Understanding and Analyzing Microtargeting Patterns on Social Media

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SCAN ME

Motivation & Broader Societal Impact

- *Distributed* Landscape of Social Media.
- Users **generate** and **consume** a variety of content.
- Social media platforms **collect** vast amounts of data and **create** very specific profiles of different users through **targeted advertising**.
  - *Microtargeting* — allows various interest groups, politicians, advertisers, and stakeholders to **tailor** messages and **influence users** based on collected personal data.

Impact of Microtargeting: *Double-edged sword*

- Enhances relevance and efficiency of targeted content.

- Posses risk of
  - **Manipulating** user behavior and perceptions (*Kruikemeier et al. 2016*),
  - **Polarization** (*Jiang et al. 2020, Zuiderveen Borgesius et al. 2018*),
 - **Echo chambers** (*Garimella et al. 2018, Quattrociocchi et al 2016*).
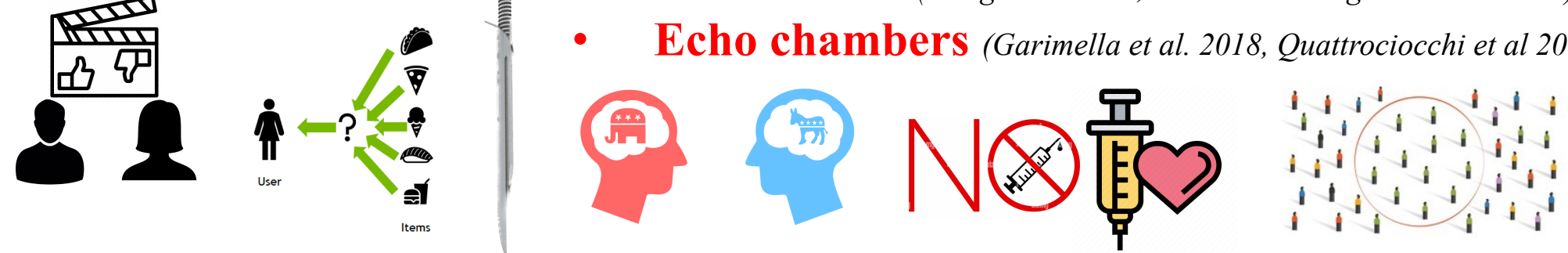
My research is motivated by the fact that some of these risks can be mitigated by providing transparency, identifying conflicting or harmful messaging choices, and indicating bias introduced in messaging in a nuanced way.

- Previous works on Microtargeting: Surveys (*Ribeiro et al. 2019*), Data scraping mechanism (*Silva & Benevenuto 2021*), Dataset (*Mejova & Kalimer 2020*), Website (*Barocas 2012*).

- We provide computational approaches and frameworks to **analyze microtargeting** and **activity patterns** on social media, which will help policymakers make better decisions.
- This is crucial for promoting healthy public discourse in the digital age and maintaining a cohesive society.
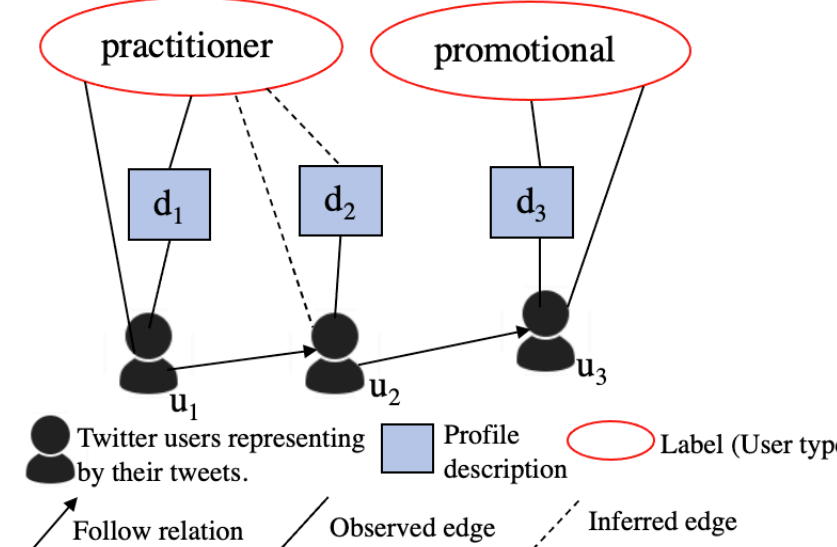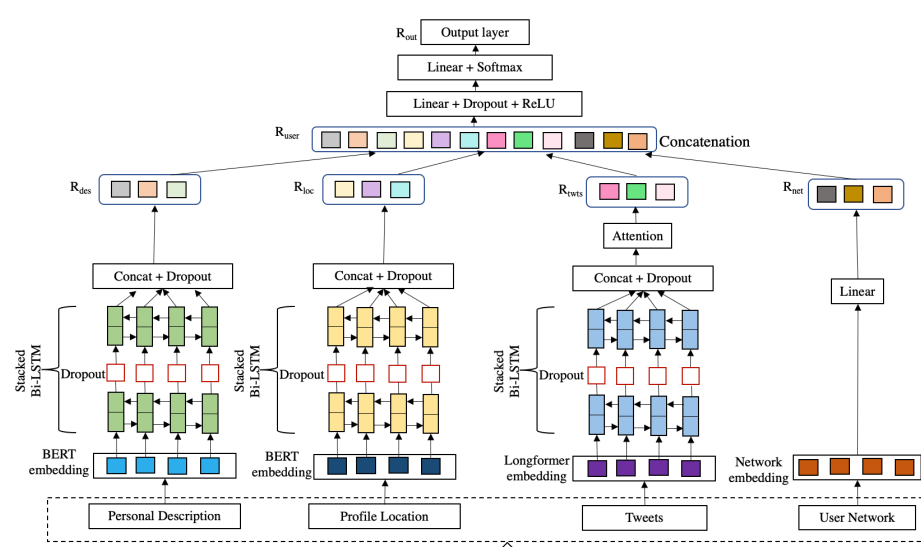
Information Graph Representation & Challenges
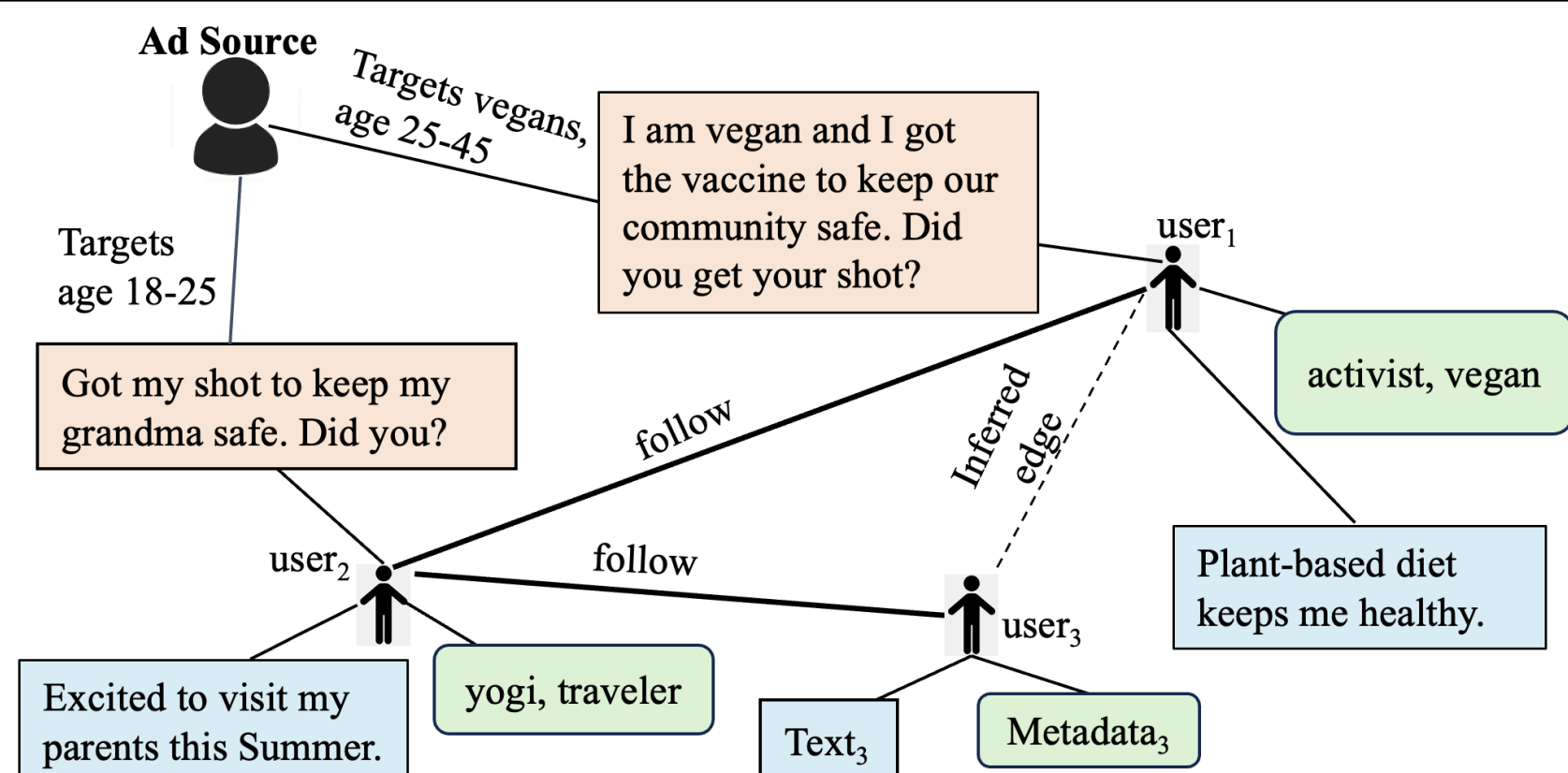
1. Activities and motivations of these users **are not known in advance**.
2. **Understanding messaging** and **how it changes** depending on the targeted user groups.

Thesis Contributions

1. Characterizing user types and their motivations.
- Domains of lifestyle choices, e.g., **Yoga & Keto diet**.

- Joint embedding model *[ICWSM'21]*
- **Multiview** representation of data.
- Weakly supervised graph embedding based framework *[ICWSM'22]*
- Addresses challenge of **label scarcity**.

2. Characterizing messaging consumed by the users and their responses to it.
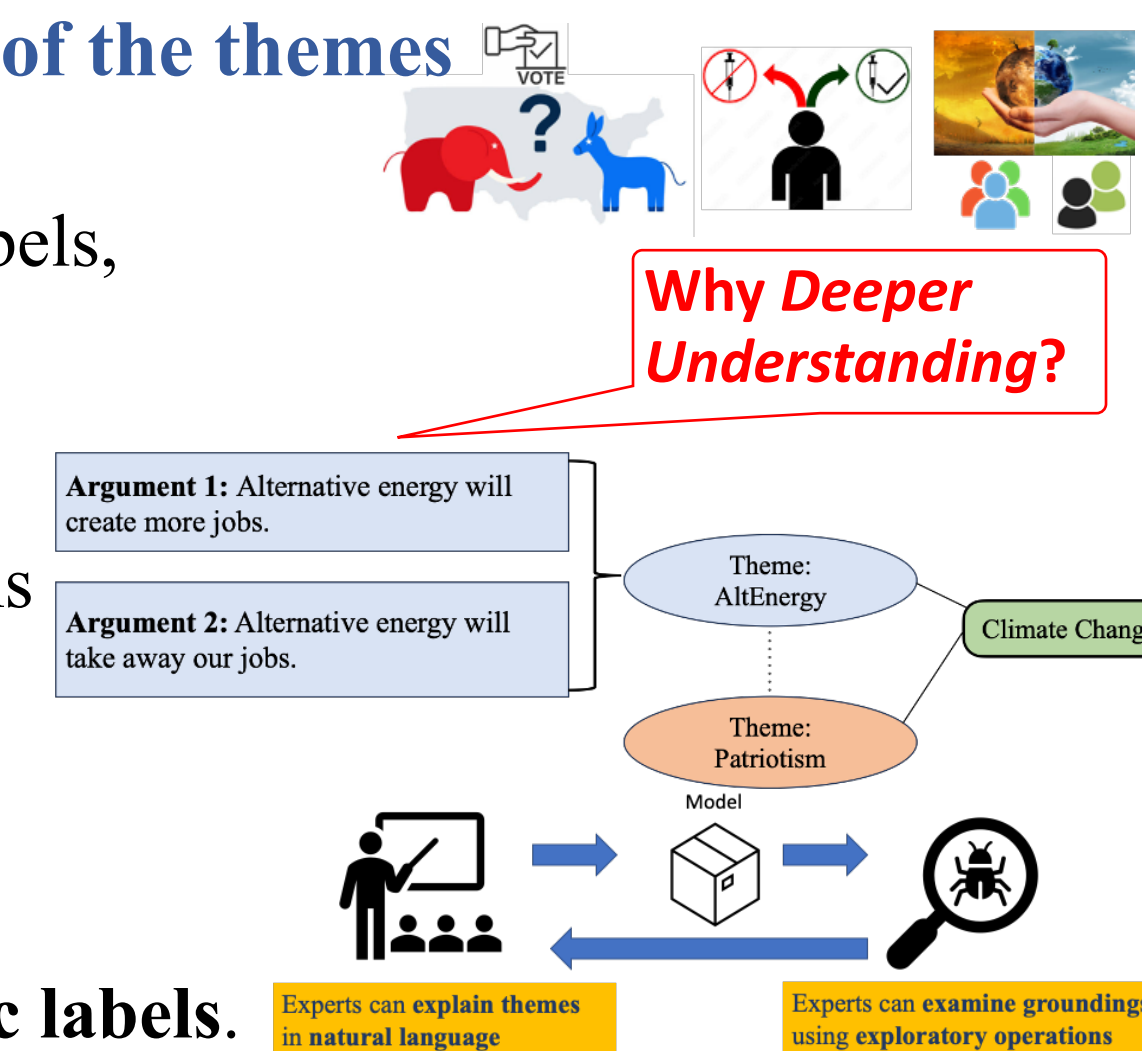- **Frameworks** for analyzing **microtargeting**.
- Aim to **identify** the **stance**, **issue**, **moral foundation**, **themes**.
- Analyze how specific campaigns **target demographics** based on **location**, **gender**, **age**.
- **Three** distinct studies on social media campaigns.

Political *[ICWSM'23]*   **COVID-19 vaccine** *[IEEE BigData'22]*   **Climate** *[AIES'23]*
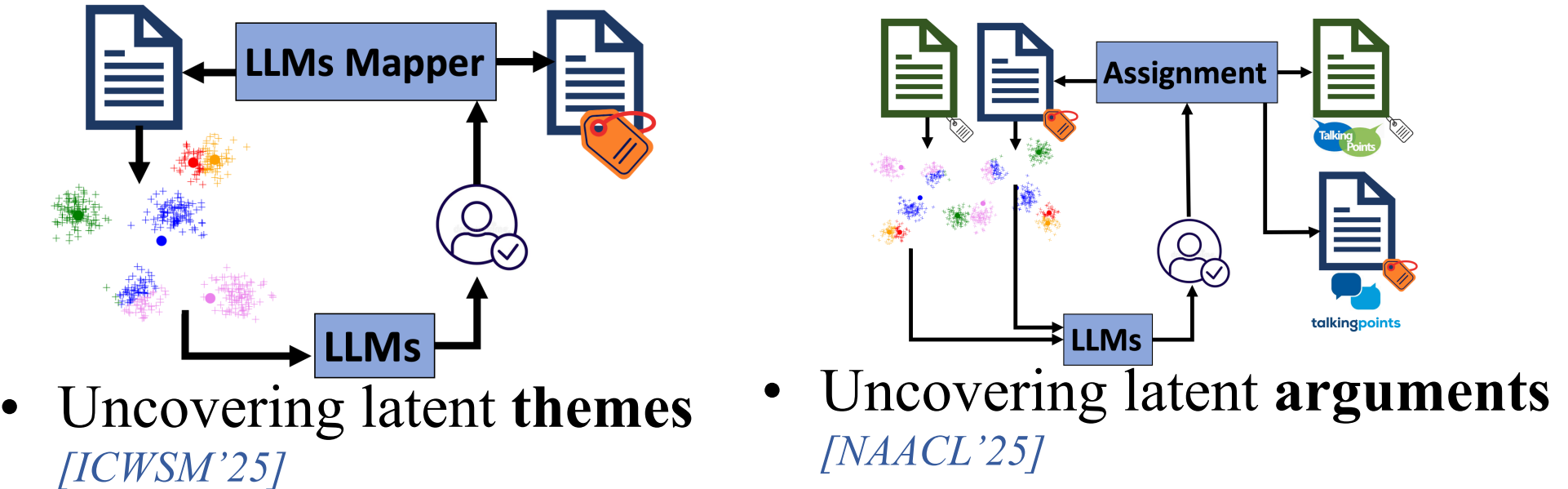
3. Delving into deeper understanding of the themes and arguments of messaging.
- In Contribution 2: **Predefined set** of labels, themes, arguments.
  - **Fixed** and **established based on existing topics/theoretical frameworks**, i.e., Moral Foundations Theory (*Haidt and Graham 2007*).

Why *Deeper Understanding*?

- Often **fails to capture the nuances** of messaging choices.
- **New set of codes** in particular domain.
- **Faster** development of **domain specific labels**.
- **Interactive human-in-the-loop** protocol to **identify themes** and **arguments**.
- **Joint approach for prediction** combining stances, arguments, morality, entity level moral sentiment holistically.
- Case study: **COVID-19, Immigration** *[ACL'23, DASH'22, NAACL'22]*
- Human-in-the-Loop: costly scalability, time consuming.
- **Machine-in-the-Loop: LLMs-in-the-Loop.** *[NAACL'25, ICWSM'25]*
  - LLMs possess **extensive domain insights**.
  - **Reasoning** capabilities.
  - **Accelerate** the process of refinement.
- Case study: **Climate** and **COVID-19 Vaccine Campaigns**.

Argument 1: Alternative energy will create more jobs.
Argument 2: Alternative energy will take away our jobs.

Experts can explain themes in natural language   Experts can examine groundings using exploratory operations

LLMs-in-the-Loop Approach

- Uncovering latent **themes** *[ICWSM'25]*
- Uncovering latent **arguments** *[NAACL'25]*

## Findings

How Themes Differ based on **Gender**.

Gender	Entity	Claim	Theme
Male	Alex Askew, Karen Greenhalgh	Alex Askew's record of raising taxes contrasted with Karen Greenhalgh's promise to cut taxes and lower living costs.	GasTax
Female	Parents, Children/Kids	Urgent need for action against climate change to protect the future of children and the planet.	FutureGeneration

How Themes Differ based on **Red** vs. **Blue** States.

State	Stance	Entity	Claim	Theme
VT	Clean-energy	Community	Climate change impacts health, family, and community.	HumanHealth
	Pro-energy	Climate Action Council	Climate Action Council plans to increase fuel and carbon taxes.	GasTax
ND	Pro-energy	Community	Oil and gas supports jobs and community growth.	Economy_pro
		Biden	Biden's energy policies increase energy costs.	BidenGasPrInc
	Clean-energy	Water system	Solution of water scarcity problem.	WaterMng&Sustain

Theme Shifts Triggered by **Key Events**.
- Event: **Gas Price Increase**, Date: **May 12, 2021**.
- Theme Freq.: AltEnergy, AgainstCorporateInterests, ClimateSolution **increased**.
- New Themes: **GasTax, BidenGasPriceIncrease**.

Event: 12 May, 2021 Gas prices rise over $3/GAL for the first time since 2014
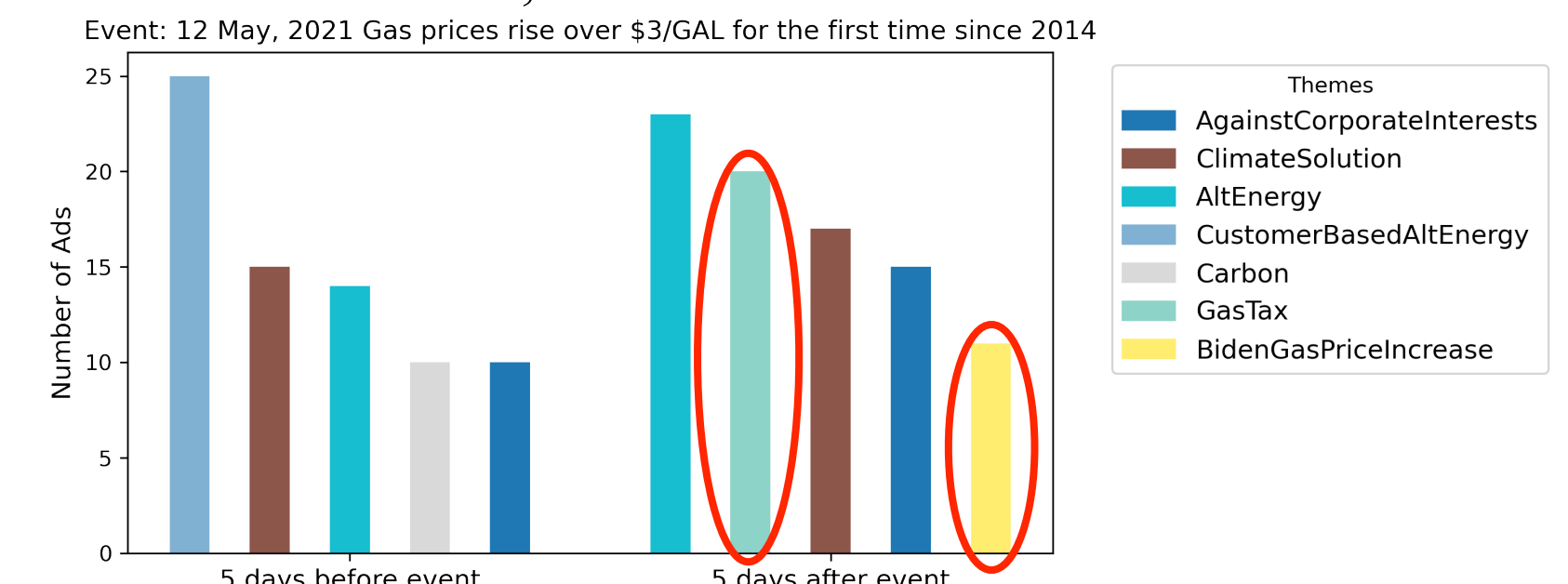
Future Research Directions

1. Opinion Mining: Predict the societal response on new policy.
   - What will people think of it?
   - Will the policy be welcomed/opposed?
   - What are the main talking points?
   - What motivates these attitudes?
2. LLMs' Impact on Microtargeting: LLMs can **Inherit** and **amplify biases** from training data (*Blodgett et al. 2020*).
   - Aspect1: Bias in Microtargeting.
   - Aspect2: LLMs' Capability on Microtargeting.

Why It Matters?
- Promote fair, responsible AI communication. • Avoid harmful stereotypes & misinformation. • Ensure AI serves societal well-being, not exploitation.