Combating Homelessness Stigma with LLMs: A New Multi-Modal Dataset for Bias Detection

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Abstract

Homelessness is a persistent social challenge, impacting millions worldwide. Over 770,000 people experienced homelessness in the U.S. in 2024. Social stigmatization is a significant barrier to alleviation, shifting public perception, and influencing policymaking. Given that online and city council discourse reflect and influence part of public opinion, it provides valuable insights to identify and track social biases. This research contributes to alleviating homelessness by acting on public opinion. It introduces novel methods, building on natural language processing (NLP) and large language models (LLMs), to identify and measure PEH social bias expressed in digital spaces. We present a new, manually-annotated multi-modal dataset compiled from Reddit, X (formerly Twitter), news articles, and city council meeting minutes across ten U.S. cities. This unique dataset provides evidence of the typologies of homelessness bias described in the literature. In order to scale up and automate the detection of homelessness bias online, we evaluate LLMs as classifiers. We applied both zero-shot and few-shot classification techniques to this data. We utilized local LLMs (Llama 3.2 3B Instruct, Qwen 2.5 7B Instruct, and Phi4 Instruct Mini) as well as closed-source API models (GPT-4.1, Gemini 2.5 Pro, and Grok-4). The LLMs outperform traditional transformer models (BERT, RoBERTa, and ModernBERT). Our findings reveal that models may exhibit inconsistencies in classifying underrepresented categories, yet their performance significantly improves with in-context learning or when SMOTE is applied. This work aims to raise awareness about the pervasive bias against PEH, develop new indicators to inform policy, and ultimately enhance the fairness and ethical application of Generative AI technologies.

Content Warning: This paper presents textual examples that may be offensive or upsetting.

Code: https://github.com/Homelessness-Project/Multimodal-PEH-Classification

Dataset: https://zenodo.org/records/16877412

This code and dataset are now in the public domain

1 Introduction

Homelessness is a persistent social challenge that affects millions of people worldwide. The Organization for Economic Cooperation and Development (OECD) reports that there are 2.2 million people experiencing homelessness (PEH) in the OECD and EU countries (OECD, 2024). The United States is no exception: more than 770,000 people were recorded as experiencing homelessness in 2024, the highest number ever documented (de Sousa and Henry, 2024). Specifically, the Point in Time count for PEH in San Francisco alone increased by 52% between 2005 and 2024 (City and County of San Francisco, 2024). In this context, there is a growing call for a shift from traditional homelessness management (which focuses on providing material resources) to comprehensive support approaches that also address the stigmatization of PEH (Union, 2024).

The marginalization suffered by PEH remains an understudied topic (Rex et al., 2025). Biases against PEH contribute to dehumanizing those affected, and make it harder for policymakers to approve and implement social measures that aim to mitigate homelessness (Curto et al., 2024; Rex et al., 2025). Further, the public perception of homelessness influences public voting in elections and therefore has an impact on policies aimed at addressing it (Clifford and Piston, 2017).

Online and city council discourse offer valuable insights into public opinion and the prevalence of social biases (Chan et al., 2021; Mislove et al.,

2011). Leveraging these digital and public records presents an affordable and relatively rapid method to derive preliminary indicators of social biases expressed through language. This study contributes to the nascent field of research on agentic large language models (LLMs) for social impact. We present novel methods, building on natural language processing (NLP) and LLMs, to identify and measure bias against PEH expressed in these digital spaces. Our work explores the effectiveness of LLMs as classifiers for online and offline data to generate and track new indices of homelessness bias across various U.S. cities. We investigate potential correlations between these indices and explore avenues for tackling homelessness by influencing public opinion. To this end, we present the following research questions (RQs):

- **RQ1:** How well can existing LLMs and transformer models classify the stigmatization of PEH?
- **RQ2:** To what extent does SMOTE improve the F1 score for multi-label text classification?
- **RQ3:** How do English online and offline textual homelessness biases differ across media platforms (social networks, news, and council meeting minutes)?

To answer these RQs, we accomplish the following tasks.

1. We collect and publish a dataset of online and offline geolocalized data on homelessness discourse between 2015 and 2025 for ten US cities from Reddit, X (formerly Twitter), news articles, and city council meeting minutes.
2. We anonymize the data using spaCy.
3. We create a multi-modal PEH bias classification frame which expands upon previous studies (Ranjit et al., 2024; Rex et al., 2025).
4. We classify biases against PEH in the multimodal data using Local LLMs (Llama 3.2 3B Instruct, Qwen 2.5 7B Instruct, and Phi4 Instruct Mini), closed-source API models (GPT 4.1, Gemini 2.5 Pro, and Grok 4), and compare them against human annotators while using transformer models (BERT, RoBERTa, and ModernBERT) as baselines.
5. We improve the transformer models' classification for minority classes by applying SMOTE
6. Finally, we compare the identified bias across different cities and data sources using the best classification model, GPT-4.1. and highlight the social impact that bias against PEH can potentially have on the actual levels of homelessness.

Our approach aims to foster greater public awareness, reduce the spread of harmful biases, inform policy decisions, and ultimately enhance the fairness and ethical application of generative AI technologies in addressing social issues. Moreover, this study uses social data and LLMs to identify and measure social bias, with the goal of alleviating homelessness by acting on shared beliefs. We acknowledge the inherent risks associated with using AI to identify biases, particularly the potential for misclassifications (false positives or negatives) that could mislead public understanding. Therefore, this project is guided by the principle of beneficence, prioritizing the maximization of societal benefits while actively minimizing potential harms (Beauchamp, 2008). To mitigate these risks and ensure the reliability of our AI models, we have created a human-annotated 'gold standard' dataset against which all models are compared. This gold standard was developed in close collaboration with domain experts from non-profit organizations and the City of South Bend, whose invaluable insights guided the identification and categorization of biases against PEH. Our partnership with the City of South Bend ensures that our research is not only academically sound but also practically relevant and actionable for policymakers on the ground.

2 Related Work

Understanding and addressing societal biases, particularly those against vulnerable populations, including PEH, is crucial for informing effective policy and fostering social equity. However, traditional social science methods for gauging public perception are often limited in their ability to process the large quantities of pertinent data available for analysis. Our research overcomes this constraint by leveraging advancements in AI, specifically LLMs and NLP, as powerful tools to systematically identify, measure, and track societal biases expressed in vast amounts of diverse textual data generated by humans. Therefore, we examine how current work (1) Evaluates and Benchmarks LLMs as Classifiers, addresses (2) Societal Impact and Policy-Oriented Data Collection, and uses (3) AI for Detecting and Classifying Societal Bias.

2.1 Evaluating and Benchmarking LLMs as Classifiers

Prior work benchmarks LLM capabilities in various classification tasks, particularly low-resource or novel scenarios like zero-shot and few-shot learning (Matarazzo and Torlone, 2025). Studies evaluate their accuracy, consistency, and ability to generalize to new data distributions. For instance, benchmarks like GLUE and BIG-Bench, while general-purpose, offer foundational insights into core linguistic capabilities relevant for classification tasks (Wang et al., 2018; Srivastava et al., 2023). More holistically, HELM evaluates models across multiple dimensions, including fairness and bias, moving beyond mere accuracy (Liang et al., 2022).

While we focus on LLMs to detect human-generated bias, it is crucial to acknowledge the "inherent biases" within LLMs themselves (e.g., representational biases, harmful content generation) as these can influence classification outcomes (Li et al., 2025). Techniques for auditing LLM outputs for fairness across demographic groups or identifying stereotypical associations within their internal representations (Bolukbasi et al., 2016; Nadeem et al., 2020; Blodgett et al., 2020) are relevant for ensuring the integrity of the classification results we obtain. Recent work continues to investigate how LLMs inherit and manifest social biases from their training data, and how these biases can impact downstream applications like bias detection (Hartvigsen et al., 2022; Chaudhary, 2024).

2.2 Societal Impact and Policy-Oriented Data Collection

NLP tools are being used to parse political activities, analyze legislation, track public sentiment, and investigate policy effects, transforming how researchers and policymakers engage with textual data (Jin and Mihalcea, 2022). LLMs are proving valuable for tasks like coding large datasets, reducing reliance on manual annotation, and extracting meaningful information for policymaking (Gilardi et al., 2023; Halterman and Keith, 2024; Li et al., 2024).

Research has also been done in mitigating biases within AI systems themselves (Morales et al., 2024). The responsible application of AI in this context, including human-centered design principles, is critical to ensure that tools serve to reduce, rather than exacerbate, social disparities (Lu et al., 2024; UNESCO, 2021).

2.3 AI for Detecting and Classifying Societal Bias

Previous studies have evaluated the effectiveness of LLMs as classifiers for biases against the poor, often collectively referred to as aporophobia, in online discourse (Kiritchenko et al., 2023; Curto et al., 2024; Rex et al., 2025). For instance, international comparative studies have shed light on the criminalization of poverty in online public opinion (Curto et al., 2024), and comprehensive taxonomies for aporophobia have been proposed (Rex et al., 2025).

More specifically concerning PEH, research has demonstrated LLMs' capability to detect shifts in public attitudes linked to socioeconomic factors (Ranjit et al., 2024). For example, analyses of tweets classified by LLMs have indicated a correlation between a larger unsheltered PEH population and an increase in harmful generalizations (Ranjit et al., 2024). These pioneering efforts highlight the immense potential of computational methods for analyzing public sentiment and identifying societal biases at scale.

The OATH framework (Ranjit et al., 2024) provides one of the most comprehensive pipelines for homelessness bias classification, categorizing biases into nine frames: 'money aid allocation', 'government critique', 'societal critique', 'solutions/interventions', 'personal interaction', 'media portrayal', 'not in my backyard', 'harmful generalization', and 'deserving/undeserving'. However, OATH's data collection was limited to a single online platform (X, formerly Twitter) and relied on a single keyword ('homeless'). Our research significantly advances this area by collecting a novel, multimodal dataset from diverse online sources (Reddit, X, news articles) and, critically, incorporating offline data from city council meeting minutes, which offers unique insights into policy-level discourse. Furthermore, we utilize a comprehensive PEH Lexicon containing the words 'homeless', 'homelessness', 'housing crisis', 'affordable housing', 'unhoused', 'houseless', 'housing insecurity', 'beggar', 'squatter', 'panhandler', and 'soup kitchen' (Jr. et al., 2025) and expand upon OATH's classification categories to capture a broader and more nuanced spectrum of biases, as detailed in Section 3.3.

3 Methodology

As noted in Figure 1, we create a multimodal dataset from Reddit, X, news articles, and meet-

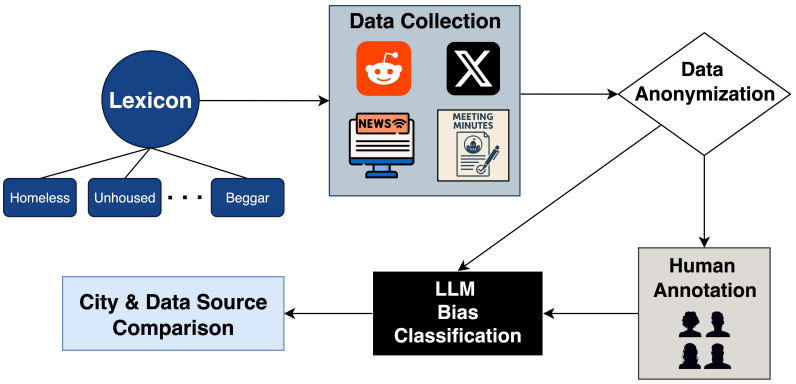

Figure 1: We collect Reddit, X, news articles, and city council offline meeting minutes data on homelessness discourse using the PEH lexicon (Jr. et al., 2025). We then anonymize the data and have both LLMs and domain experts classify the data into different bias categories to determine the reliability of LLMs as classifiers.

ing minutes by using the PEH lexicon (Jr. et al., 2025). Then we anonymize the data with spaCy (Honnibal et al., 2020) to remove personally identifiable information (PII). We identify if the data contains bias against PEH and classify the types of biases using our multimodal PEH bias classification criteria. We use human annotators, LLMs, and transformer models as PEH bias classifiers. We utilized local LLMs (Llama 3.2 3B Instruct, Qwen 2.5 7B Instruct, and Phi4 Instruct Mini) as well as closed-source API models (GPT-4.1, Gemini 2.5 Pro, and Grok-4), zero-shot and instruct (few-shot), and evaluated their performance against human annotators, transformers (BERT, RoBERTa, and ModernBERT), and traditional ML models (linear regression, SVM, and random forest).

3.1 Data Collection

To collect the data, we selected ten different cities in the US. Five of them are considered small in size and have low levels of homelessness, similar to South Bend, Indiana. We also select five larger cities similar to San Francisco, CA. Our code outlines how we created a list of 20 k-Nearest-Neighbors (kNNs) for the city list. When selecting cities, we filtered out those that had fewer than 50 Reddit posts on PEH between January 1st, 2015, and January 1st, 2025. The set of counties in Table 1 (corresponding to the selected set of cities) has similar levels of population, homelessness rates, and GINI, yet differs in racial fragmentation. We can also compare the differences in the two groups of cities since the San Francisco group contains larger cities and has higher levels of homelessness. The full criteria for kNNs, can be found in Appendix A.

Multimodal Data Related to PEH	
Small Cities - Similar to South Bend, IN	
City	**County**
South Bend	St. Joseph County, IN
Rockford	Winnebago County, IL
Kalamazoo	Kalamazoo County, MI
Scranton	Lackawanna County, PA
Fayetteville	Washington County, AR
Large Cities - Similar to San Francisco, CA	
City	**County**
San Francisco	San Francisco, CA
Portland	Multnomah County, OR
Buffalo	Erie County, NY
Baltimore	Baltimore County, MD
El Paso	El Paso County, TX

Table 1: Counties Included in Multimodal PEH Analysis

We create a dataset on PEH by using the PEH lexicon (Jr. et al., 2025) described in the Related Work. We have over 50,000 entities from Reddit, X, news articles, and city council meeting minutes between January 1st, 2015, and January 1st, 2025. To scrape Reddit, we looked at the subreddits for each city. Since less than 3% of X posts are geolocized, we scraped data that was either geolocized or included the city by name. For news articles, we used the LexisNexis API. More information can be found in Appendix A.

Finally, we gathered data from city council meeting minutes. The cities in scope post their information in different ways, and two of the cities do not

provide publicly accessible data. Seven cities have video or audio recordings that were transcribed via LLMs, while San Francisco provides the raw text.

3.2 Data Anonymization

Prioritizing the anonymization of our data is essential for research and privacy protection. We leveraged the capabilities of the spaCy NLP library (Honnibal et al., 2020). This technique allowed us to automatically identify and mask PII within the text. The specific categories of entities targeted for anonymization included: person name, geographic locations, organizations, and other identifying information such as street addresses, phone numbers, and emails. We also leveraged the Python module pydeidentify (Kogan, 2023), which is based on spaCy, in case we missed any other information to be anonymized.

The result of this multifaceted anonymization strategy is a dataset that respects user privacy while retaining the essential content for bias analysis and the development of mitigation techniques.

3.3 Multimodal PEH Bias Classification Categories

We create categories for a multimodal PEH bias classification that has 16 categories and expands upon the nine OATH-Frames (Ranjit et al., 2024), noted in the Related Work. The OATH frames include different types of biases in discussion. However, the categories are limiting, since the frames were designed for Twitter (now X) and do not include claims or questions as independent categories. Since questions are common on Reddit, we added the categories 'ask a genuine question' and 'ask a rhetorical question'. Additionally, we created the categories, 'provide a fact or claim' and 'provide an observation', based on the data we encountered through the annotation exercise. We also added the categories 'express their opinion' and 'express others' opinions', which indicate if the authors are giving a personal view or expressing the views of others. Finally, we include the category 'racist' that categorizes whether a post expresses racism or not. The definitions for the labels can be found in Appendix B.

3.4 Manually Annotated Baseline

Three human annotators labeled the dataset, using the defined multimodal PEH bias classification categories. We created a manually annotated baseline (Cardoso et al., 2014) utilizing stratified sampling (Liberty et al., 2016). To accomplish this, we annotated 50 comments per city (ten cities) for each of the four data sources. Since not all the cities had 50 entities for each source, a total of 1702 entities form our gold standard. When annotating, we worked in close collaboration with domain experts in the City of South Bend. This led us to have a high agreement rate among the human annotators, averaging 78.38% per category. However, it is not perfect, since inevitably, people have different opinions about biases based on their personal experiences and backgrounds. Therefore, we construct the gold standard using soft labeling (Fornaciari et al., 2021), which averages annotators' responses; if two or more annotators agree, it is classified accordingly. Annotator agreement rates per category can be found in Appendix C.

4 Results

4.1 Model Selection & Experimental Setup

To test and improve upon the current state of PEH bias classification, we benchmark a diverse set of models, encompassing established deep learning architectures, transformer models, and state-of-the-art large language models (LLMs), against our human-annotated gold standard dataset. Our selection process was driven by the need to assess performance across different model sizes, architectures, and access modalities (local vs. API-based) to investigate the impact of various prompting strategies.

We test six LLMs, three transformer models, and three traditional machine learning architectures against our gold standard. We choose three local LLMs to evaluate classification performance in low-resource environments: Llama 3.2 3B Instruct, Qwen 2.5 7B Instruct, and Phi4 Instruct Mini. We also test three closed-source LLMs: GPT-4.1, Gemini 2.5 Pro, and Grok-4. For all six LLMs, we used two types of prompts:

Zero-Shot Learning: This setup evaluates a model's inherent understanding and ability to classify unseen examples without any explicit task-specific examples in the prompt.

In-Context Learning (Few-shot): This strategy involves providing a small number of example input-output pairs directly within the prompt to guide the model's understanding of the task. For our experiments, we used five diverse examples from the human-annotated gold standard dataset for in-context learning. This process is standard in

Data Source	GPT-4		LLaMA		Qwen		Phi-4		Grok		Gemini		BERT		RoBERTa		ModernBERT	
	Zero	Few	Zero	Few	Zero	Few	Zero	Few	Zero	Few	Zero	Few	Finetuned	SMOTE	Finetuned	SMOTE	Finetuned	SMOTE
Reddit (Macro)	75.00	**76.95**	64.92	59.94	66.09	70.58	60.62	63.35	60.05	61.98	60.67	63.47	25.45	31.23	27.22	46.74	32.11	40.78
Reddit (Micro)	80.62	**82.93**	80.69	69.16	73.91	79.95	81.35	79.03	77.18	77.14	69.42	72.28	42.50	45.57	38.13	52.18	41.73	50.70
X (Twitter) (Macro)	65.00	65.96	64.99	59.59	60.20	**70.98**	55.98	66.73	63.67	65.02	68.34	68.21	18.07	32.74	18.17	47.57	30.75	37.2
X (Twitter) (Micro)	77.15	78.55	83.46	69.75	71.01	79.78	82.44	82.15	**83.69**	81.84	79.63	79.55	26.14	52.04	47.44	66.18	43.82	54.41
News (Macro)	67.84	70.56	64.17	56.11	54.91	**73.02**	59.81	71.39	66.96	68.75	69.55	72.21	1.08	19.71	14.24	23.25	16.18	22.35
News (Micro)	81.04	83.02	85.45	73.61	63.38	84.62	86.88	**87.06**	85.75	85.96	81.79	84.29	33.77	42.00	45.02	35.13	33.33	45.42
Meeting Minutes (Macro)	66.59	70.50	65.67	61.49	64.31	**74.96**	60.31	63.97	66.56	70.70	70.87	73.10	11.66	18.20	15.64	24.68	22.82	22.42
Meeting Minutes (Micro)	78.42	81.06	84.89	74.69	73.61	83.84	**84.51**	80.53	84.39	84.32	80.63	82.43	37.86	38.13	39.58	52.04	48.87	56.99
Weighted Avg (Macro)	73.73	**75.78**	64.96	59.95	65.43	70.95	60.33	63.73	60.83	62.88	61.96	64.56	24.12	30.89	25.89	40.15	30.45	36.23
Weighted Avg (Micro)	80.29	**82.56**	81.22	69.66	73.53	80.30	81.73	79.46	78.19	78.06	70.99	73.60	40.89	46.34	40.89	51.45	42.78	52.15

Table 2: Macro and Micro F1 Scores for All Models by Data Source

literature (Wang et al., 2020). All prompts are independent calls, which prevents data leakage between prompts. These examples were chosen to represent a variety of sources and classification categories to maximize their utility.

At the beginning of the prompt, we provide definitions of the classification categories and five examples when in-context learning is used. Since this is a multi-label classification problem, the models should output multiple labels when appropriate. The LLM prompt and all in-context prompts can be found in Appendix D. It is important to note that the five in-context examples are dependent upon the source (five from Reddit, five from X, five from news, and five from meeting minutes).

Here are two examples of in-context prompts that the human annotators agreed on:

Example X: "Did your Black flunky mayor get the[image][ORGANIZATION]'s memo 2 stick it 2 Rump instead of serving you by refusing 2 deport migrants + give them Black taxpayers'[image] 4 shelter+food while Black citizens go homeless? [ORGANIZATION] mayors did. Charity starts at [image].[URL]"
Few-shot classification: 'ask a rhetorical question', 'provide a fact or claim', 'express their opinion', 'money aid allocation', 'harmful generalization', 'deserving/undeserving', and 'racist'.

Example Meeting Minutes: "but they stuck with us, they got all the permissions they needed, and we would not have made the functional end of veteran homelessness in [ORGANIZATION] without them, so thank you. PERSON0? Well, thank you for this honor."
Few-shot classification:'provide a fact or claim', 'express their opinion', and 'solutions/interventions'.

For the three transformer models BERT (Devlin et al., 2019), RoBERTa (Liu et al., 2019), and ModernBERT (Warner et al., 2024), we finetune the data using a training, validation, testing split of 70%, 10%, 20%, which is standard for the size of our data. We also set the random state to 42 so that are tests can be repeated. Since our data is imbalanced, we add SMOTE (Chawla et al., 2002) to the transformer models to see if it is beneficial. SMOTE is only applied to the training categories in order to prevent data leakage while targeting 30% positive per category.

To assess model performance, we use macro-F1 score (Opitz and Burst, 2019), yet also report the micro-F1 score. This metric is critical for multi-label classification tasks with potential class imbalance, as it calculates the F1 score for each individual class and then averages them, thus equally weighting the performance on both prevalent and rare categories. In our dataset, class imbalance is prevalent. For example, over 70% of the results in the gold standard are classified as 'provide a fact or claim', yet less than 1% are classified as racist.

We compare all models' overall F1 score on the gold standard for both zero-shot and few-shot. We then choose the best-performing model to test on the entire dataset. When choosing the best model, we pick the best macro-F1 score for the weighted average, where the weighted average is with respect to the number of results in the complete dataset.

4.2 Results and Analysis

In Table 2, we see that GPT has the best weighted average, so we chose it to classify our complete dataset. When examining Table 3, we find that GPT, which achieves the best results, shows improvement in in-context learning for underrepresented categories. However, zero-shot performance is better for categories where the LLM already performs well.

When analyzing the results, it is important to note that certain LLMs outperform GPT when classifying X, news, and meeting minutes. GPT performs best overall, primarily because of its dominance in classifying Reddit comments. This may

Category	Reddit		News		Meeting Minutes		X (Twitter)	
	Zero	Few	Zero	Few	Zero	Few	Zero	Few
Ask Genuine Question	**78.95**	78.46	**12.90**	9.52	15.38	**18.18**	**13.16**	12.99
Ask Rhetorical Question	**73.22**	63.51	17.20	**22.50**	0.00	**22.22**	**28.57**	0.00
Deserving/Undeserving	6.67	**10.13**	4.55	**10.13**	0.00	**8.70**	0.00	**3.57**
Express Others Opinions	**39.34**	34.85	8.00	**14.71**	**19.23**	15.52	0.00	**2.74**
Express Opinion	**91.61**	91.06	**64.57**	64.17	25.64	**25.91**	63.98	**65.73**
Government Critique	**57.00**	56.22	**31.02**	28.40	15.00	**26.53**	16.39	**27.20**
Harmful Generalization	45.07	**48.70**	**25.33**	23.36	0.00	0.00	**21.62**	21.43
Media Portrayal	**9.30**	7.14	2.15	**4.76**	0.00	0.00	0.00	0.00
Money Aid Allocation	59.76	**60.44**	**29.85**	19.44	**35.64**	35.56	**35.29**	29.14
Not in My Backyard	50.53	**58.97**	**13.79**	0.00	0.00	0.00	**8.70**	0.00
Personal Interaction	54.84	**58.23**	**11.54**	8.00	0.00	0.00	**11.27**	9.76
Provide Fact/Claim	**80.50**	79.81	**83.18**	78.65	**93.69**	92.90	82.08	**89.06**
Provide Observation	53.81	**62.76**	6.40	**9.09**	3.39	**4.23**	**6.19**	4.04
Racist	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Societal Critique	**39.80**	38.39	19.79	**21.35**	13.33	**14.16**	**8.60**	6.90
Solutions/Interventions	68.75	**71.78**	43.15	**47.31**	52.52	**58.31**	51.43	**55.98**

Table 3: Category-wise F1 Scores for GPT4 Model

be in part because it was explicitly trained on Reddit and other online data (Ge et al., 2024). When it comes to classifying X, news, and meeting minutes, other models perform better, as noted in Table 2. Additionally, local LLMs perform comparably or even outperform closed-source models at these tasks. This shows that it may be beneficial to use local LLMs when either cost savings or data security is needed for classification purposes.

We also observe that transformers struggle with classifying data with multiple labels, unlike LLMs. However, when SMOTE is applied, the scores improve because data imbalance is reduced by adding synthetic examples. Overall, LLMs perform the best, followed by transformer models, while traditional ML models perform the worst. A full breakdown of model results can be found in Appendix E - G.

The correlation matrix in Figure 2 reveals that there are significant negative correlations between 'solutions/interventions' vs. 'societal critique', 'solutions/interventions' vs. 'harmful generalization', and 'solutions/interventions' vs. 'personal interaction'. There are also significant positive correlations between 'societal critique' vs 'deserving/undeserving', 'express their opinion' vs 'deserving/undeserving', and 'ask a genuine question' vs 'deserving/undeserving'. These findings can potentially help policymakers address homelessness alleviation by acting on public opinion. Our

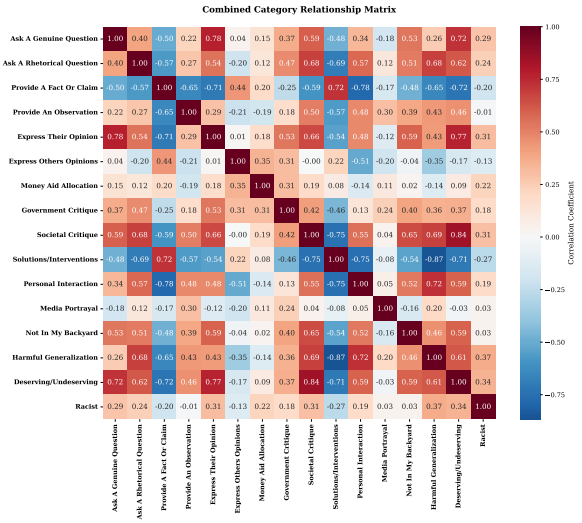

Figure 2: Correlation Matrix

findings illustrate how, when there are harmful generalizations, there is less acceptance of solutions and interventions. Moreover, the positive correlation between "deserving / undeserving" and "ask a genuine question" could potentially indicate that there is some questioning about shared beliefs that tend to blame PEHs for their fate (Sandel, 2020; Desmond, 2023).

In Figure 3 we see that there are several significant correlations between the multimodal PEH bias classification categories and the media type. For example, meeting minutes and news sources dis-

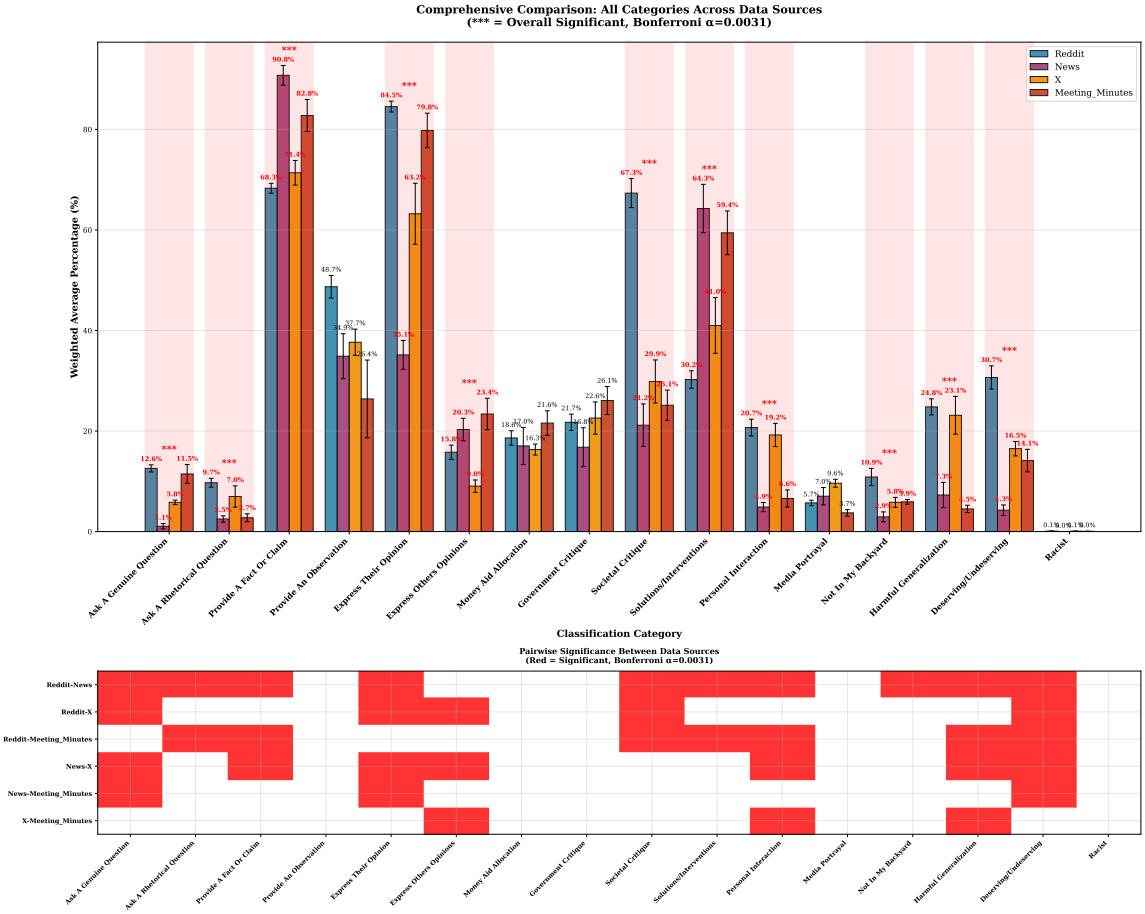

Figure 3: Data Source Comparison

cuss solutions/interventions more frequently than social media. Additionally, social media posts are more likely to express harmful generalizations or opinions about the deservingness of PEH. When determining statistical significance, we applied the Bonferroni correction (Weisstein, 2004) since this involves multi-label classification analysis.

5 Conclusion

This research introduces a novel multi-modal dataset and demonstrates the effectiveness of Large Language Models (LLMs) in identifying and classifying homelessness bias in online and offline public discourse. Our evaluation shows that while models may exhibit inconsistencies in classifying underrepresented categories, yet their performance significantly improves with in-context learning or when SMOTE is applied. This highlights the potential for scalable and accessible social biases detection solutions, which are valuable tools to combat urgent social challenges (such as homelessness) by acting on public opinion. The observed variations in bias prevalence across cities and media platforms underscore the heterogeneous nature of public perception, emphasizing the necessity for context-specific interventions when aiming to alleviate homelessness through acting on the social fabric.

This work aims to foster public awareness, mitigate harmful biases, and inform policy, thereby enhancing the ethical application of generative AI in addressing critical social challenges. The invaluable partnership with the City of South Bend and their non-profit collaborators has been instrumental, guiding our human annotation and ensuring the practical relevance of our findings. By developing new indicators of homelessness bias, we empower cities like South Bend with data-driven tools to counter stigmatization and facilitate more equitable approaches to homelessness alleviation.

Limitations

Drawing text content from diverse sources, including Reddit, X, news sources, and city council meeting minutes, provides a robust dataset for analysis. However, it cannot be said that this dataset

encompasses all of the available dialogue concerning homelessness. Future research might benefit from including novel data sources in order to capture discourse that is currently underrepresented in our final dataset. Additionally, we do not determine whether the data is coming from an actual human or a bot.

The geographic scope of our data collection is confined to ten specific U.S. cities. Although these cities were strategically chosen to represent varying demographics and homelessness rates, they do not represent the full spectrum of socio-economic and cultural contexts across the entire United States, let alone globally. Our lexicon is also standardized across all ten cities, and does not pick up on cultural nuances. Furthermore, it is difficult to find significant correlations between cities when only examining ten cities.

Despite our expanded multimodal PEH bias classification criteria and rigorous human annotation processes, the inherent complexity and subjectivity of identifying and categorizing social bias remain a challenge. Subtle, implicit biases that do not involve overt discriminatory language are difficult for automated systems to fully capture, even with advanced LLMs.

Ethical Considerations

The principle of beneficence, which maximizes benefits while minimizing potential harms (Beauchamp, 2008), is critical to our research. It is also important to promote fairness, especially when dealing with biases towards PEH. These ethical principles are especially important in socially challenging topics such as homelessness alleviation. We have been working in close collaboration with specialized non-profits in the city of South Bend to make guided decisions in the human manual annotation of homelessness biases.

We make sure that privacy is paramount. All data is anonymized to remove PII using spaCy, adhering to ethical standards for data privacy. The anonymization process ensures that individuals' identities are protected, while still allowing for valuable insights to be drawn from the data. For this process, we received IRB approval to scrape public data, and we ensure that proper guidelines and ethics are followed when using this data.

In creating the paper, we used LLMs such as ChatGPT and Gemini to help with code and writing editing, though all of the content is our own.

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A Data

We selected ten US cities, grouped into two sets of 5, based on our kNN script. When selecting the cities, we gathered data from their respective counties from the U.S. Census. The counties for these cities were selected to have similar levels of population, homelessness rates, and GINI index, while differing primarily in racial fragmentation. The cities of South Bend, Indiana, and San Francisco, California, were selected as the cities for each group.

Our dataset from the ten cities can be seen in Table 5. The dataset comprises 50,447 total text samples from January 1st, 2025, to January 1st, 2025, with the largest contributions from Reddit comments (34,447) and X (Twitter) posts (16,472). Smaller cities like Scranton and El Paso contribute fewer total data samples than larger cities like San Francisco and Portland. Kalamazoo and Baltimore's city council sites do not make meeting minute data publicly available (thus denoted N/A). Additionally, certain cities have a lower number of meetings since they do not span ten years. For example, the city of San Francisco began publishing the complete text of their meeting minutes in 2023. Prior to that, they just recorded a summary (no full text or audio recordings available). The given distribution reflects both population differences and varying levels of online civic engagement across cities.

Grouping	County, State (City Within County)	RFI*	Population	RPP†	RPA‡	Homelessness▽	GINI×
	Counties / Cities Comparable to San Francisco County (San Francisco, CA, USA)						
1	San Francisco County, California (San Francisco)	0.75	851,036	1,032	131	98	0.52
2	Multnomah County, Oregon (Portland)	0.56	808,098	1,198	237	91	0.47
3	Erie County, New York (Buffalo)	0.47	951,232	1,342	134	60	0.46
4	Baltimore County, Maryland (Baltimore)	0.63	850,737	997	99	7	0.46
5	El Paso County, Texas (El Paso)	0.69	863,832	1,919	99	11	0.47
	Counties / Cities Comparable to St. Joseph County (South Bend, IN, USA)						
A	St. Joseph County, Indiana (South Bend)	0.52	272,388	1378	97	8	0.47
B	Winnebago County, Illinois (Rockford)	0.57	284,591	1,583	134	29	0.45
C	Kalamazoo County, Michigan (Kalamazoo)	0.43	261,426	1297	83	25	0.46
D	Lackawanna County, Pennsylvania (Scranton)	0.38	215,672	1252	238	8	0.46
E	Washington County, Arkansas (Fayetteville)	0.60	247,331	1,466	80	32.14	0.48

*RFI: Racial Fractionalization Index

†RPP: Rate of People Below Poverty Line (per 10k)

‡RPA: Rate of People With Public Assistance (per 10k)

▽Homelessness: Homelessness Rate (per 10k)

×GINI: Income Inequality (GINI)

Table 4: Table of US counties, used in the dataset. Counties are similar to San Francisco County, CA, and St. Joseph County, IN. The counties are similar in the rate of people below the poverty line, the rate of people with public assistance, the homelessness rate, and GINI, yet differ in racial fractionalization.

City	Reddit		News		X (Twitter)			City Council	
	Posts	Comments	Articles	Paragraphs	Posts	Geolocated	Non-Reposts	Meetings	Comments
South Bend	62	**196**	36	**49**	96	6	**65**	86	**330**
Rockford	43	**188**	6	**9**	98	0	**43**	344	**243**
Kalamazoo	209	**1846**	8	**11**	99	1	**40**	N/A	N/A
Scranton	13	**79**	108	**159**	92	2	**56**	431	**514**
Fayetteville	34	**102**	28	**29**	97	3	**81**	233	**1043**
San Francisco	714	**14777**	1181	**1537**	9168	23	**2330**	25	**14**
Portland	751	**15301**	322	**397**	5574	39	**1215**	372	**6618**
Buffalo	151	**589**	176	**196**	685	1	**115**	211	**135**
Baltimore	246	**1215**	142	**156**	464	7	**244**	N/A	N/A
El Paso	40	**154**	28	**31**	99	1	**53**	74	**284**
Grand Total	2263	**34447**	2035	**2577**	16472	83	**4242**	3552	**9181**

Table 5: Dataset Summary

B Classification Taxonomy

We expanded upon the nine OATH-Frames (Ranjit et al., 2024) to create 16 classification categories. The new categories were added based on the needs of a multimodal dataset. For example, 'ask a genuine question' and 'ask a rhetorical question' were added since questions are common on Reddit.

OATH Categories:

- Critque Categories
  - Money Aid Allocation: Discussion of financial resources, aid distribution, or resource allocation for homelessness
  - Government Critique: Criticism of government policies, laws, or political approaches to homelessness
  - Societal Critique: Criticism of social norms, systems, or societal attitudes toward homelessness
- Response Categories
  - Solutions/Interventions: Discussion of specific solutions, interventions, or charitable actions
- Perception Types
  - Personal Interaction: Direct personal experiences with PEH
  - Media Portrayal: Discussion of PEH as portrayed in media
  - Not in my Backyard: Opposition to local homelessness developments
  - Harmful Generalization: Negative stereotypes about PEH
  - Deserving/Undeserving: Judgments about who deserves help

New Categories:

- Comment Types
  - Ask a Genuine Question: The speaker asks a sincere question about homelessness or related issues
  - Ask a Rhetorical Question: The speaker asks a question not intended to be answered, often to make a point
  - Provide a Fact or Claim: The speaker provides a factual statement or claim about homelessness
  - Provide an Observation: The speaker shares an observation about homelessness or related situations
  - Express their Opinion: The speaker expresses their own views or feelings about homelessness
  - Express Others Opinions: The speaker describes or references the views or feelings of others about homelessness
- Racist Classification
  - Racist: The speech contains explicit or implicit racial bias

C Inter-Annotator Agreement

To establish the reliability of our multi-label classification, we conducted an Inter-Annotator Agreement (IAA) study on a gold standard set of 1702 entities using three human annotators. Annotators were trained using a comprehensive coding guide based on our 16 multimodal PEH bias classification categories). The gold standard was created via stratified sampling across all ten cities and four data sources (Reddit, X, News, and City Council Minutes) to ensure representation. (50 entries per city per source; not all city-source combinations had 50 as noted in Appendix A). For multi-label assignment, we employed a soft labeling mechanism: a category label was included in the final Gold Standard if two or more of the three annotators agreed on its presence. This process resulted in a robust final dataset with an average agreement rate among the human annotators of 78.38% per category. This high percentage indicates a substantial level of reliability in the classification process, validating the annotated labels used for our model training and evaluation. A detailed table showing the agreement rate for each of the 16 individual categories can be seen in Figure 4.

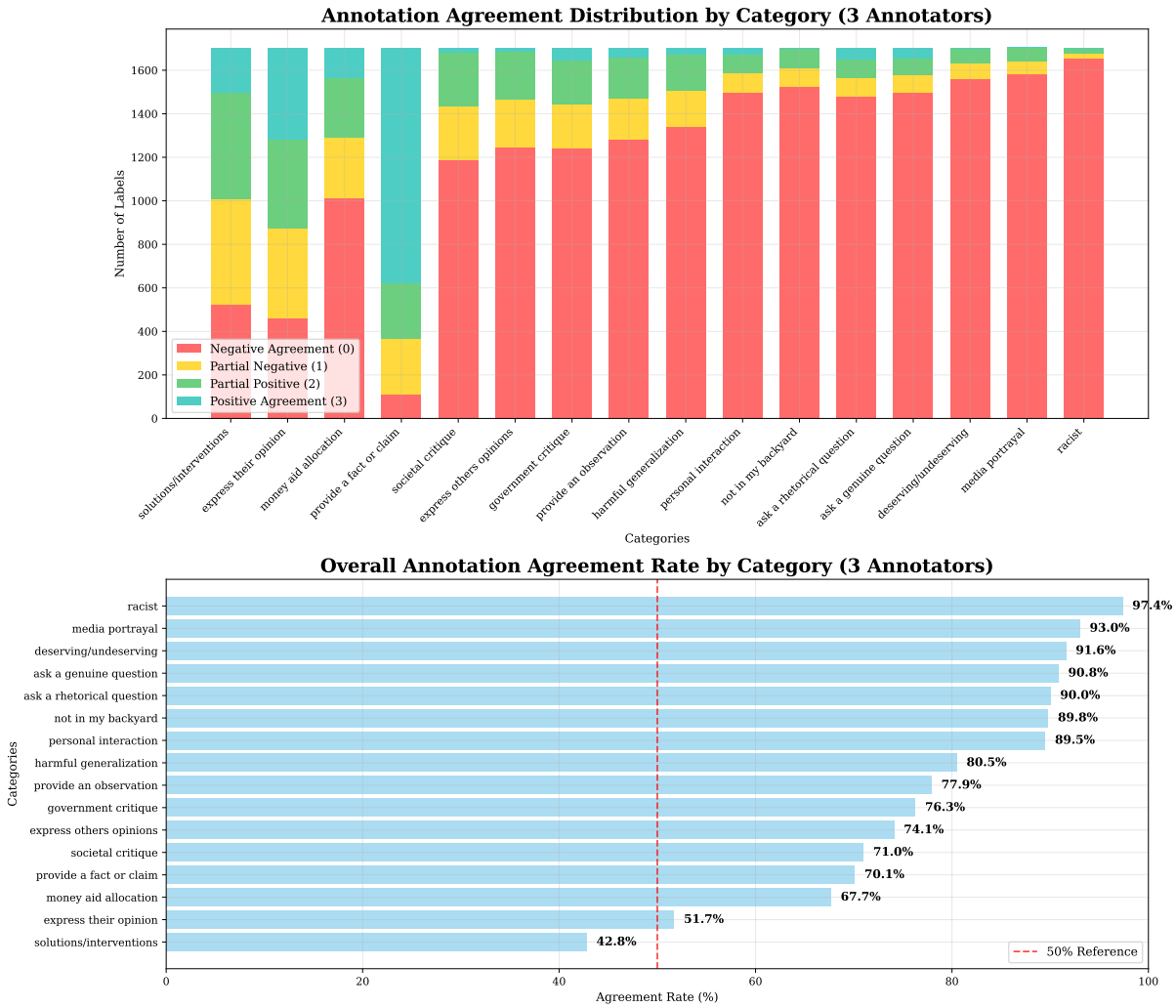

Figure 4: Inter-Annotator Agreement - The upper panel displays the distribution of agreement levels (negative agreement, partial negative, partial negative, and positive agreement) for each category, showing considerable variation in consensus across different labels. Positive agreement describes a case in which each annotator agreed that the given label applied to a piece of sample text, whereas negative agreement describes a case in which none of the annotators identified the given label as applying to a piece of sample text. The lower panel presents the overall annotation agreement rates, with *racist* having the highest agreement rate (97.4%), followed by *media portrayal* (93.0%) and *deserving/undeserving* (91.6%). Categories such as *express their opinion* and *solutions/interventions* show lower agreement rates (51.7% and 42.8%, respectively), which can be attributed to larger differences in annotators' interpretations of these labels.

D LLM Prompt

We pass the following prompt into the LLM when classifying the data.

```
You are an expert in social behavior analysis. Your task is to analyze {content_desc} about homelessness and categorize them according to specific criteria.

DEFINITIONS:
1. Comment Types (select all that apply):
- Ask a Genuine Question: The speaker asks a sincere question about homelessness or related issues
- Ask a Rhetorical Question: The speaker asks a question not intended to be answered, often to make a point
- Provide a Fact or Claim: The speaker provides a factual statement or claim about homelessness
- Provide an Observation: The speaker shares an observation about homelessness or related situations
- Express their Opinion: The speaker expresses their own views or feelings about homelessness
- Express Others Opinions: The speaker describes or references the views or feelings of others about homelessness

2. Critique Categories (select all that apply):
- Money Aid Allocation: Discussion of financial resources, aid distribution, or resource allocation for homelessness
- Government Critique: Criticism of government
```

policies, laws, or political approaches to homelessness
- Societal Critique: Criticism of social norms, systems, or societal attitudes toward homelessness

3. Response Categories (select all that apply):
- Solutions/Interventions: Discussion of specific solutions, interventions, or charitable actions

4. Perception Types (select all that apply):
- Personal Interaction: Direct personal experiences with PEH
- Media Portrayal: Discussion of PEH as portrayed in media
- Not in my Backyard: Opposition to local homelessness developments
- Harmful Generalization: Negative stereotypes about PEH
- Deserving/Undeserving: Judgments about who deserves help

5. Racist Classification:
- Yes: Contains explicit or implicit racial bias
- No: No racial bias present

INSTRUCTIONS:
1. Read the comment carefully
2. Analyze it according to the categories above
3. Provide your analysis in the exact format below
4. Include a brief reasoning for your classification

FORMAT YOUR RESPONSE EXACTLY AS FOLLOWS:

Comment Type: [ask a genuine question, ask a rhetorical question, provide a fact or claim, provide an observation, express their opinion, express others opinions]
Critique Category: [money aid allocation, government critique, societal critique]
Response Category: [solutions/interventions]
Perception Type: [personal interaction, media portrayal, not in my backyard, harmful generalization, deserving/undeserving]
Racist: [Yes/No]
Reasoning: [brief explanation] If it is zero-shot learning, we just pass in the sentence after. If it is in-context learning, we pass in 5 examples that the human annotators have agreed upon.

Reddit Comments Examples

- "Are you implying that local police beat panhandlers with batons? Because they don't.'
  - ask a genuine question; provide a fact or claim; societal critique
- "Most comments are saying how great it is to homeless (and it usually is) but are ignoring or unaware of the ***type*** of homeless they plan to [STREET] here. *Drug addicts and people with mental issues.* If it were more homes for homeless and/or low income families, I wouldn't think twice about it but I'm very concerned about a facility housing drug addicts and people with mental issues just a couple hundred feet from a school in the middle of a residential neighborhood."
  - express their opinion; express others opinions; not in my backyard; harmful generalization; deserving/undeserving
- "What is up with the pots and pans? What homeless or trafficked person needs those? Oh wait! She needs some. Send her 50 sets. She can keep one and sell the rest! What a piece of [emoji]"
  - ask a rhetorical question; express their opinion; societal critique; not in my backyard; harmful generalization
- "I live here too [ORGANIZATION][ORGANIZATION][ORGANIZATION] Fuck the homeless"
  - express their opinion; not in my backyard; harmful generalization; deserving/undeserving
- "I won't support organizations that are homophobic personally. I clearly stated that others can make their own choices. I then brought up a very real issue in [ORGANIZATION]. I'm a Social Worker. I've worked directly with [ORGANIZATION] in the past. They are very religious. It is what it is. You overreacted to my post IMO. I'm not that important. Its just my opinion. But yeah, I'm not okay with discrimination, so personally I would not work for nor support [PERSON]. I know far too many GLBTQIA+ and Trans individuals that have struggled in [ORGANIZATION] because of discrimination from places like this. Trans houseless individuals in particular are often sexually assaulted around here when they start engaging in services. Its a problem. >""Get over it"" **No.**"
  - provide a fact or claim; provide an observation; express their opinion; societal critique

X (Twitter) Posts Examples

- "[PERSON] awarded $100,000 to [PERSON] (ORG3) to enhance employment and education-related skills for [DATE] and migrant farmworkers. The award was part of a $300,000 discretionary fund award under the CSBG Program. [PERSON]"
  provide a fact or claim; money aid allocation; solutions/interventions

- "Did your Black flunky mayor get the[emoji][ORGANIZATION]'s memo 2 stick it 2 Rump instead of serving you by refusing 2 deport migrants + give them Black taxpayers'[emoji]4 shelter+food while Black citizens go homeless? [ORGANIZATION] mayors did. Charity starts at [emoji]. [URL]"
  - ask a rhetorical question; provide a fact or claim; express their opinion; money aid allocation; government critique; harmful generalization; deserving/undeserving; racist: Yes

- "PERSON0 Instead of peacocking on social media for your next job, how about you concentrate on the gaggles of homeless people in [ORGANIZATION]?"
  - ask a rhetorical question; provide a fact or claim; express their opinion; societal critique; solutions/interventions

- "[ORGANIZATION] Just what [ORGANIZATION] needs...another beggar."
  - express their opinion; not in my backyard; harmful generalization; deserving/undeserving

- "[ORGANIZATION] area in [ORGANIZATION] is facing a housing crisis. 40% of people in this area live in poverty, and the city lacks 20,000 affordable housing units. Initiatives like [ORGANIZATION] to fix old housing, but progress depends on securing funding. [URL]"
  - provide a fact or claim; money aid allocation; solutions/interventions

News Articles Examples

- "We applaud this important first step to assure the long-term resolution of homelessness."
  - express their opinion; solutions/interventions

- "60 million for programs to support homeless veterans including 20 million for [ORGANIZATION]. The President proposed to eliminate the program."
  - provide a fact or claim; solutions/interventions

- "[ORGANIZATION] county commissioners on [ORGANIZATION] weighed options for creating a migrant support services center while city emergency managers opened a busing hub, as dozens of migrants remained in homeless conditions [LOCATION]."
  - provide a fact or claim; solutions/interventions

- "About 1 in 3 people who are homeless in [ORGANIZATION] report having a mental illness or a substance use disorder, and the combination of homelessness and substance use or untreated mental illness has led to very public tragedies."
  - provide a fact or claim; express their opinion

- "I would imagine she is not being delusional about being unsafe on the streets, [ORGANIZATION], executive director of [ORGANIZATION], told [ORGANIZATION]. [PERSON] specializes in treating mentally ill homeless people. Somewhere in all of this is a hook around the fear she has of being unsafe, especially as a woman who is homeless, and that is not uncommon. There should be a real conversation about that, and it could be very useful for figuring out whats going on with her."
  - provide a fact or claim; provide an observation; express their opinion; solutions/interventions

Meeting Minutes Examples

- "Okay. But on that area, one corner is the location that is on dispute right now. And the reason that we are, that I am questioning that is because we got a lot of homeless people there."
  - provide a fact or claim; express their opinion; not in my backyard

- "but they stuck with us, they got all the permissions they needed, and we would not have made the functional end of veteran homelessness in [ORGANIZATION] without them, so thank you. PERSON0? Well, thank you for this honor."

  - provide a fact or claim; express their opinion; solutions/interventions

- "I've seen it all, like certain people being removed out of there. And I'm down there [ORGANIZATION]. And all the [ORGANIZATION] and all the residents there, like, I know them all, you know, and I love them because I was dropped off to be homeless [DATE]."
  - provide a fact or claim; provide an observation; express their opinion

- "Yeah. Yeah, I just think that there's a different ROI for chronically homeless folks. And there's a deeper impact, but a more narrow impact."
  - provide a fact or claim; express their opinion; money aid allocation; solutions/interventions; deserving/undeserving

- "Simple delays, be they [ORGANIZATION] or [LOCATION], have been a feeble solution. Demolitions of up to 370 affordable houses a year valued at $100 million dwarfs the city's efforts at spending $20 million to support affordable housing. Can we really achieve affordable housing through demolition?"
  - ask a rhetorical question; provide a fact or claim; express their opinion; money aid allocation; government critique; solutions/interventions

E LLM Classification Results

Since GPT 4.1 performs the best, the results are included in the main paper. The other five LLM classifications can be seen in Tables 6 - 10.

Category	Reddit		News		Meeting Minutes		X (Twitter)	
	Zero	Few	Zero	Few	Zero	Few	Zero	Few
Ask Genuine Question	40.22	**61.55**	51.83	**72.03**	61.02	**94.40**	**78.35**	71.12
Ask Rhetorical Question	45.16	**79.00**	84.87	**91.09**	59.20	**63.27**	**65.15**	62.27
Provide Fact/Claim	74.83	**84.83**	49.57	**87.55**	58.68	**59.08**	60.42	**62.34**
Provide Observation	46.36	**76.05**	43.72	**90.64**	**72.32**	50.92	64.02	**80.66**
Express Opinion	43.62	**77.71**	**66.22**	52.22	58.21	**91.98**	86.51	**89.33**
Express Others Opinions	44.73	**62.32**	41.88	**71.19**	86.02	**90.34**	75.39	**80.72**
Money Aid Allocation	44.33	**72.74**	**88.05**	70.87	58.89	**65.82**	64.23	**79.06**
Government Critique	52.38	**67.33**	57.15	**65.55**	56.66	**63.68**	**85.51**	52.98
Societal Critique	54.37	**73.14**	**88.49**	56.65	**89.94**	75.00	59.54	**78.87**
Solutions/Interventions	**83.69**	62.70	79.59	**86.45**	**72.46**	64.91	44.91	**60.00**
Personal Interaction	76.06	**77.54**	46.11	**63.57**	46.58	**55.52**	46.49	**59.30**
Media Portrayal	66.04	**91.60**	77.19	**78.09**	**69.68**	60.30	**76.03**	61.17
Not in My Backyard	55.50	**84.86**	**81.35**	65.47	**68.69**	67.87	80.22	**81.12**
Harmful Generalization	88.01	**91.90**	82.13	**90.43**	56.50	**59.20**	46.68	**92.26**
Deserving/Undeserving	**75.33**	62.56	70.28	**93.61**	68.54	**89.77**	**62.01**	53.01
Racist	55.75	**68.97**	80.75	**89.28**	40.48	**89.50**	78.42	**78.96**

Table 6: Category-wise F1 Scores for GEMINI Model under zero-shot and few-shot conditions. Boldface marks the higher F1 score between zero and few-shot conditions for each combination of category and data source. Results indicate that few-shot learning improves classification performance in many cases, although there is substantial variation by category and data source.

Category	Reddit		News		Meeting Minutes		X (Twitter)	
	Zero	Few	Zero	Few	Zero	Few	Zero	Few
Ask Genuine Question	**16.09**	13.95	**10.53**	9.52	0.00	0.00	**37.29**	15.87
Ask Rhetorical Question	**27.10**	26.42	12.90	**23.68**	0.00	**33.33**	10.53	**26.09**
Deserving/Undeserving	**4.26**	3.92	0.00	**7.41**	0.00	**50.00**	**25.00**	0.00
Express Others Opinions	**21.67**	15.38	5.13	**5.56**	**18.82**	8.57	6.25	6.25
Express Opinion	55.18	**62.89**	40.12	**44.27**	16.98	**26.36**	45.62	**56.10**
Government Critique	**20.31**	20.00	**19.80**	19.67	9.84	**10.34**	15.15	**24.69**
Harmful Generalization	17.24	**20.59**	**13.56**	11.90	0.00	0.00	0.00	**9.09**
Media Portrayal	0.00	0.00	0.00	**16.00**	0.00	**20.00**	0.00	0.00
Money Aid Allocation	11.11	**22.22**	20.37	**25.56**	**32.05**	17.27	29.63	**32.00**
Not in My Backyard	**23.19**	7.59	**16.67**	0.00	0.00	0.00	0.00	**19.05**
Personal Interaction	16.49	**18.87**	0.00	**7.02**	14.29	**26.67**	**17.39**	14.81
Provide Fact/Claim	49.16	**55.68**	61.59	**71.35**	69.04	**73.59**	60.24	**76.74**
Provide Observation	28.98	**36.91**	**4.40**	4.11	**6.00**	3.70	**7.23**	4.55
Racist	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Societal Critique	**22.10**	20.10	0.00	**20.62**	**10.00**	4.76	8.00	**16.00**
Solutions/Interventions	27.31	**32.51**	35.47	**41.97**	44.94	**53.26**	43.69	**51.38**

Table 7: Category-wise F1 Scores for GROK Model under zero-shot and few-shot conditions. Boldface marks the higher F1 score between zero and few-shot conditions for each combination of category and data source. Results indicate that few-shot learning produces substantial improvements for some categories (e.g., *Provide Fact/Claim, Solutions/Interventions*), while other categories (e.g., *Media Portrayal*) yield low to zero F1 scores, revealing category- and source-specific weaknesses.

Category	Reddit		News		Meeting Minutes		X (Twitter)	
	Zero	Few	Zero	Few	Zero	Few	Zero	Few
Ask Genuine Question	12.90	**47.37**	0.00	**21.95**	28.57	28.57	**44.90**	37.93
Ask Rhetorical Question	2.08	**14.68**	4.76	**27.07**	0.00	**22.22**	0.00	0.00
Deserving/Undeserving	**5.97**	4.11	4.44	**5.68**	**22.22**	4.55	0.00	**3.64**
Express Others Opinions	20.51	**29.93**	0.00	**11.11**	**10.00**	9.09	0.00	**4.55**
Express Opinion	**86.10**	66.13	**76.19**	71.78	**37.13**	29.15	66.35	**75.56**
Government Critique	**42.86**	32.00	**36.36**	34.48	**23.53**	16.39	7.84	**28.57**
Harmful Generalization	**31.53**	28.33	**35.94**	19.05	**11.43**	8.60	**13.33**	7.50
Media Portrayal	0.00	**1.80**	0.00	**4.69**	0.00	0.00	0.00	**1.77**
Money Aid Allocation	3.03	**17.20**	5.06	**42.01**	0.00	**30.46**	3.03	**50.82**
Not in My Backyard	**21.77**	13.33	**13.73**	10.00	0.00	0.00	8.16	**26.67**
Personal Interaction	3.64	**15.15**	0.00	**8.82**	0.00	0.00	0.00	**15.38**
Provide Fact/Claim	26.11	**66.67**	36.67	**62.03**	**67.27**	18.09	**53.61**	16.67
Provide Observation	14.18	**38.68**	**16.00**	7.06	**15.38**	8.70	**7.41**	0.00
Racist	0.00	**1.71**	0.00	**6.25**	0.00	0.00	0.00	0.00
Societal Critique	**38.87**	35.33	**29.49**	18.38	**18.18**	14.91	**15.62**	10.87
Solutions/Interventions	1.12	**62.14**	6.49	**57.69**	7.07	**64.57**	1.16	**64.79**

Table 8: Category-wise F1 Scores for LLAMA Model under zero-shot and few-shot conditions. Boldface marks the higher F1 score between zero and few-shot conditions for each combination of category and data source. Results display considerable label- and domain-specific variation: few-shot learning yields large gains for labels such as *Solutions/Interventions*, while several labels (e.g., *Media Portrayal*) remain near-zero regardless of data source and learning approach.

Category	Reddit		News		Meeting Minutes		X (Twitter)	
	Zero	Few	Zero	Few	Zero	Few	Zero	Few
Ask Genuine Question	15.87	**43.24**	12.50	**22.22**	25.00	25.00	**48.98**	36.36
Ask Rhetorical Question	**5.83**	4.26	**13.64**	9.52	**22.22**	0.00	0.00	0.00
Deserving/Undeserving	5.56	**10.91**	0.00	**11.68**	0.00	0.00	**50.00**	0.00
Express Others Opinions	0.00	**6.90**	6.90	**7.41**	0.00	0.00	0.00	0.00
Express Opinion	**74.58**	66.67	61.87	**70.33**	34.88	**45.56**	50.64	**56.50**
Government Critique	**36.96**	35.74	22.50	**37.50**	24.24	**34.86**	12.77	**33.51**
Harmful Generalization	30.48	**38.89**	25.71	**27.45**	25.00	25.00	0.00	**16.33**
Media Portrayal	**2.63**	0.00	1.89	**7.27**	2.70	**3.33**	0.00	0.00
Money Aid Allocation	0.00	**9.88**	14.46	**36.84**	**21.85**	1.92	23.08	**25.29**
Not in My Backyard	**25.00**	24.20	5.08	**8.25**	0.00	0.00	11.43	**15.38**
Personal Interaction	**12.12**	10.53	0.00	0.00	33.33	**40.00**	30.00	**37.50**
Provide Fact/Claim	12.34	**56.82**	5.87	**46.54**	34.10	**73.85**	25.81	**38.16**
Provide Observation	1.65	**37.16**	0.00	**5.71**	0.00	**12.50**	**15.38**	0.00
Racist	0.00	0.00	0.00	**40.00**	0.00	0.00	0.00	0.00
Societal Critique	2.22	**31.63**	0.00	**26.28**	**20.00**	15.79	0.00	**8.40**
Solutions/Interventions	**20.00**	8.60	20.00	**68.65**	30.36	**63.43**	21.89	**65.45**

Table 9: Category-wise F1 Scores for PHI4 Model under zero-shot and few-shot conditions. Boldface marks the higher F1 score between zero and few-shot conditions for each combination of category and data source. Overall, few-shot prompting tends to improve performance, although gains vary greatly by category and data source. PHI4 best classifies instances of categories like *Provide Fact/Claim*, and performs worst on classifying categories such as *Racist* and *Media Portrayal*.

Category	Reddit		News		Meeting Minutes		X (Twitter)	
	Zero	Few	Zero	Few	Zero	Few	Zero	Few
Ask Genuine Question	57.73	**62.14**	37.21	**41.18**	**40.00**	36.36	**60.00**	59.15
Ask Rhetorical Question	**14.52**	10.20	36.62	**50.98**	**11.76**	0.00	0.00	**15.38**
Deserving/Undeserving	6.58	**21.88**	3.70	**8.45**	1.09	**6.25**	2.60	**20.00**
Express Others Opinions	**25.43**	9.84	12.56	**17.02**	**16.84**	16.00	0.00	**4.35**
Express Opinion	**88.12**	74.29	69.49	**75.82**	35.37	**37.84**	75.69	**76.00**
Government Critique	**43.30**	42.75	**47.46**	45.45	20.09	**30.16**	**43.31**	38.86
Harmful Generalization	30.81	**42.86**	29.81	**35.24**	3.92	**6.67**	8.40	**11.32**
Media Portrayal	**4.00**	3.28	**1.27**	0.00	1.01	**3.39**	2.60	**2.90**
Money Aid Allocation	40.28	**43.21**	41.51	**48.94**	57.03	**62.20**	**59.86**	51.22
Not in My Backyard	17.59	**34.85**	8.38	**20.20**	0.00	0.00	3.87	**10.17**
Personal Interaction	35.15	**35.94**	9.72	**14.18**	3.47	**19.51**	17.14	**23.33**
Provide Fact/Claim	65.64	**71.45**	59.52	**83.66**	86.33	**86.81**	71.81	**80.94**
Provide Observation	45.48	**54.44**	**6.99**	5.00	3.68	**7.84**	**6.12**	0.00
Racist	0.00	0.00	0.00	**28.57**	0.00	0.00	0.00	0.00
Societal Critique	35.00	**38.99**	22.67	**24.49**	12.90	**13.79**	7.59	**19.35**
Solutions/Interventions	60.37	**65.67**	61.07	**67.99**	68.78	**75.39**	70.09	**72.21**

Table 10: Category-wise F1 Scores for QWEN Model under zero-shot and few-shot conditions. Boldface marks the higher F1 score between zero and few-shot conditions for each combination of category and data source. Few-shot prompting generally improves classification ability, although performance varies substantially by label and data source. For instance, QWEN identifies *Express Opinion* samples better than it does *Racist* samples, although its identification of *Express Opinion* samples is much poorer for Meeting Minutes data than for the other data sources.

F Transformer Classification Results

When comparing the transformer models, it typically performs better when SMOTE is incorporated. The modelss generally perform better than traditional ML models, yet worse than LLMs.

Category	Reddit		News		Meeting Minutes		X (Twitter)	
	Orig	SMOTE	Orig	SMOTE	Orig	SMOTE	Orig	SMOTE
Ask A Genuine Question	27.69	**48.00**	0.00	**11.11**	15.38	**20.29**	18.75	**28.00**
Ask A Rhetorical Question	0.00	**41.38**	0.00	**3.70**	0.00	**0.00**	0.00	**34.78**
Deserving/Undeserving	0.00	**0.00**	0.00	**0.00**	0.00	**14.81**	21.05	**41.18**
Express Others Opinions	0.00	**0.00**	**17.14**	16.00	0.00	**0.00**	**12.24**	12.12
Express Their Opinion	86.71	**89.39**	0.00	**33.33**	12.00	**36.07**	0.00	**78.18**
Government Critique	12.50	**13.79**	10.26	**25.81**	10.34	**15.38**	20.20	**42.42**
Harmful Generalization	0.00	**27.45**	0.00	**3.28**	0.00	**0.00**	17.39	**48.28**
Media Portrayal	14.12	**22.22**	0.00	**0.00**	0.00	**0.00**	0.00	**47.06**
Money Aid Allocation	**18.60**	7.14	0.00	**51.28**	0.00	**31.25**	**39.02**	29.63
Not In My Backyard	32.76	**40.00**	0.00	**0.00**	0.00	**0.00**	**6.78**	0.00
Personal Interaction	**25.00**	23.40	0.00	**0.00**	5.71	**36.36**	0.00	**0.00**
Provide A Fact Or Claim	**75.16**	68.70	92.09	**95.59**	**84.80**	76.27	69.12	**89.70**
Provide An Observation	53.06	**58.46**	**5.41**	0.00	0.00	**0.00**	0.00	**0.00**
Racist	0.00	**0.00**	0.00	**0.00**	0.00	**0.00**	**13.64**	0.00
Societal Critique	**18.37**	13.79	0.00	**16.00**	0.00	**7.89**	**24.76**	24.24
Solutions/Interventions	43.24	**46.02**	52.43	**59.18**	**58.25**	52.94	46.15	**48.28**

Table 11: BERT Per-Category F1 Scores (Original vs SMOTE) by Data Source

Category	Reddit		News		Meeting Minutes		X (Twitter)	
	Orig	SMOTE	Orig	SMOTE	Orig	SMOTE	Orig	SMOTE
Ask A Genuine Question	21.24	**73.33**	7.41	**7.50**	22.50	**28.57**	28.57	**50.00**
Ask A Rhetorical Question	25.00	**50.00**	0.00	**3.28**	0.00	**0.00**	16.16	**58.33**
Deserving/Undeserving	38.24	**41.03**	0.00	**0.00**	**7.89**	0.00	8.00	**30.77**
Express Others Opinions	20.69	**32.65**	7.14	**17.14**	0.00	**0.00**	0.00	**18.18**
Express Their Opinion	88.51	**90.50**	11.76	**38.71**	45.90	**75.79**	**83.64**	82.14
Government Critique	0.00	**48.48**	0.00	**54.55**	17.39	**36.36**	0.00	**50.00**
Harmful Generalization	18.52	**20.83**	0.00	**0.00**	0.00	**0.00**	11.27	**50.00**
Media Portrayal	12.96	**15.38**	0.00	**0.00**	0.00	**0.00**	0.00	**54.17**
Money Aid Allocation	29.57	**56.25**	44.00	**70.59**	36.62	**38.71**	0.00	**50.00**
Not In My Backyard	8.70	**40.91**	0.00	**0.00**	12.99	**30.00**	0.00	**47.37**
Personal Interaction	22.22	**46.15**	0.00	**0.00**	0.00	**40.00**	0.00	**50.00**
Provide A Fact Or Claim	74.21	**75.68**	**95.24**	60.00	**96.35**	67.29	97.78	**97.78**
Provide An Observation	47.33	**67.74**	0.00	**13.33**	0.00	**5.88**	0.00	**0.00**
Racist	**5.56**	0.00	0.00	**33.33**	0.00	**0.00**	0.00	**22.22**
Societal Critique	22.73	**31.11**	0.00	**6.06**	0.00	**0.00**	0.00	**32.43**
Solutions/Interventions	0.00	**57.83**	62.22	**67.50**	10.53	**72.22**	45.38	**67.69**

Table 12: RoBERTa Per-Category F1 Scores (Original vs SMOTE) by Data Source

Category	Reddit		News		Meeting Minutes		X (Twitter)	
	Orig	SMOTE	Orig	SMOTE	Orig	SMOTE	Orig	SMOTE
Ask A Genuine Question	11.76	**43.48**	0.00	**0.00**	**23.38**	21.28	**33.33**	25.00
Ask A Rhetorical Question	22.00	**30.00**	0.00	**0.00**	0.00	**0.00**	16.84	**62.50**
Deserving/Undeserving	**19.05**	12.50	0.00	**0.00**	0.00	**0.00**	25.81	**33.33**
Express Others Opinions	**22.22**	19.67	20.29	**25.81**	0.00	**0.00**	**19.51**	13.70
Express Their Opinion	88.62	**90.59**	0.00	**51.85**	**75.00**	74.34	81.25	**85.25**
Government Critique	20.51	**51.06**	**13.79**	13.56	**20.00**	0.00	25.45	**34.48**
Harmful Generalization	25.53	**31.25**	**10.53**	4.35	0.00	**0.00**	23.81	**32.26**
Media Portrayal	18.92	**45.16**	0.00	**0.00**	0.00	**0.00**	36.04	**42.86**
Money Aid Allocation	32.69	**46.15**	52.94	**68.18**	**41.67**	33.33	25.53	**36.07**
Not In My Backyard	36.36	**45.16**	0.00	**0.00**	16.22	**20.00**	23.26	**30.51**
Personal Interaction	19.51	**29.63**	0.00	**0.00**	6.78	**30.77**	0.00	**0.00**
Provide A Fact Or Claim	**74.21**	70.50	87.30	**94.89**	97.14	**97.87**	93.57	**97.21**
Provide An Observation	48.28	**60.32**	4.35	**6.25**	**5.41**	0.00	0.00	**0.00**
Racist	0.00	**0.00**	**5.26**	0.00	0.00	**0.00**	10.53	**20.00**
Societal Critique	**25.00**	19.51	0.00	**25.00**	**9.52**	6.06	**33.96**	29.89
Solutions/Interventions	49.06	**57.47**	64.41	**67.74**	70.00	**75.00**	43.14	**52.17**

Table 13: ModernBERT Per-Category F1 Scores (Original vs SMOTE) by Data Source

G Traditional ML Classification Results

In addition to LLM and transformer model classification, we also perform classification for traditional ML models (linear regression, SVM, and random forest). Overall LLM classification performs the best, followed by the transformer models. The traditional ML models perform the worst.

Model	Reddit		News		Meeting Minutes		X (Twitter)	
	Macro	Micro	Macro	Micro	Macro	Micro	Macro	Micro
Logistic Regression	24.49	53.69	17.38	71.57	22.11	76.55	22.07	60.68
SVM	13.47	53.02	14.98	71.53	15.33	72.88	14.26	59.23
Random Forest	11.13	46.94	13.30	69.60	12.90	66.88	12.97	56.21

Table 14: Traditional ML Models Macro and Micro F1 Scores by Data Source

H City Classification

Even though there is not a significant difference between the group of cities; we can examine the heatmap by city as shown in Figure 5.

Our analysis does not reveal a significant difference between small and large cities in terms of bias against PEH (Figure 6), indicating no significant influence the homelessness bias.

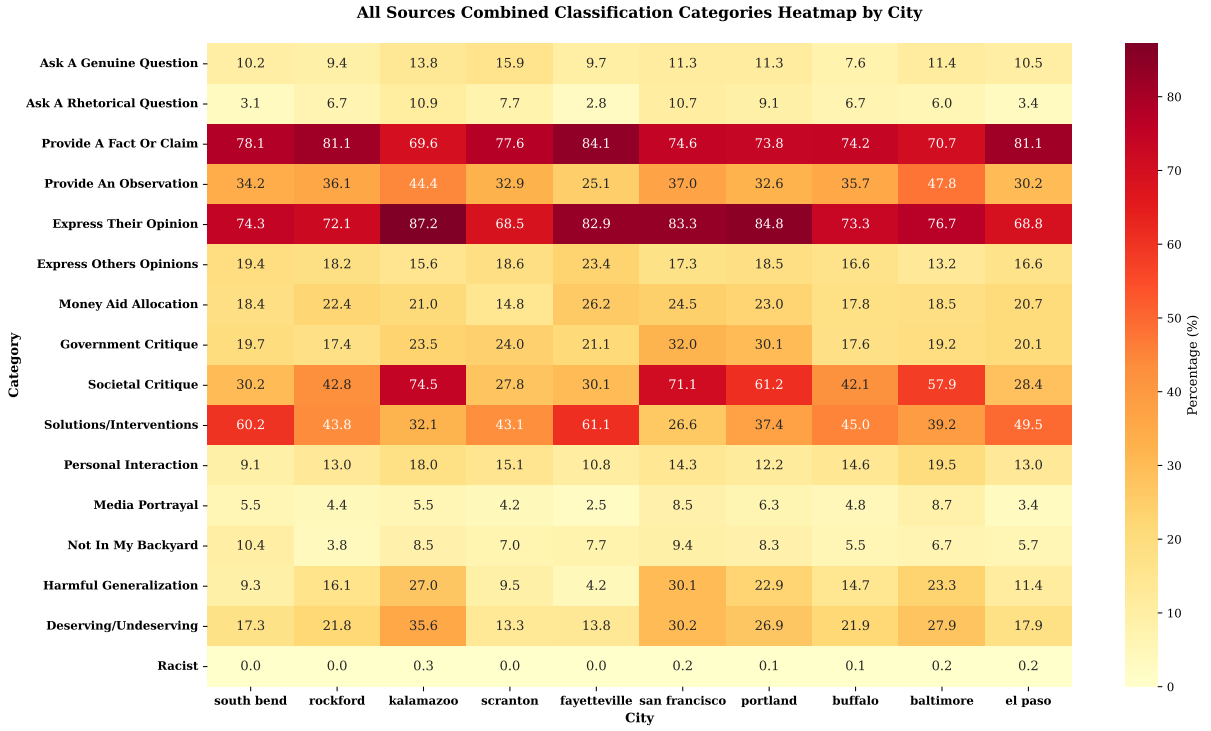

Figure 5: Heatmap displaying the distribution of classification categories across nine cities, combining data from all sources (Reddit, News, X, and City Council meeting minutes). The intensity of coloring represents the percentage of content that falls into each category for each city, with darker red indicating higher concentrations of the given label. Some notable insights are that *Racist* content remains consistently low across all cities (<0.3%), and *Harmful Generalization* and *Deserving/Undeserving* samples occur more frequently in data sourced from cities such as Kalamazoo and San Francisco than in cities like Fayetteville and South Bend. Geographic variation in content patterns suggests city-specific discourse characteristics potentially influenced by local political climates, demographics, and platform usage patterns.

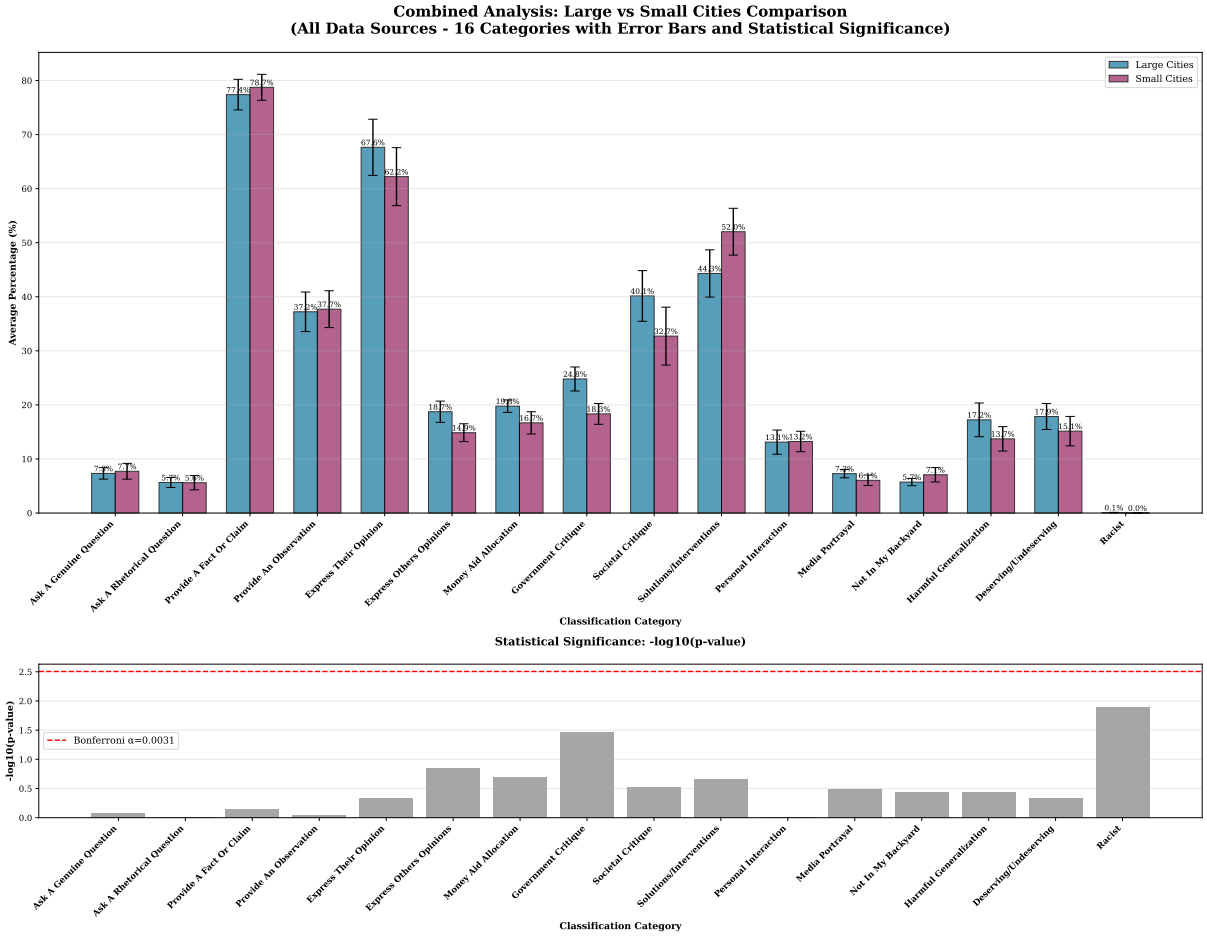

Figure 6: Large Small City Comparison