speaker speaks, the closer the gap between the minutes and speech recognition results. The estimated coefficient for HC indicates that the correspondence rates are generally higher in the House of Councillors. Plenary, Finance and Economy are estimated to have a statistically significant negative impact on the correspondence rate, while other committees except Budget, Cabinet, Interior, and Environment are estimated to have a significant positive impact on the correspondence rate.

Table 2 shows that controlling the length and frequency of utterances as well as the parliamentary organizational and cross-sectional factors, speech recognition may perform well when cabinet members answer to questions in parliamentary meetings. A dummy variable, Ministers, is assigned a value of one when the utterance comes from Prime Minister and cabinet ministers, and zero otherwise. As Table 2 also suggests, there are other political and electoral factors that may affect the rates of correspondence between the official minutes and speech recognition results. Age, measuring the seniority of the speaker, is estimated to have a statistically significant negative impact on the correspondence rate, implying that more senior a speaker is, the wider the gap between the minutes and speech recognition results.

In comparison to the baseline, which is defined as the utterance coming from the member of the major ruling party, the Liberal Democratic Party, the estimated coefficients for party dummy variables indicate that the correspondence rates are higher when a speaker belongs to the minor ruling coalition partner (CGP), a center-left opposition party (DP) and a communist party (JCP), while lower when a speaker belongs to a right-leaning opposition party (JIP). No statistically significant difference is found for other minor opposition parties (MIN). Each of PR-HR and PR-HC is assigned a value of one when the utterance comes from the speaker who is elected from the proportional representation constituency, and zero otherwise. As compared to those elected in the plurality system, the estimated coefficients imply that the correspondence rates are relatively higher for the speaker elected from the proportional representation system in the House of Representatives (PR-HR) while generally lower in the House of Councillors (PR-HC).

It is more intuitive to interpret the predicted values based on the logit coefficients. Assuming that both Characters, Utterances, and Age are held at their average values and all the dummy variables except Budget are set at zero, the predicted baseline correspondence rate would be 72.6 percent. With all other factors remaining the same, the correspondence rate increases to 76.5 percent when the utterance comes from Prime Minister and cabinet ministers in Budget Committee (approximately 4 percentage points up from the baseline).[8]

<u>*Conclusion*</u>

Although our video retrieval system is still at the developing stage, we believe that our system offers alternative means of access to parliamentary video streaming for those who have visual and hearing impairments. Also, by incorporating automatic translation into the web-based keyword search interface, we have made our system available from computers without Japanese text capability. We found substantial variation in the rate of correspondence between the official minutes and the results of speech recognition of deliberation videos, which may be systematically related to the nature of parliamentary meetings by committee and policy area. In this paper, we found that there is a substantial difference in speech recognition rates between asking questions and answering questions in parliamentary meetings, which may also have something to do with the speaker's ideological stance and electoral conditions.

Our video retrieval system has great potential to boost the usage of parliamentary videos in relation to policy-making. The sound recognition techniques for creating timestamp data for matching video and text information are applicable to a wide range of proceedings, including those of local assemblies and administrative councils,[9] as well as other types of videos such as TV news clips. Our system is expected to enhance discussion thanks to a better understanding of policy making in the Japanese Diet, and to indicate a direction for the development of parliamentary video streaming systems in other countries. Much remains to be done in this regard, but we believe that our system encourages research on the use of visual information in policy-making and marks a step towards the provision of universal access to policy information.

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logit link, we used a GLM with a complementary log log link to account for the skewed distribution of correspondence rates (See Appendix). The estimation results are not substantially different from those reported in Table 2.

[9] We have developed a similar video retrieval system for the Japanese local assemblies, and a sample of deliberation videos are searchable by keywords for selected prefectural and municipal assemblies.

http://gclip1.grips.ac.jp/local-assembly/

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GLM Estimation: Cloglog Link

	B	Robust SE	P
Characters	0.213	0.003	0.000
Utterances	0.000	0.003	0.852
HC	0.054	0.005	0.000
Plenary	−0.151	0.015	0.000
Budget	−0.002	0.007	0.777
Cabinet	0.005	0.011	0.630
Interior	0.015	0.010	0.142
Justice	0.043	0.008	0.000
Foreign	0.039	0.008	0.000
Finance	−0.087	0.010	0.000
Education	0.119	0.011	0.000
Welfare	0.062	0.008	0.000
Agriculture	0.080	0.009	0.000
Economy	−0.073	0.014	0.000
Land	0.085	0.010	0.000
Environment	0.003	0.010	0.795
Audit	0.051	0.009	0.000
Ministers	0.117	0.007	0.000
Age	−0.003	0.000	0.000
CGP	0.062	0.008	0.000
DP	0.010	0.007	0.160
JCP	0.060	0.008	0.000
JIP	−0.167	0.010	0.000
MIN	0.009	0.009	0.325
PR- HR	0.018	0.006	0.004
PR- HC	−0.065	0.006	0.000
Constant	−0.745	0.023	0.000

N59,474. Log pseudolikelihood: −23591.194
Residual Deviance: 8789.057. Pearson Deviance: 8414.106.