L(u)PIN: LLM-based Political Ideology Nowcasting

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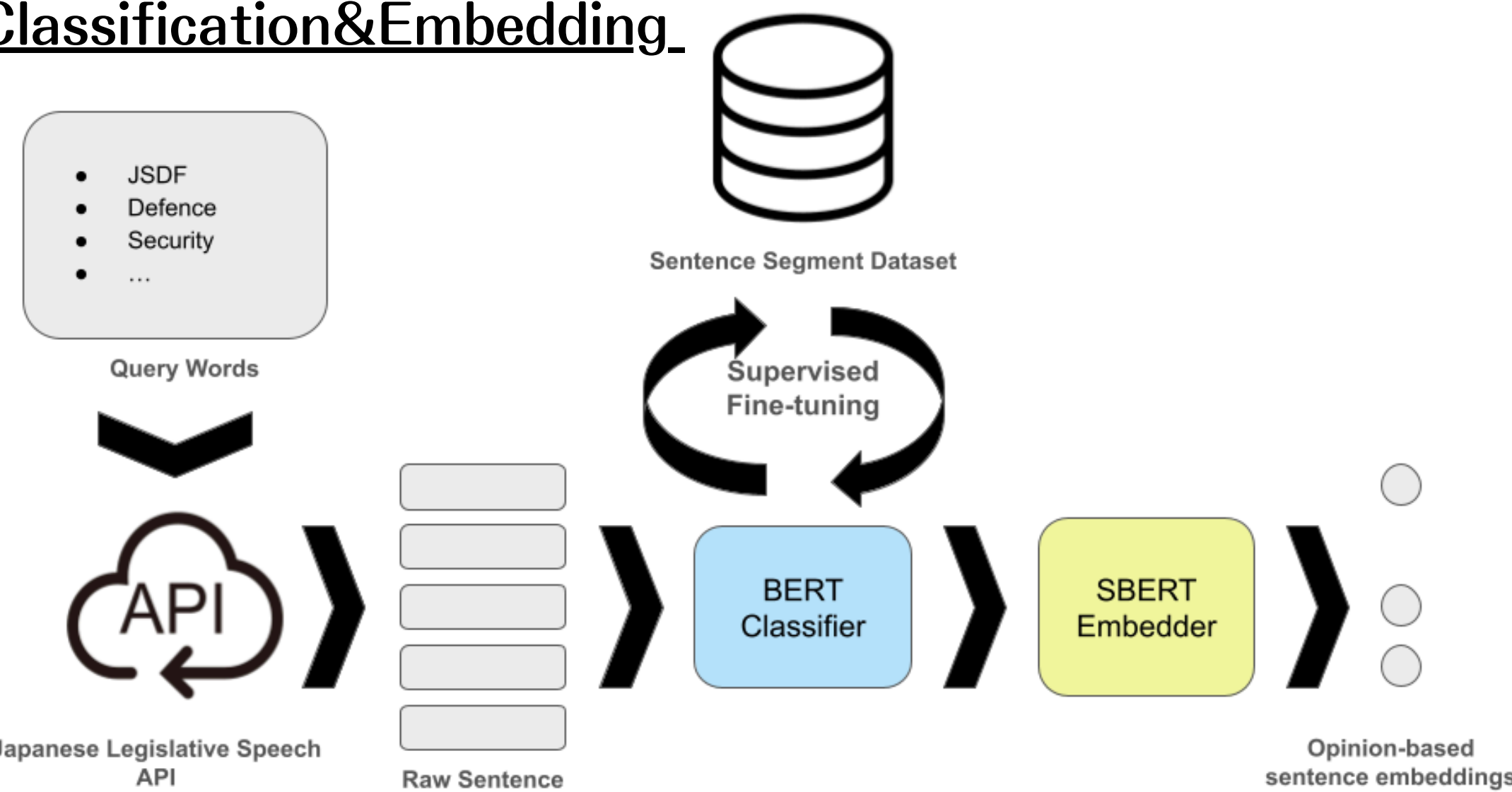https://www.kenkato.info

Abstract

- Quantitative analysis of political ideological positions is a difficult task
- Previous methods of suffered from a common challenge => amount of data available for analysis.
- Previous methods lacked fine-grain analysis of individual representatives and focused on party-wide positions
- _Proposition_: Use the latent knowledge of LLMs to analyze political stances from parliamentary speeches
- _Contribution_: Established a framework to use LLM embeddings to analyze and visualize stances of representatives from parliamentary speech

Methodology

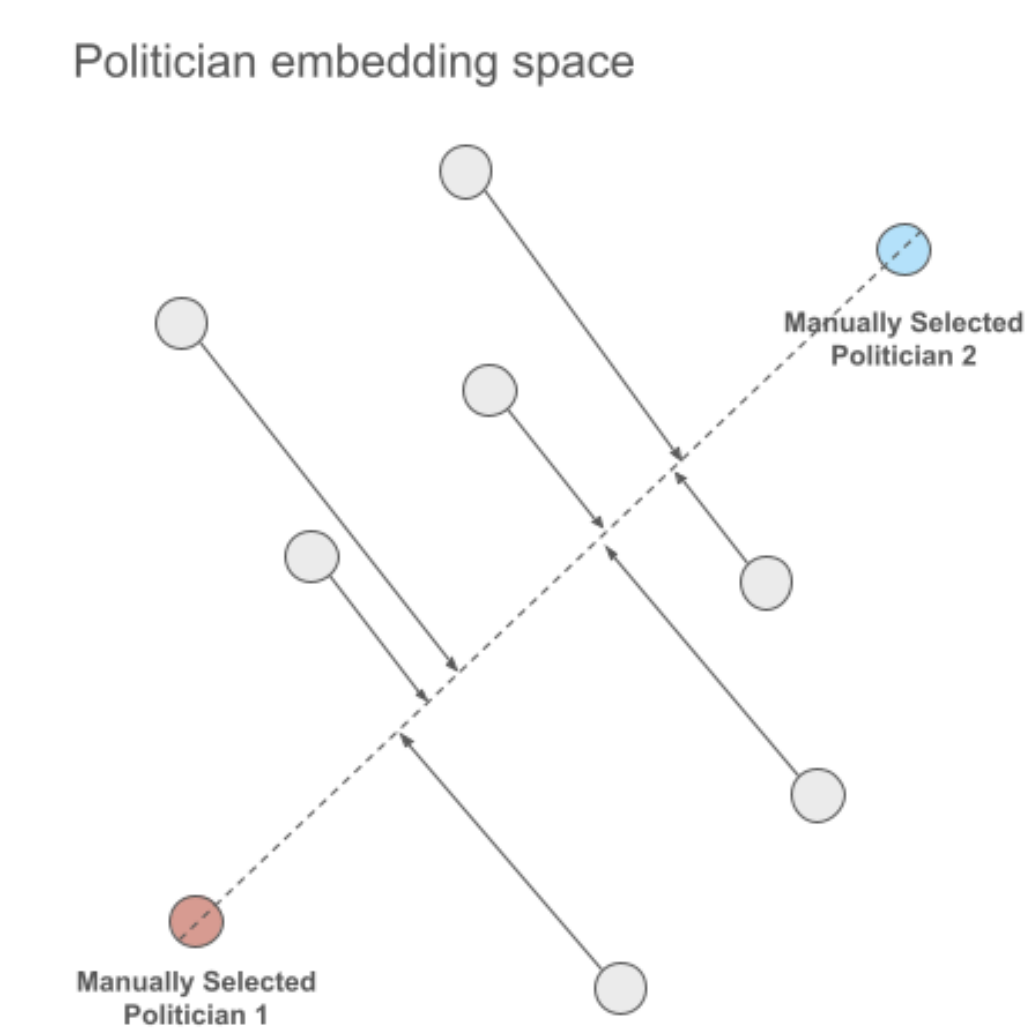Our methodology is a two step process:

1. _Classification&Embedding_: We classify sentence segments and filter out noise and embed them using an LLM.
2. _Projection_: We either manually choose reference representatives or generate reference sentences and collapse all the representative embeddings onto these axis.
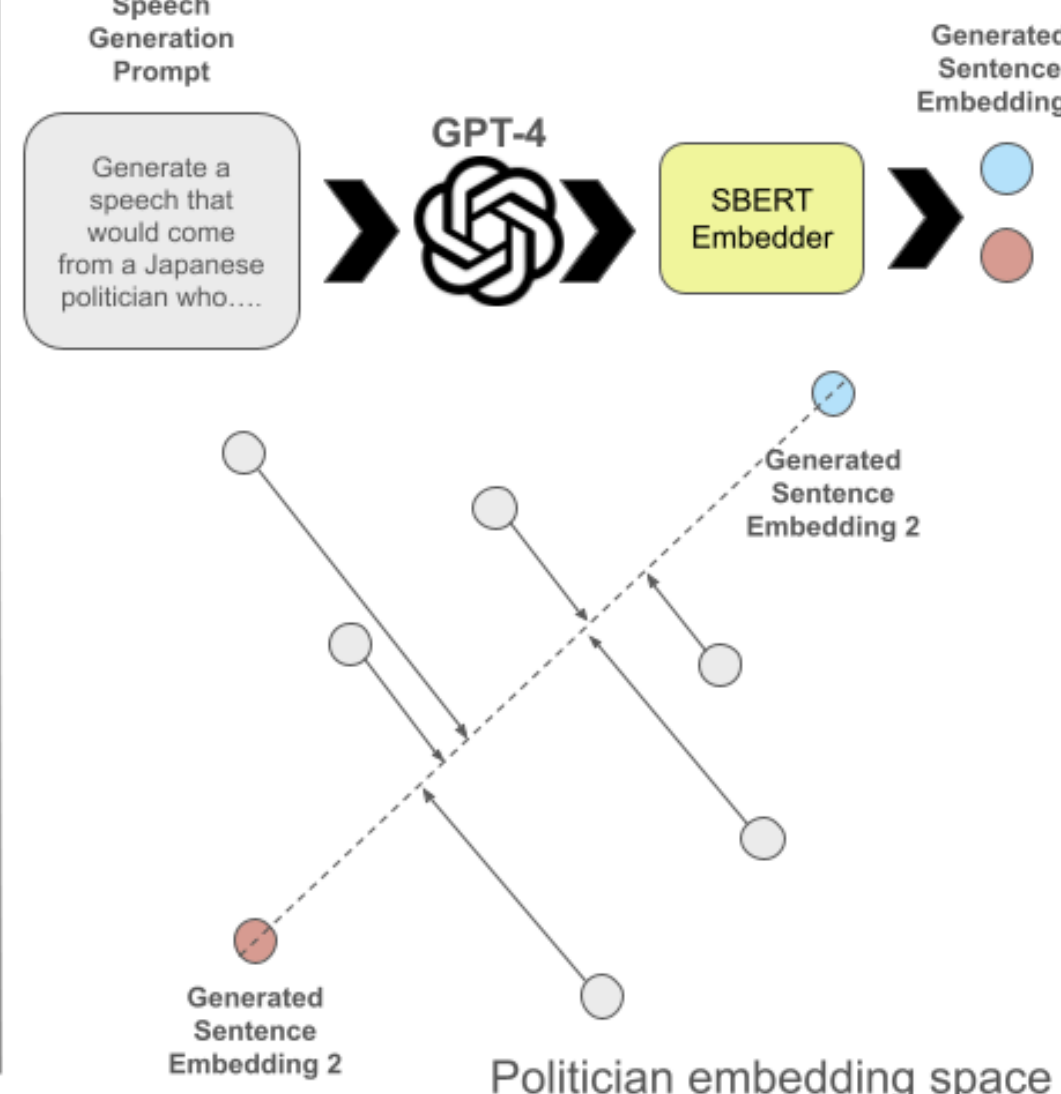
Classification&Embedding

Projection Phase

Method 1: Reference Representatives
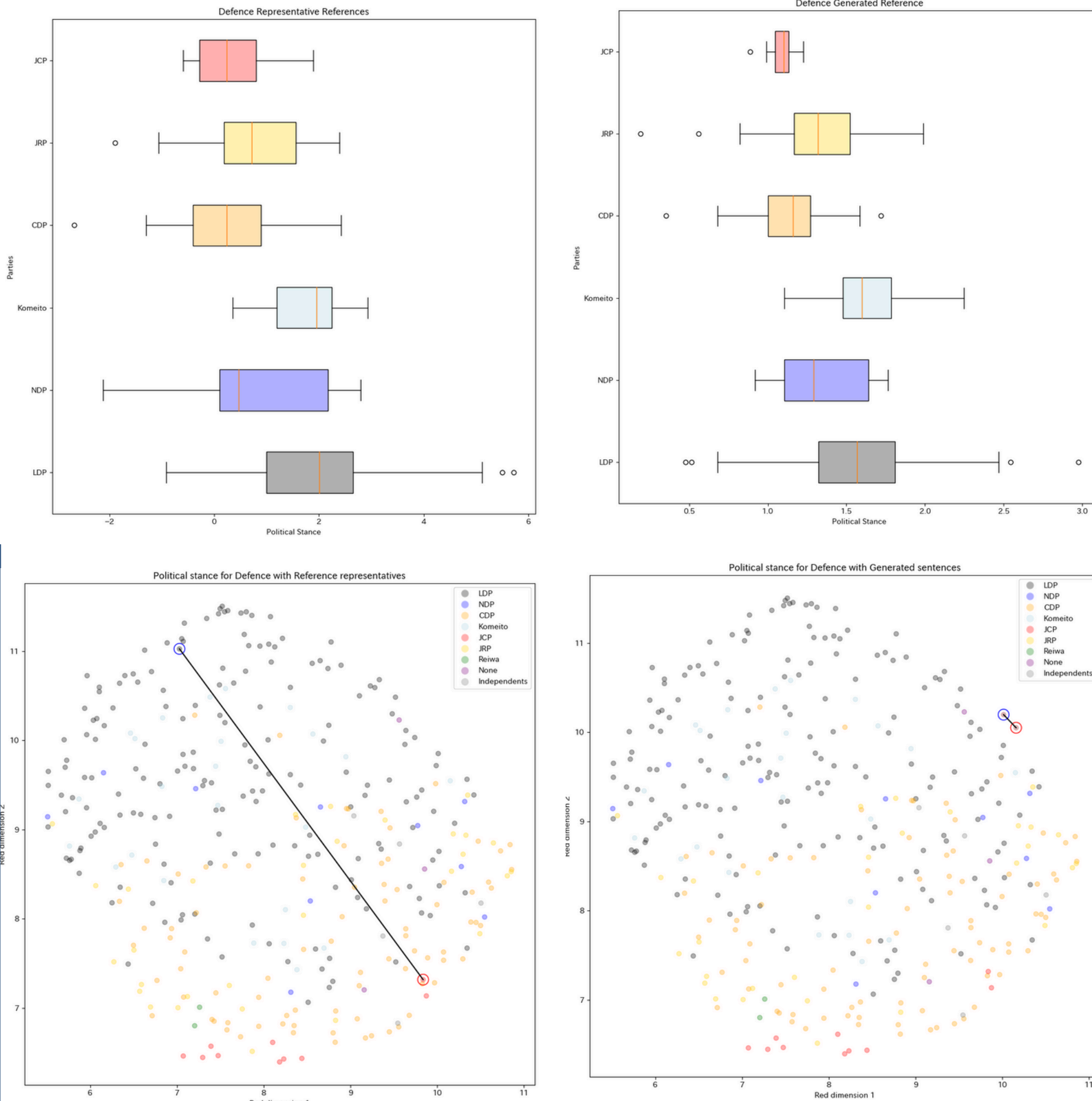

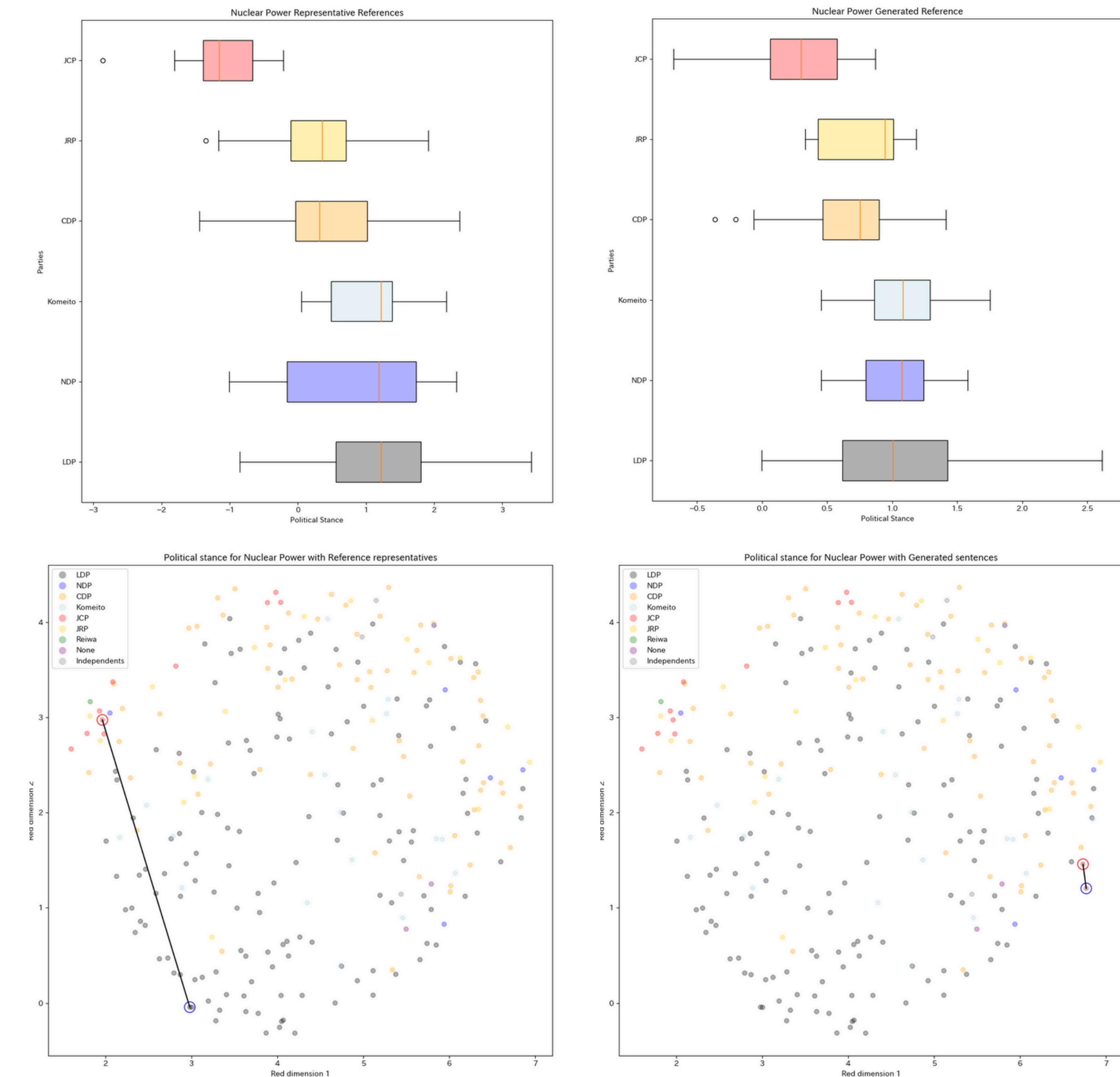Method 2: Generated References

Results

Our research focused on two major controversial topics in Japanese politics which are:
- The acknowledgement of JSDF in the Japanese constitution
- Use of nuclear power in Japan following the Fukushima disaster

Reference politicians:
Defence: Tomomi Inada, Akira Kasai
Nuclear: Fumio Kishida, Shii Kazuo

Acknowledgement of JSDF

Use of Nuclear Power

Table 1: English Interpretation of BERTopic Results for Defence

Topics	Group 0 (Left)	Group 1 (Centered)	Group 2 (Right)
Topic 0	Japanese Government's relationship with the US	Japanese government and people	US-Japan Relationship and Diplomacy
Topic 1	US-bases in Okinawa	Issues surrounding US deployment in Japan	Taiwan Strait Risk
Topic 2	Parties in Japanese Diet	International Condition Surrounding Japan	Accidents caused by helicopters of JSDF
Topic 3	Self-sustainability of Japan and Diplomacy	Funding of JSDF	Ukraine Aid and Natural disaster aid
Topic 4	Increased funding of JSDF	Japanese law and limits of JSDF activities	Diplomacy and Military Deterrent

Table 2: English Interpretation of BERTopic Results for Nuclear Power

Topics	Group 0 (Left)	Group 1 (Centered)	Group 2 (Right)
Topic 0	Accident of Power Plant	Accident and Electricity Supply	Accident and Energy
Topic 1	Fukushima Accident and Responsibilities	Damages caused by Fukushima accident	Damages of Fukushima Disaster
Topic 2	Government and Enterprises	Accident, Chenobyl and the learnings	Fukushima Disaster and Challenges
Topic 3	Assurance of Safety	3.11 Earthquake and Responses	Local area of Fukushima and long-term solution
Topic 4	(Un-interpretable)	(Un-interpretable)	Russian Invasion of Ukraine and attack on Zaporizhzhya NPP

Discussion

Analysis of BERTopic Results

We have used the BERTopic topic modelling technique to analyze what different segments of our projections are mentioning in their speech.

Acknowledgement of JSDF in constitution

We see that the group that is against this topic emphasize US bases in Okinawa. This is a common topic that is raised by the group as parties such as the JCP have been advocating for the removal of US bases from Japanese soil. – We observe that the group that is favourable of this mentions the risk that surrounds Japan by mentioning the Taiwan strait crisis and the Russian invasion of Ukraine.

Restarting of NPPs

We notice that the group against the restart of NPPs emphasize the safety and responsibility of operating NPPs as well as the accident. – While the group favourable of the restart also talk about the accident and the risks associated with the NPPs, they shift their attention more towards moving forward from the accident .

Comparison to expert estimations

To verify our estimations, we compared them to the expert predictions done by a Japanese NPO called Mielka who aim to make Japanese politics more transparent to the public.

Figure: Mielka Estimations for Restarting NPPs(left) and JSDF(right)

For both topics, we see that our estimations roughly match the expert predictions from Mielka. For example for the topic of the acknowledgement of JSDF:
- The JCP and CDP who are estimated by Mielka to be against the acknowledgement of JSDF are also positioned on the left side by our estimation.
- The LDP, Komeito, JRP, and NDP who are estimated by Mielka to be relatively pro-acknowledgement of JSDF are positioned on the right side by our estimation.

Limitations of our work

Representing each legislator as a single embedding
- if a representative changes their political stance suddenly, their stance-embedding is going to be skewed by their speeches from past.

Discrepancy to the estimations of Mielka
=>Parties paint a specific picture about themselves
- Since the estimations of Mielka are based on the party manifestos and policy summaries published by the parties themselves, their estimations might not accurately reflect the stances taken by the representatives in the diet.

=> Legislators are not created equally
- Since the Mielka estimations are based on the party manifestos, it is possible that their estimations are skewed towards representatives with more influence in the party.

LLMs are black-boxes
- biases might be introduced during the training process but we have made efforts to visualize the embeddings in human-understandable manner

Conclusion

- Showcased that we are able to retrieve political ideological scaling purely from the utterances of individual politicians in the parliament that align with preexisting expert predictions. This makes the research of political text significantly easier for researchers as they no longer need to fit their own model to political text which will require computational power and high level programming knowledge.
- In the future, we see this methodology being extended in two directions. The first is to analyze the change in ideological stance of politicians over-time, similar to the works of Rheault and Cochrane and Gentzkow et al.. Being able to quantitatively express the shift in political ideology is going to be a valuable measure for the public and researchers.