T13P04 / Advanced Computational Methods for Public Policy: NLP, ML, and LLMs

Topic : T13 / METHODOLOGIES

Chair : Antoine Lemor (Université de Sherbrook (QC, Canada) ; Réseau francophone international en conseil scientifique (RFICS) ; Centre de recherche sur la science et la technologie (CIRST))

Second Chair : Louis-Robert Beaulieu-Guay (University of Saskatchewan)

Third Chair : Igor Tkalec (University College London, University of London)

GENERAL OBJECTIVES, RESEARCH QUESTIONS AND SCIENTIFIC RELEVANCE

Context

Natural Language Processing (NLP) is a subfield of computer science and linguistics that focuses on enabling computers to understand and interact with human language. It uses techniques from Machine Learning (ML), a branch of artificial intelligence that allows computers to learn from data and improve their performance. In the context of policy analysis, ML-driven NLP can be used for a variety of tasks, such as automatically categorizing policy documents or identifying policy change. Recently, the development of Large Language Models (LLMs), such as GPT-4, has further advanced NLP capabilities. LLMs are models trained on vast amounts of text data, allowing them to comprehend and generate human-like language. LLMs can assist in many tasks both in policy analysis and policy advice through their ability to process large quantities of data.

Natural Language Processing (NLP) and Machine Learning (ML) are becoming a powerful tool in policy analysis. With the increasing digitization of policy documents, these methods have been applied to various types of texts—ranging from legislative documents and regulations to policy briefs and political debates—enhancing the efficiency and scope of policy analysis. However, while NLP and ML show potential in automating routine tasks, debates continue about whether it can fully replace human policy analysts, especially when it comes to the interpretation of context or complex policy document and ethical considerations (Safaei & Longo, 2024; Bol & Bono, 2024). **How can NLP, enriched by ML and LLMs, enhance public policy analysis, and what are their limitations? This panel aims to critically examine the (1) types of data used, (2) the methods employed—including the roles of ML and LLMs—and (3) the applications of these technologies in public policy, exploring both their current use and future potential.**

(1) Types of textual data

The effectiveness of NLP and ML in policy analysis depends on the availability and quality of textual data. Current efforts include large corpora of parliamentary proceedings, such as the ParlaMint dataset, which contains transcriptions of European parliamentary debates (Erjavec et al., 2023). Similarly, RegCan, a database of Canadian federal regulations, provides data for studying regulations (Tremblay-Faulkner et al., 2018). Policy briefs, party manifestos, and political speeches are also being analyzed using NLP techniques (Orellana & Bisgin, 2023). These textual datasets provide the raw material for NLP and LLMs, but they also present challenges due to the complexity of legal and political language, preprocessing, or inherent bias, requiring advanced methods and controls to use and analyze these documents accurately.

(2) Types of methods used

Various NLP methods are applied to analyze these textual data. Text classification techniques categorize documents into policy areas such as health, education, or climate (Jin & Mihalcea, 2023). Topic modeling is another common method, which identifies latent themes within large corpora, analyzing trends in policy debates (Singh et al., 2024). Sentiment analysis measures the emotional tone in parliamentary speeches (Rheault et al., 2016). More advanced methods, such as causal mapping and graph analytics, allow for the extraction of cause-effect relationships from policy documents, enabling the visualization of policy impacts and interdependencies (Hooper et al., 2024). Machine Learning algorithms can enhance these methods by enabling predictive analysis and pattern recognition. LLMs also can perform tasks like summarization, question-answering, and even drafting policy documents. However, despite these advancements, concerns about model interpretability, ethical use, and biases persist (Rodriguez et al., 2024).

(3) Types of applications in policy analysis and policymaking

The applications of NLP for policy are broad, ranging from policy evaluation to the production of policy briefs. Automated systems and LLMs now generate policy briefs by summarizing legislative texts (Safaei & Longo, 2024). NLP tools are also used to monitor and evaluate the implementation of international climate agreements (Singh et al., 2024). Furthermore, sentiment analysis of public opinion data—such as social media—enables policymakers to assess public reactions to policy changes (Rodriguez et al., 2024). Despite these advances, the idea that LLMs could entirely replace human policy analysts remains controversial (Bol & Bono, 2024).

CALL FOR PAPERS

We invite contributions focusing on: (1) the types of textual data analyzed, (2) the methodologies employed—including NLP, ML, and LLMs—and (3) the applications in policy analysis/policymaking. While these technologies are transforming how researchers and policymakers analyze large bodies of data, challenges remain, particularly in interpreting complex policy documents and ensuring ethical use. This panel seeks to address these issues, bringing together research on the application of NLP, ML, and LLMs in public policy and exploring their potential for future development.

We are particularly interested in papers that address one or more of the following themes:

(1) Types of textual data used for policy analysis

Submissions may explore the variety of textual data being used in current NLP, ML and LLMs applications for policy analysis. Relevant data sources include legislative texts, regulations, policy briefs, political manifestos, speeches, and parliamentary debates. Papers can discuss how these datasets are processed, the challenges of working with complex legal or political language, and the potential for expanding the range of data used in policy analysis.

(2) Methods applied

We welcome papers that present or evaluate different methodologies for analyzing policy-related data. Methods of interest include text classification, topic modeling, sentiment analysis, causal mapping, predictive analytics, and the use of LLMs for advanced language tasks. Contributions may focus on how these techniques are used to identify policy trends, predict policy outcomes, map relationships between policy issues, or assess the sentiment and tone of political discourse. Papers can also address limitations and ethical concerns, such as biases within models, transparency, interpretability, and the challenges of deploying ML and LLMs in policy contexts.

(3) Applications in policymaking

Submissions may highlight the practical applications of these technologies in various aspects of policymaking. These could include the automated production of policy briefs using LLMs to summarize legislative texts, real-time monitoring and evaluation of policy implementation, or predictive modeling to forecast policy outcomes. Papers are encouraged to explore how these applications can support decision-making processes, improve policy design, or enhance the understanding of complex policy issues. We are also interested in critical assessments of whether these technologies can replace or should only complement human analysts and policymakers.

We encourage contributions from both researchers and practitioners who are exploring the intersection of NLP, ML, LLMs, and public policy. Submissions may present empirical studies, methodological innovations, case studies, or theoretical reflections. The goal of this panel is to foster an interdisciplinary dialogue on how these technologies are reshaping the field of public policy, the practical challenges they face, and the opportunities for further development.

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Session 1Advanced computational methods for political science and public policy

Wednesday, July 2nd 13:45 to 15:45 (B9)

Discussants

Antoine Lemor (Université de Sherbrook (QC, Canada) ; Réseau francophone international en conseil scientifique (RFICS) ; Centre de recherche sur la science et la technologie (CIRST))

Louis-Robert Beaulieu-Guay (University of Saskatchewan)

Applied machine learning for political science: an overview

Igor Tkalec (University College London, University of London)

Generative Artificial Intelligence as a Canadian Policy Expert: Results from Advanced Fine-tuning and Customization of a Base Large Language Model

Stany Nzobonimpa (École nationale d'administration publique, Université du Québec)

Jean-Francois Savard (ENAP)

Justin Lawarée (École nationale d'administration publique, Université du Québec)

(Virtual) Party manifestos and parliamentary questions: What do they say about environment and environmental politics and policies in India?

Pradeep Guin (Jindal School of Government and Public Policy)

Papiya Mazumdar (University of Leeds)

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Session 2NLP applications in policy and public administration contexts

Thursday, July 3rd 08:00 to 10:00 (D7)

Discussants

Igor Tkalec (University College London, University of London)

Evidence and Influence: A Systematic Analysis of Consultation Practices in Regulation

Louis-Robert Beaulieu-Guay (University of Saskatchewan)

Antoine Lemor (Université de Sherbrook (QC, Canada) ; Réseau francophone international en conseil scientifique (RFICS) ; Centre de recherche sur la science et la technologie (CIRST))

Credible Science, Influential Science? A Computational Study on the Influence and Credibility of Public Scientific Research Agencies in Public Health in Canada

Antoine Lemor (Université de Sherbrook (QC, Canada) ; Réseau francophone international en conseil scientifique (RFICS) ; Centre de recherche sur la science et la technologie (CIRST))

Protestor Partisanship and Police Response: Evidence from France, Germany, and the United Kingdom

Katelyn Nutley (University of St Andrews)

Mission-Driven Performance: An NLP Approach to Performance Dynamics

Hyemin Lee (Ewha Womans University, Republic of Korea)

Yujin Choi (Ewha Womans University)