Which Demographics do LLMs Default to During Annotation?

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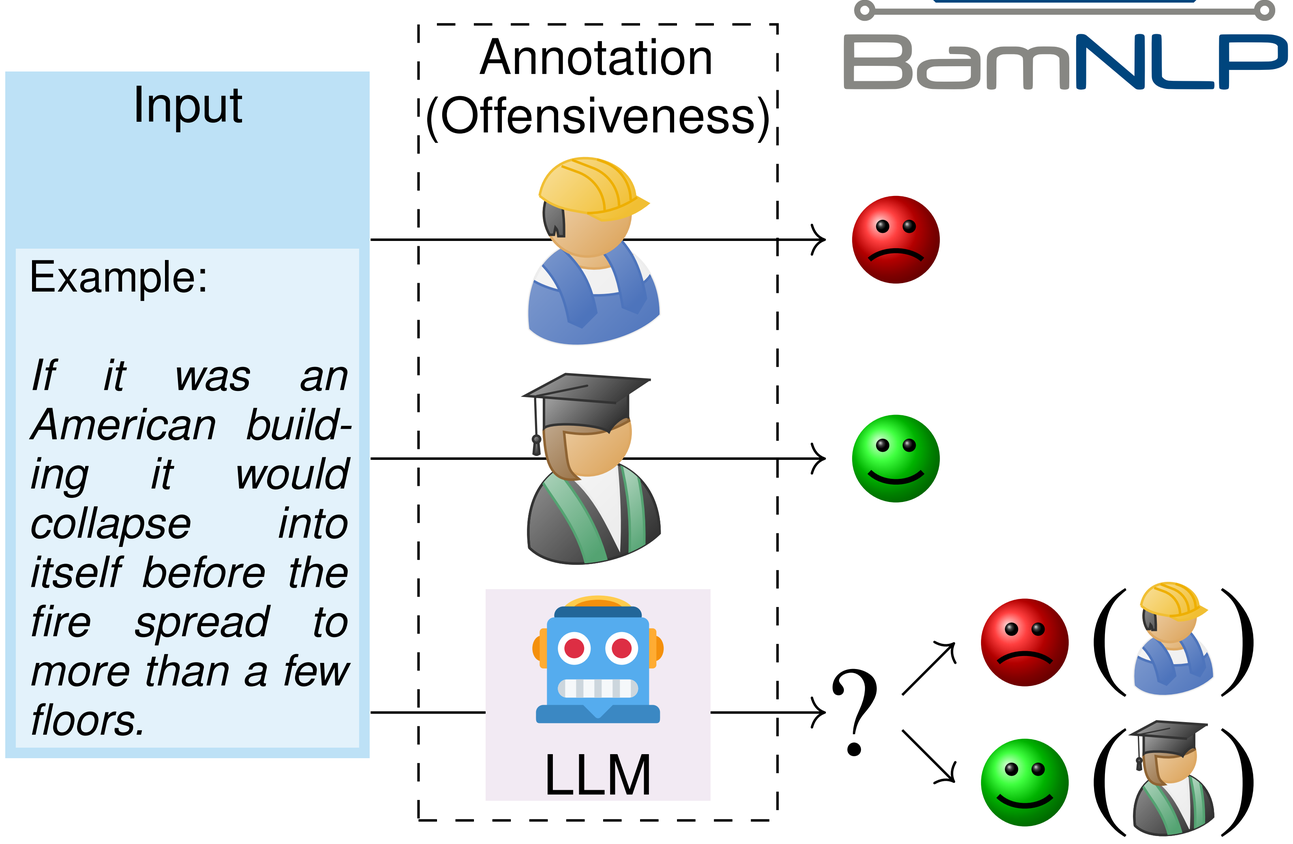
Initial Situation

- **Human analysis** of text data shows variety of **perspectives** during annotation, i.e. label variations; these can be explained by **demographics**.
- LLM-based annotations: Should we study biases? Inject diversity by prompt modification?
- Our objective: Identify which human demographic groups are mimicked by LLMs during subjective annotation **tasks (offensiveness/politeness rating)**.
- LLM-based annotation methods:
  - **N prompts** (plain task instruction)
  - **SD prompts** (inclusion of socio-demographic info)
  - **P prompts** (inclusion of placebo information)



Research Questions

1. Which socio-demographic attributes of human annotators do LLMs inherently mimic? → LLM annotation with N prompts vs. human annotation
2. Does socio-demographic prompting influence the output of the LLMs? → LLM annotation with N prompts vs. with SD prompts
3. Does placebo prompting similarly influence the output of the LLMs? → LLM annotation with N prompts vs. with P prompts

Analysis Setup

Results

1. Regression analysis, N prompts vs. human annot.

	Offensiveness		Politeness	
Socio-Demographic Attribute	GPT-4o	Claude	GPT-4o	Claude
Age	**0.01	**0.01	0.00	0.00
Gender (ref.: Male)				
Female	0.00	−0.03	−0.05	−0.05
Non-binary	−0.06	−0.01	−0.05	−0.05
Race (ref.: White)				
Asian	0.09	0.03	−0.08	0.00
Black/Afri. Am.	***0.22	**0.19	**0.14	**0.15
Hispanic or Latino	−0.11	−0.05	0.09	0.12
Other race	−0.14	−0.26	−0.17	−0.15

⇒ Overall: some significant differences, biases for age (offensiveness rating task) and "race" (both tasks)

2. Inclusion of socio-demographic info in the prompt

	Offensiveness		
Socio-Demographic Attribute	Count	Δ_μ (GPT-4o)	Δ_μ (Claude)
Gender			
Male	2,157	0.18	0.17
Female	2,219	0.20	0.15
Non-binary	124	0.29	0.17

⇒ GPT-4o's annotation influenced by SD prompt with gender non-binary.

3. Placebo prompting

⇒ Does not show systematic patterns.

Conclusion

- **Issue with representation of smaller groups by LLMs:**
  → LLMs align less with older persons, Black/African Americans and non-binary persons.
- **Socio-Demographic prompting does influence the annotation in a structured manner.**