Ritsumeikan University
College of Information Science and Engineering
Digital Governance Systems Laboratory

Dynamic VAA Profile Generation Using Topic Extraction and Sentiment Analysis on Politician Tweets

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Course: PBL5, Professor Uwe Serdült

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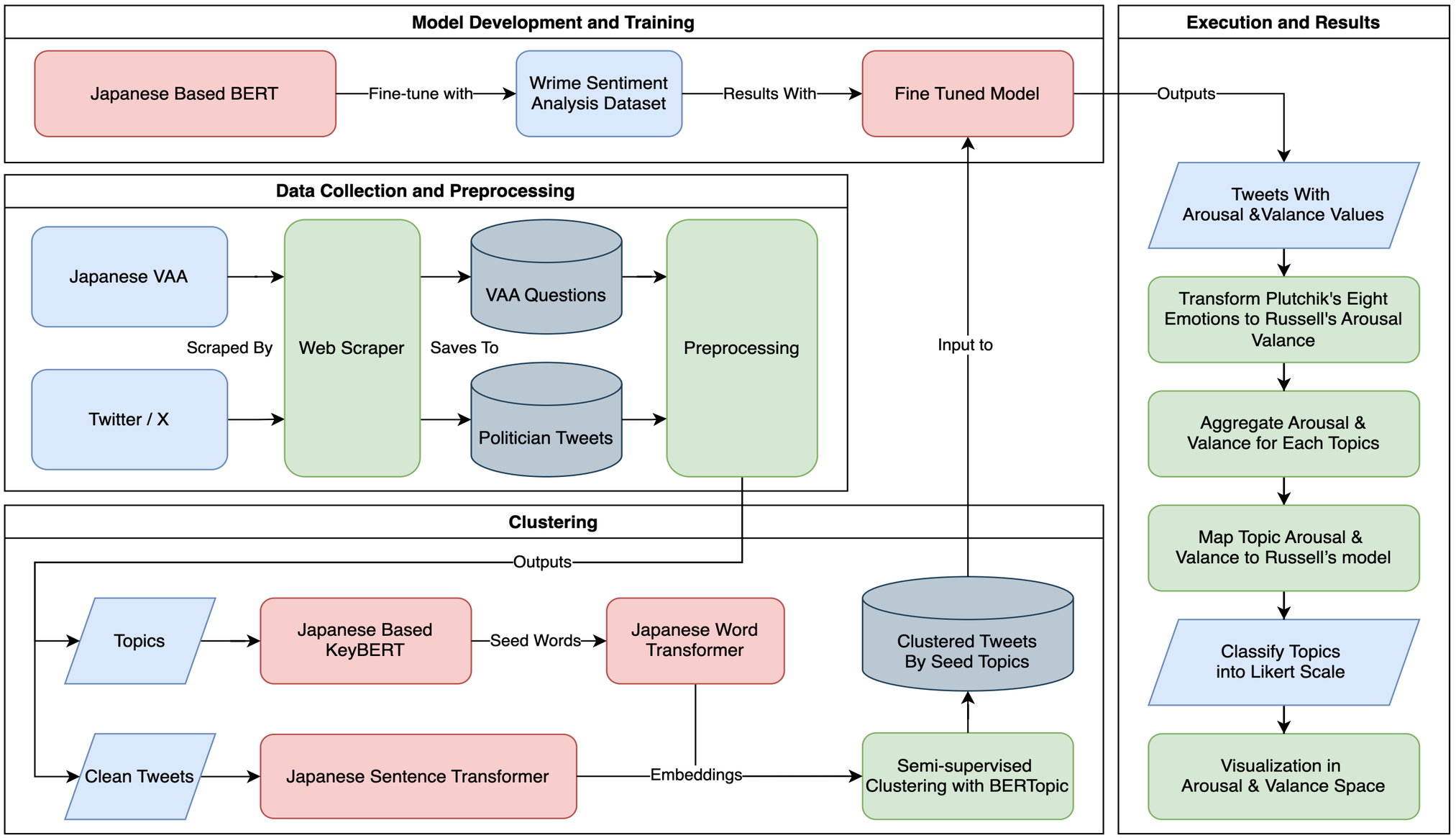
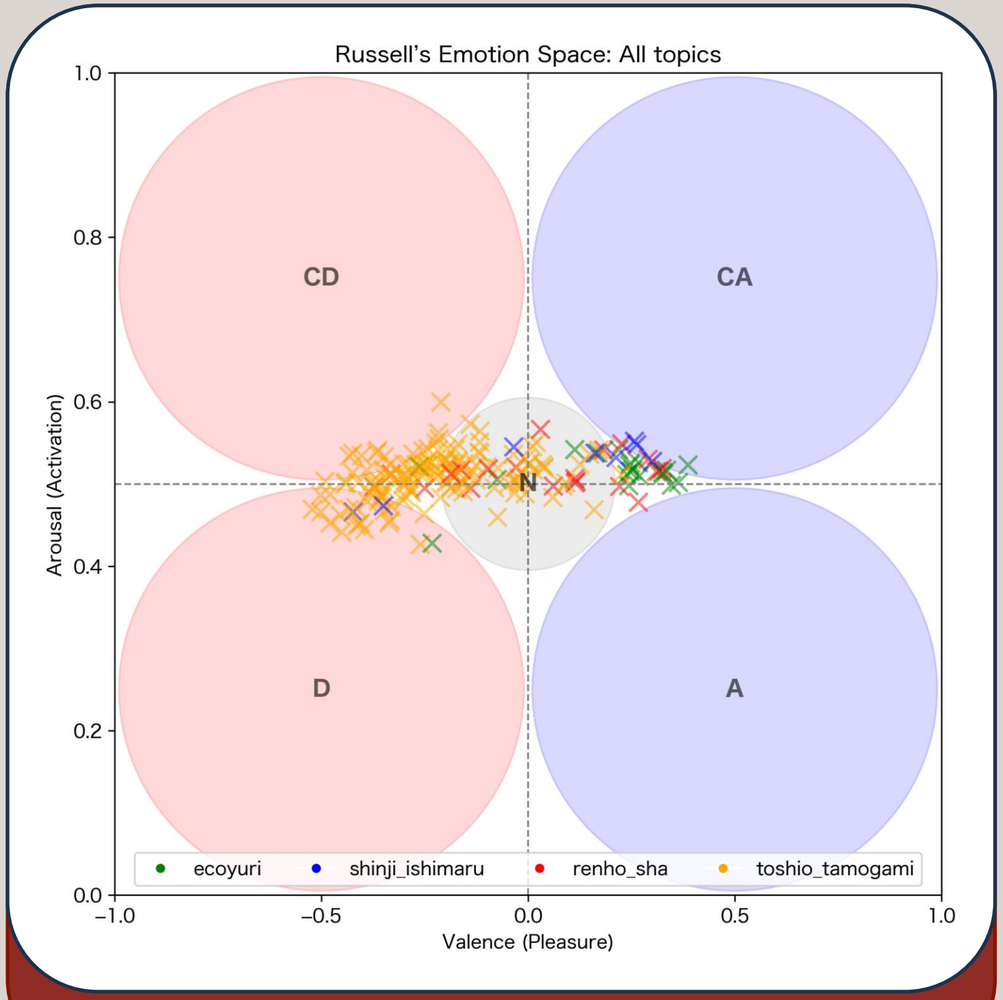
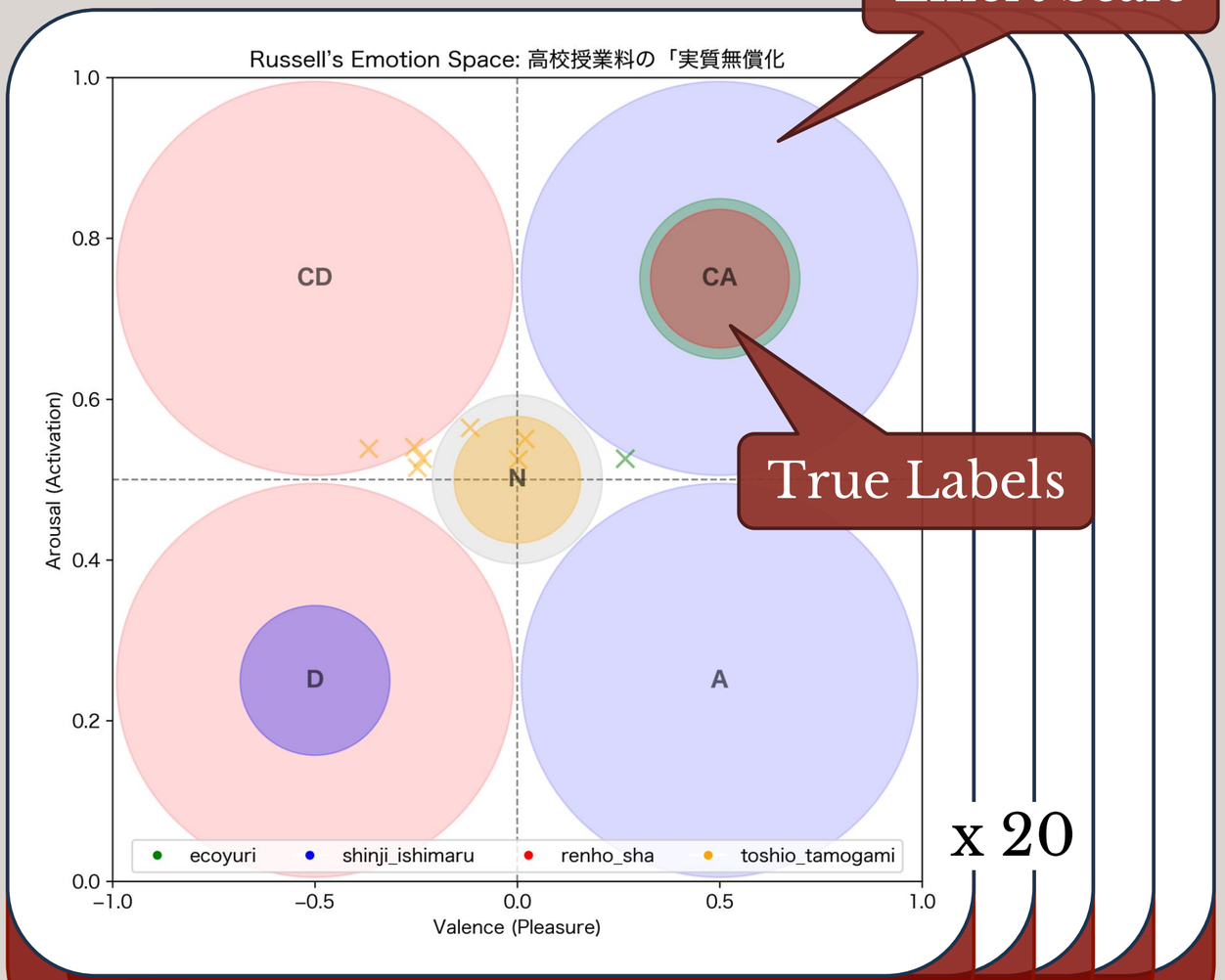


System Model Diagram

Results – Overview



All Tweets from all Topics



Tweets from Topic 1 - 20

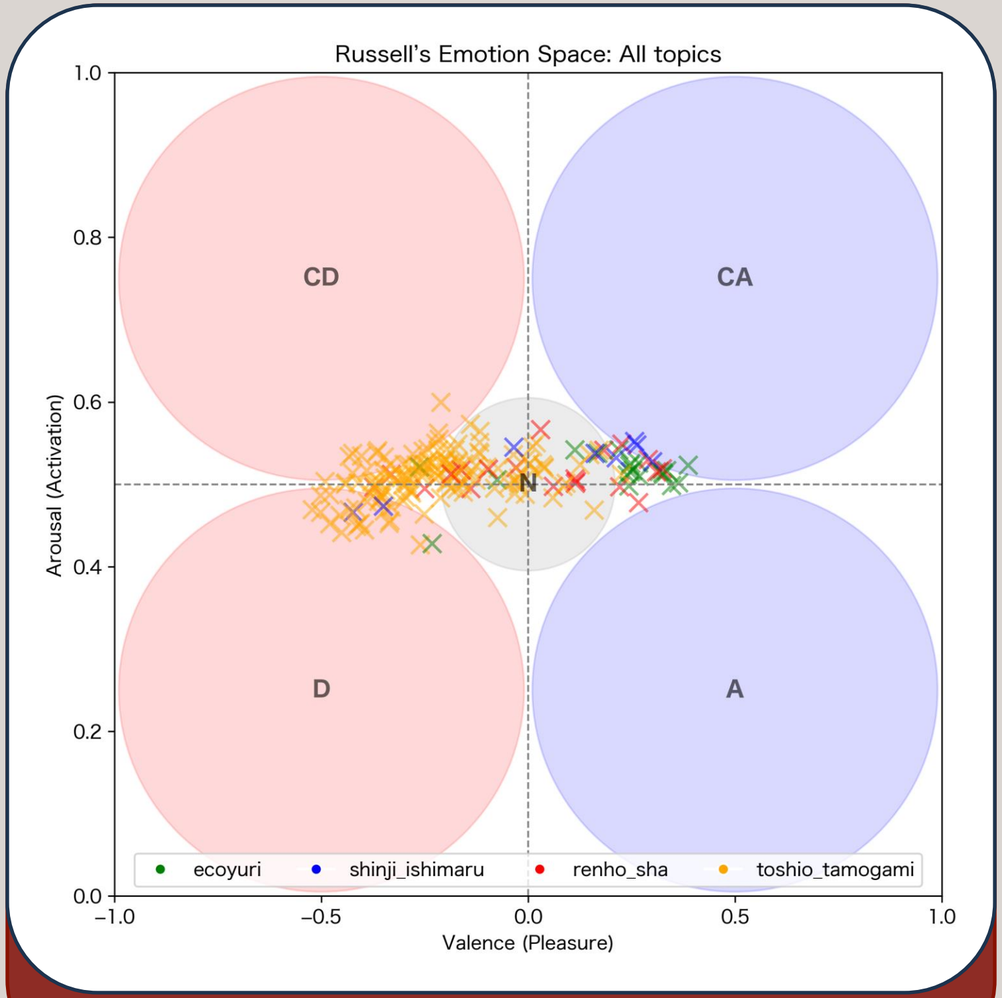
Results – Sentiments

Sentiment Analysis

- Arousal averages out complex sentences.
  - Normally Distributed at Arousal = 0.5
- All sentiments are close to “Neutral”
  - Low absolute Valence value
- Data point for each politicians concentrates in a particular region
  - Style of Speech
  - Emotion is Irrelevant to Sentiment

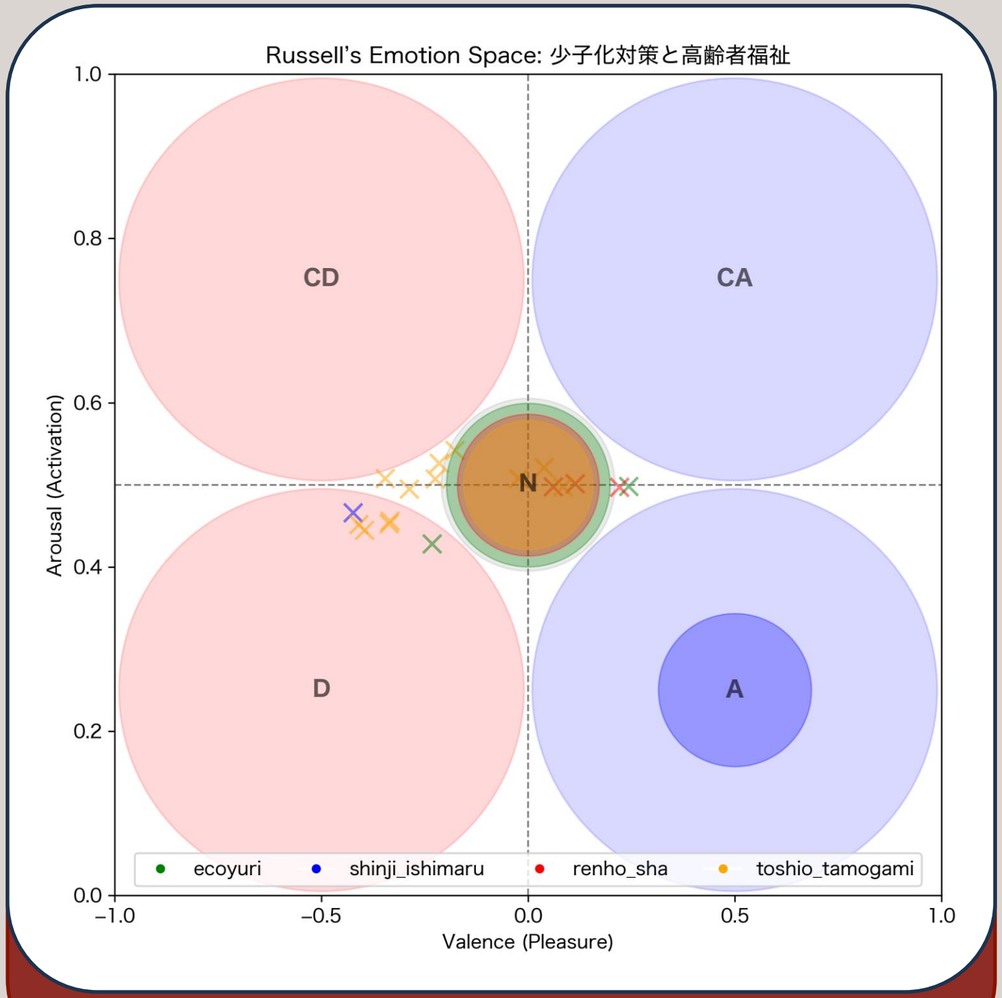
Transformation Matrix

- Premature matrix definition
- Alternate Dataset Labeling
- Define Likert Scale in Plutchik’s Eight emotion space



All Tweets from all Topics

Results – Clustering



Tweets from Topic 8

Clustering Issues

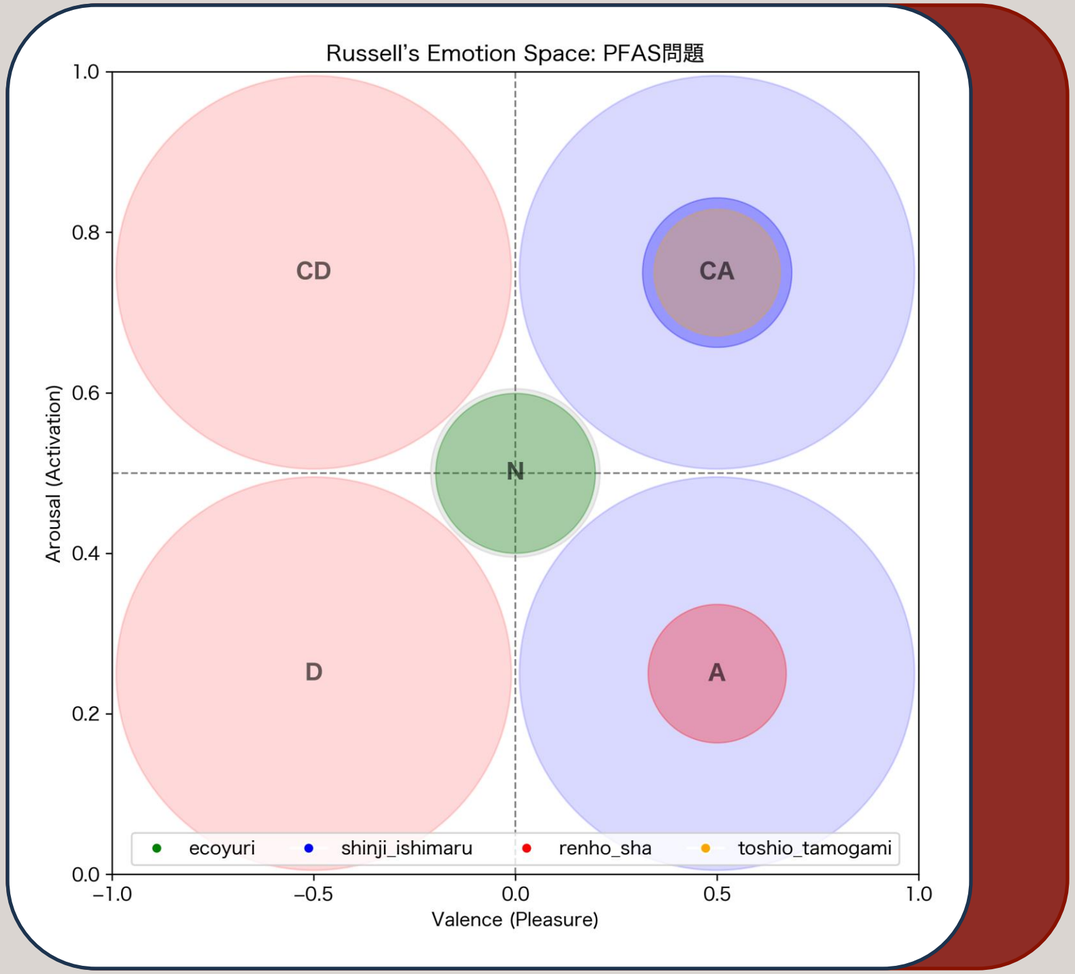
- Semi-supervised Clustering successfully excluded irrelevant topics
- Beyond certain semantic similarity, accuracy diminishes
  - "Different Taxes" issue
  - "Partial Answer" issue

Potential Improvements

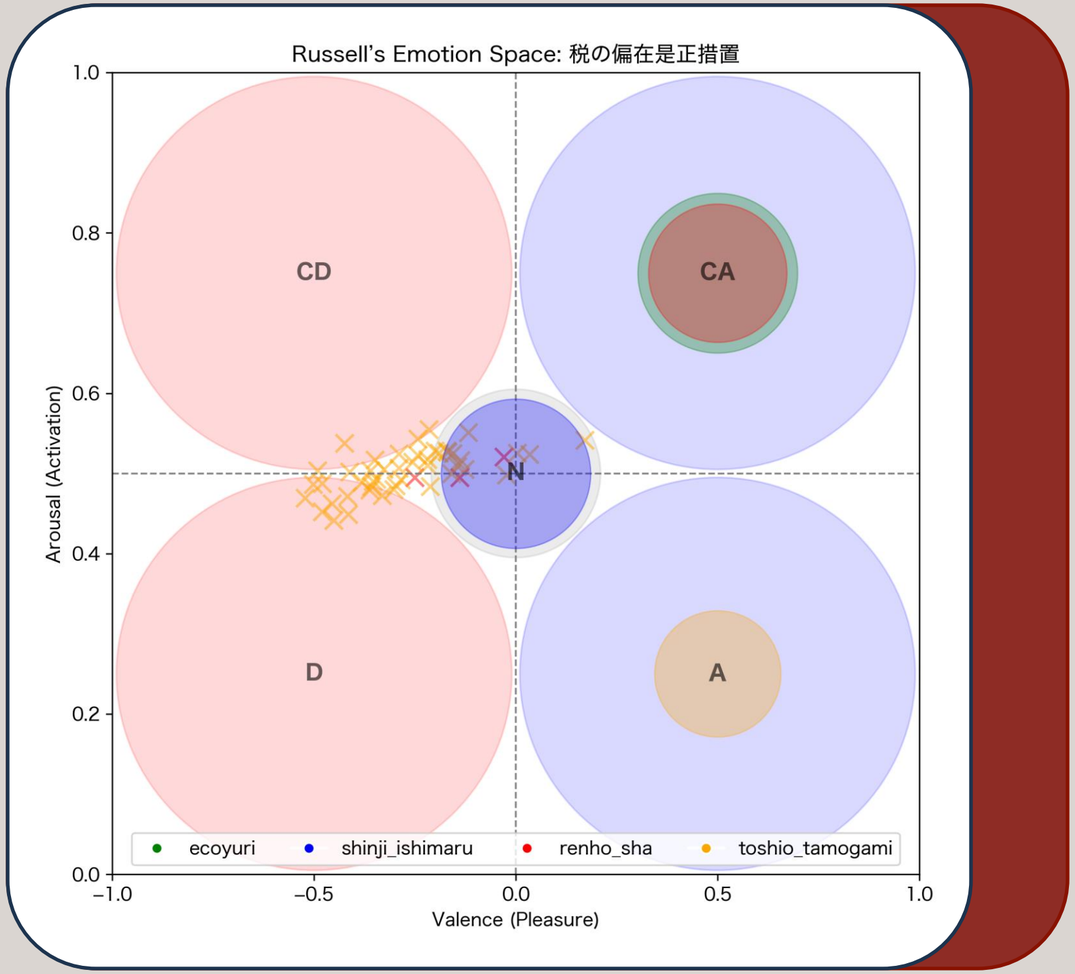
- Manual key words
- Dimension reduction with K-Means (simpler clustering models)

Results – Data / Tweets

Lack of Data / Tweets



Imbalanced Data / Tweets



Comparison

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Characteristics of Reference Literature

- Disagrees with Experts
- Model rarely produce “Neutral”
  - Variability between Arousal
- Lack of Data

Characteristics of this Methodology

- Low performance: Inaccurate Results
- Sentiments converge to “Neutral”
- Same Problem: Lack of Data

Table 1. Comparison of Answers: Experts vs. Twitter

	@BarackObama		@SenJohnMcCain		@HillaryClinton	
Question #	Twitter	Expert	Twitter	Expert	Twitter	Expert
1	CA	CA	CA	CD	CA	A
2	**No answer**	CD	CA	CA	CA	D
3	**No answer**	CA	CA	CD	**No answer**	A
4	CA	CD	**No answer**	CD	**No answer**	CD
5	CA	D	**No answer**	CD	**No answer**	D
6	CA	CD	CA	N	CA	CD
7	CA	CD	CA	CA	CA	A
8	CA	CD	CA	CA	CA	CD
9	CA	CA	**No answer**	CD	**No answer**	CA
10	CA	A	CA	CD	CA	A
11	**No answer**	A	CA	CD	**No answer**	A
12	**No answer**	CD	CA	A	CA	CD

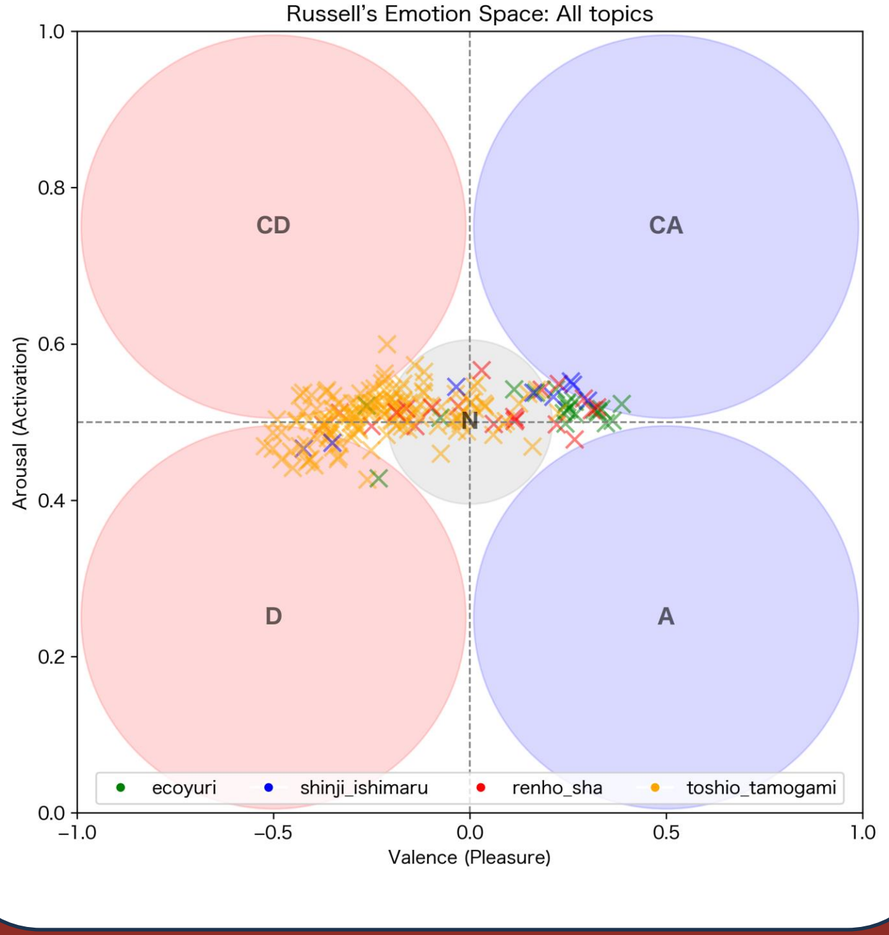
Conclusion & Future Work

Results

- Transformation between emotion spaces is premature and currently ineffective
- Fundamentally, Plutchik's emotion is not correlated to overall sentiment
- Clustering / Classification Difficulty

Future Work

- Explore emotion spaces transformation
- Explore appropriate Clustering Methods
- Develop Japanese based Russell emotion model
- Train with Political Emotion Dataset



All Tweets from all Topics

Academic Reference

Ravenda, F., Bahrainian, S. A., Raballo, A., Mira, A., & Crestani, F. (2024). A self-supervised seed-driven approach to topic modelling and clustering. Journal of Intelligent Information Systems, 1-21.

Terán, L., Kakenova, U., & Portmann, E. (2017, March). Analyzing and integrating dynamic profiles on voting advice applications. In Proceedings of the 10th International Conference on Theory and Practice of Electronic Governance (pp. 62-69).

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