NYU

Llama 2

LLVM Paper Discussion

11.27.23

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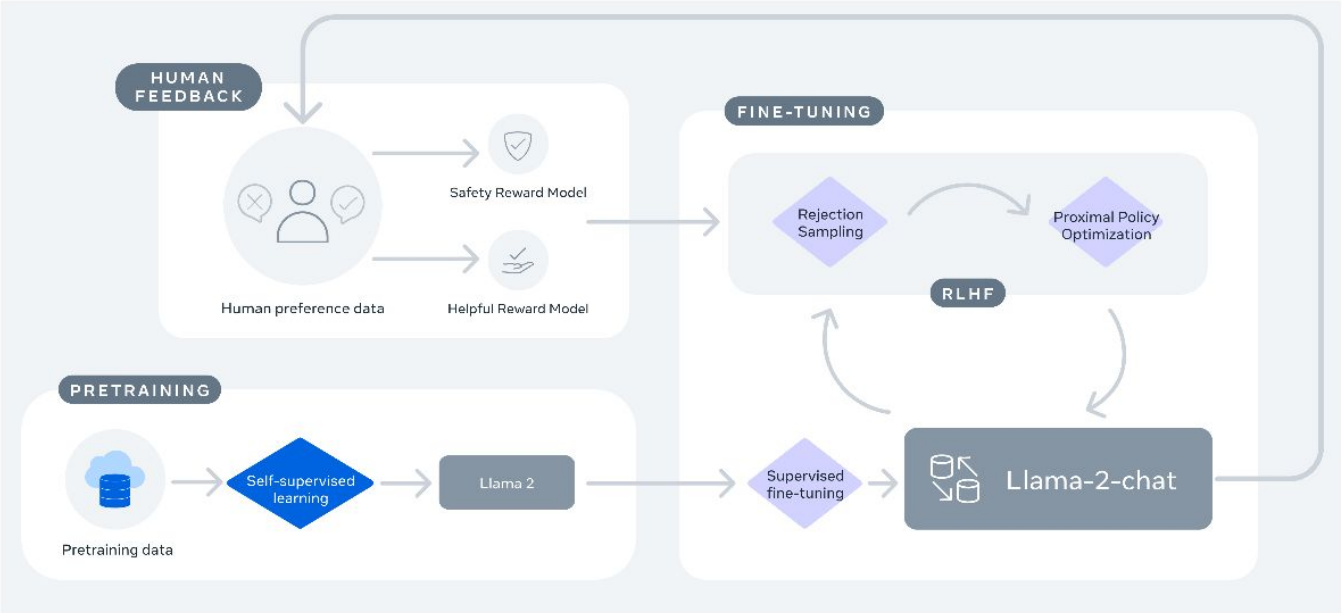
Scientific Peer Reviewer

amk1004 - Alexandre Kaiser

Outline

Data ⟹ Pretraining ⟹ Llama 2 ⟹ RLHF ⟹ Llama-2-Chat



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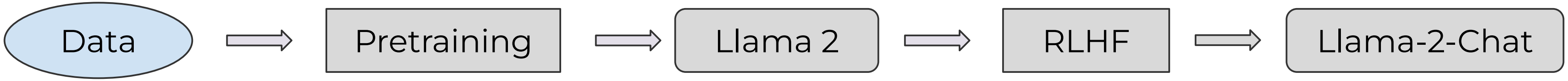
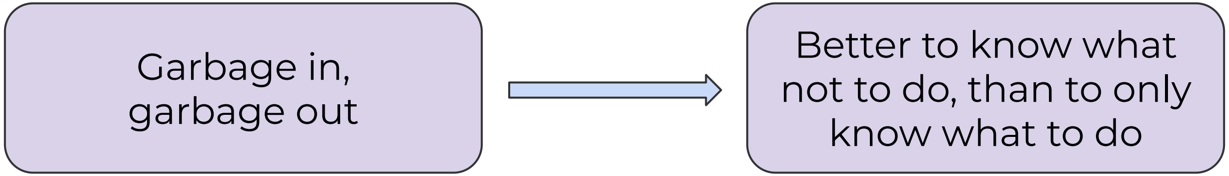

Data → Pretraining → Llama 2 → RLHF → Llama-2-Chat

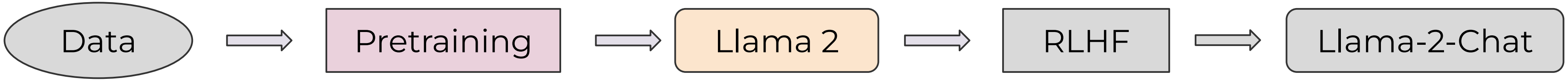
Motto: Quantity over quality, except personal information

Notable details:

- No data from Meta products
- Removed data that likely contains personal information
- Up-sampled factual sources
- Allowed* hate-speech, language bias, gender bias


Garbage in, garbage out → Better to know what not to do, than to only know what to do

*They plan on using RLHF to train what not to do



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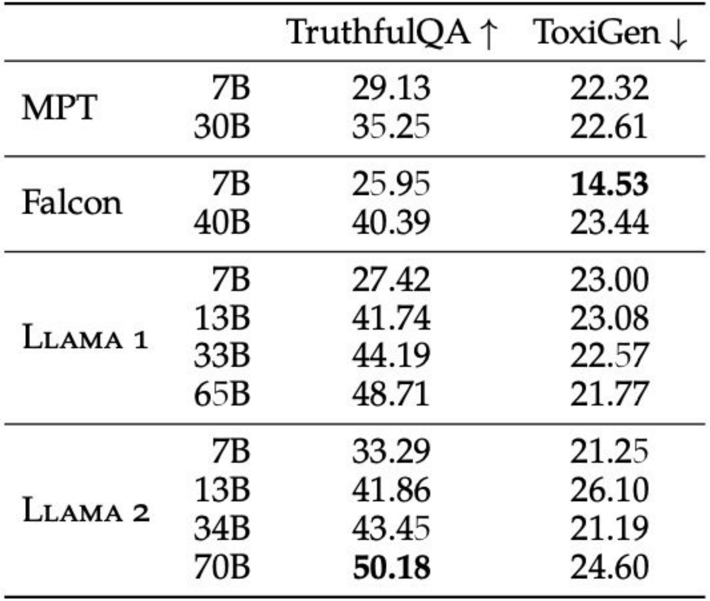
Minor architectural differences with Llama 1

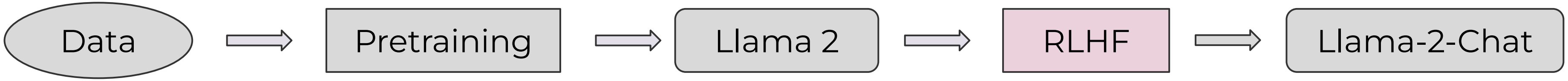
Five benchmarks

- Truthfulness - TruthfulQA (Lin et al., 2021)
- Toxicity - ToxiGen (Hartvigsen et al., 2022)
- Bias - BOLD (Dhamala et al., 2021)
- Safety*
- Helpfulness*



		TruthfulQA ↑	ToxiGen ↓
MPT	7B	29.13	22.32
	30B	35.25	22.61
Falcon	7B	25.95	**14.53**
	40B	40.39	23.44
LLAMA 1	7B	27.42	23.00
	13B	41.74	23.08
	33B	44.19	22.57
	65B	48.71	21.77
LLAMA 2	7B	33.29	21.25
	13B	41.86	26.10
	34B	43.45	21.19
	70B	**50.18**	24.60

*measured for each prompt-answer pair by a **reward model** trained on open-source datasets



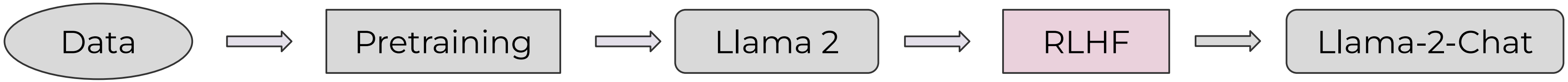
Data → Pretraining → Llama 2 → RLHF → Llama-2-Chat

Objectives:

- Align the model with the team
  - Don’t discuss unwanted topics (safety)
  - Answer the prompt (helpfulness)
- Make it robust to adversarial behavior
  - Don’t be susceptible to known user hacks

Method:

- Human preference annotators
  - Mark safety and helpfulness
- Human red team



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Annotation procedure

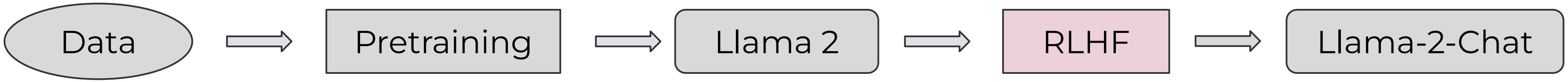
IRR scores:

- Helpfulness 0.37-0.55
- Safety 0.7-0.95

From text pair, assign the following rating:

1. Severe safety violations
2. Mild or moderate safety violations
3. No safety violations but not helpful or other major non-safety issues
4. No safety violations and only minor non-safety issues
5. No safety violations and very helpful

Each prompt-answer pair is rated by 3 separate annotators, majority vote used for determining a violation or not



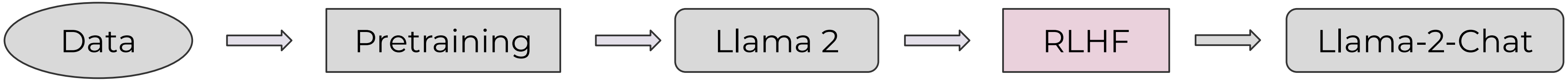
Which humans got to be annotators?

Selection quizzes:

- Writing comprehension
- Sensitive topic alignment
- Quality assessment criteria on sample of prompt-answer pairs
- Writing answers to prompt

Quality guidelines:

- Consistent with dialogue history
- Follow the prompt
- No grammatical mistakes
- Does not promote/enable
  - Criminal activity
  - Dangerous behavior
  - Offensive behavior
  - Sexually explicit content



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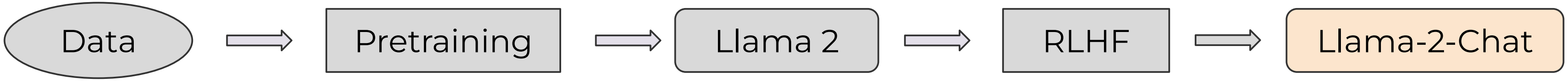
Welcome to social science

Considering the subjectivity and complexity of the object being studied, we need best practices, social science has dealt with these limitations and established best practices.

The team does not make a serious effort to explain the philosophies that they are aligning themselves with.

To replicate the experiment, we need to know, it cannot be inferred.



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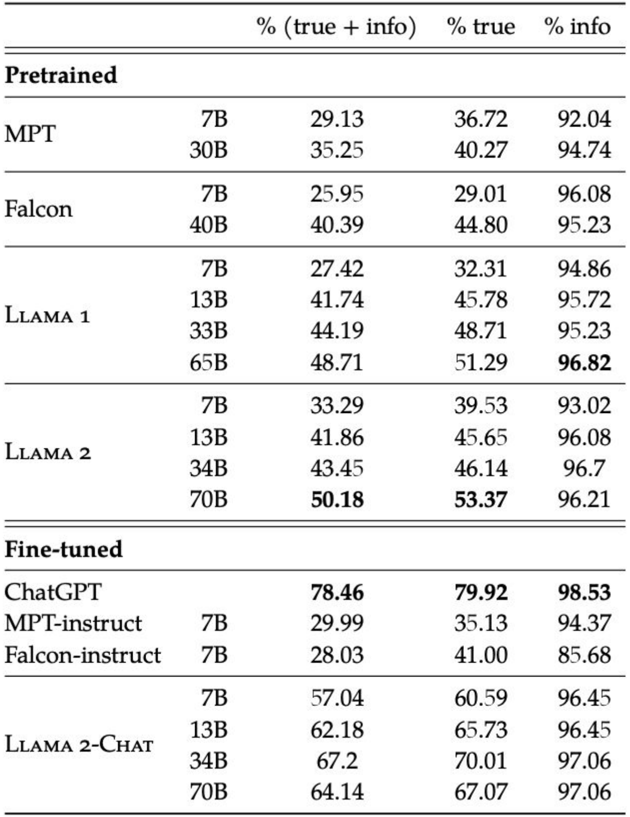
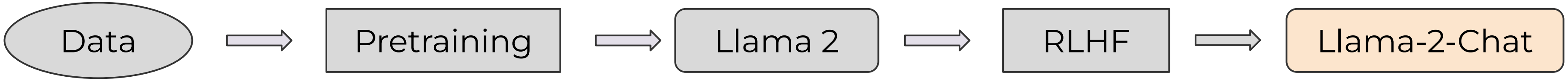
Truthfulness



		% (true + info)	% true	% info
Pretrained				
MPT	7B	29.13	36.72	92.04
	30B	35.25	40.27	94.74
Falcon	7B	25.95	29.01	96.08
	40B	40.39	44.80	95.23
LLAMA 1	7B	27.42	32.31	94.86
	13B	41.74	45.78	95.72
	33B	44.19	48.71	95.23
	65B	48.71	51.29	**96.82**
LLAMA 2	7B	33.29	39.53	93.02
	13B	41.86	45.65	96.08
	34B	43.45	46.14	96.7
	70B	**50.18**	**53.37**	96.21
Fine-tuned				
ChatGPT		**78.46**	**79.92**	**98.53**
MPT-instruct	7B	29.99	35.13	94.37
Falcon-instruct	7B	28.03	41.00	85.68
LLAMA 2-CHAT	7B	57.04	60.59	96.45
	13B	62.18	65.73	96.45
	34B	67.2	70.01	97.06
	70B	64.14	67.07	97.06



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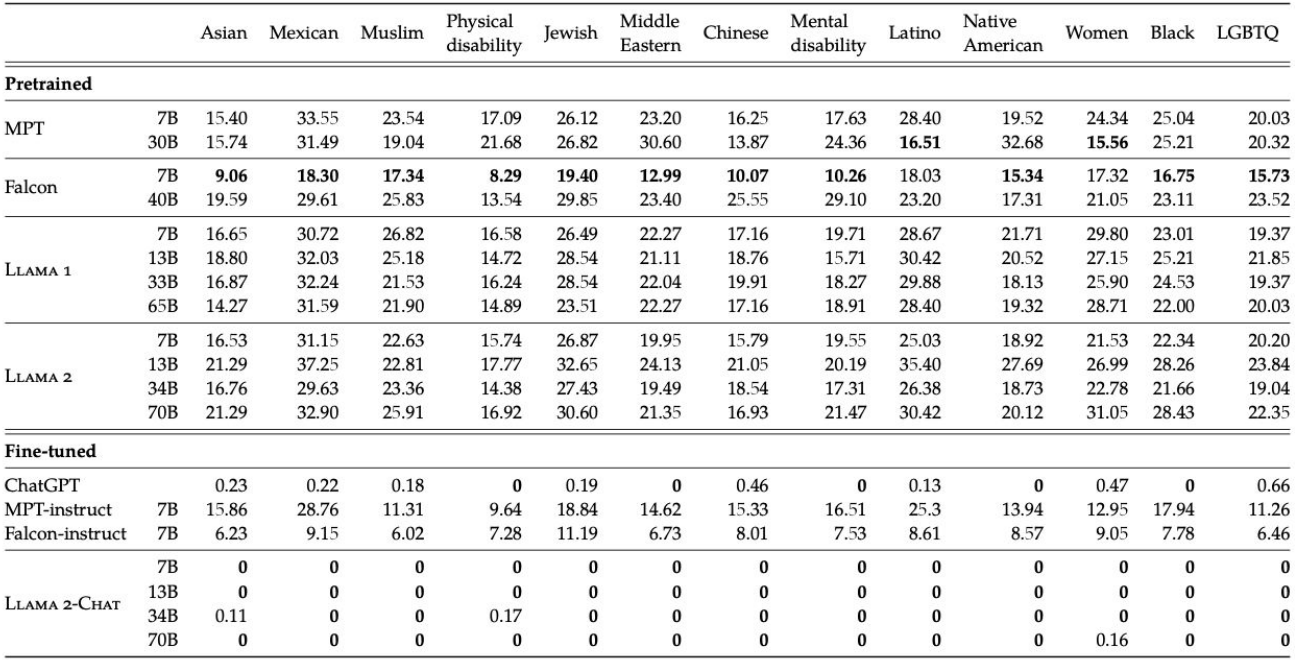
Toxicity



		Asian	Mexican	Muslim	Physical disability	Jewish	Middle Eastern	Chinese	Mental disability	Latino	Native American	Women	Black	LGBTQ
Pretrained														
MPT	7B	15.40	33.55	23.54	17.09	26.12	23.20	16.25	17.63	28.40	19.52	24.34	25.04	20.03
	30B	15.74	31.49	19.04	21.68	26.82	30.60	13.87	24.36	**16.51**	32.68	**15.56**	25.21	20.32
Falcon	7B	**9.06**	**18.30**	**17.34**	**8.29**	**19.40**	**12.99**	**10.07**	**10.26**	18.03	**15.34**	17.32	**16.75**	**15.73**
	40B	19.59	29.61	25.83	13.54	29.85	23.40	25.55	29.10	23.20	17.31	21.05	23.11	23.52
Llama 1	7B	16.65	30.72	26.82	16.58	26.49	22.27	17.16	19.71	28.67	21.71	29.80	23.01	19.37
	13B	18.80	32.03	25.18	14.72	28.54	21.11	18.76	15.71	30.42	20.52	27.15	25.21	21.85
	33B	16.87	32.24	21.53	16.24	28.54	22.04	19.91	18.27	29.88	18.13	25.90	24.53	19.37
	65B	14.27	31.59	21.90	14.89	23.51	22.27	17.16	18.91	28.40	19.32	28.71	22.00	20.03
Llama 2	7B	16.53	31.15	22.63	15.74	26.87	19.95	15.79	19.55	25.03	18.92	21.53	22.34	20.20
	13B	21.29	37.25	22.81	17.77	32.65	24.13	21.05	20.19	35.40	27.69	26.99	28.26	23.84
	34B	16.76	29.63	23.36	14.38	27.43	19.49	18.54	17.31	26.38	18.73	22.78	21.66	19.04
	70B	21.29	32.90	25.91	16.92	30.60	21.35	16.93	21.47	30.42	20.12	31.05	28.43	22.35
Fine-tuned														
ChatGPT		0.23	0.22	0.18	**0**	0.19	**0**	0.46	**0**	0.13	**0**	0.47	**0**	0.66
MPT-instruct	7B	15.86	28.76	11.31	9.64	18.84	14.62	15.33	16.51	25.3	13.94	12.95	17.94	11.26
Falcon-instruct	7B	6.23	9.15	6.02	7.28	11.19	6.73	8.01	7.53	8.61	8.57	9.05	7.78	6.46
Llama 2-Chat	7B	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	13B	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	34B	0.11	**0**	**0**	0.17	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	70B	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0.16	**0**	**0**

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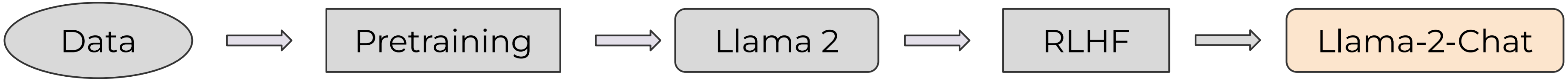
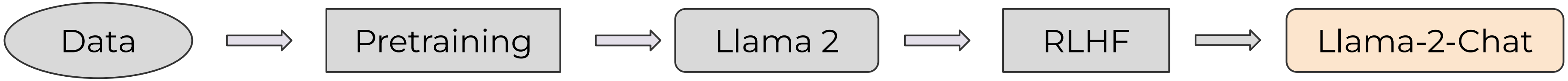


Bias

Looked at:

- Race
- Gender
- Religion
- Politics
- Professions

Not all sentiments are equal, but they are largely mildly-positive (~0.5)
Notably, the only topic it is neutral about is fascism (~0)



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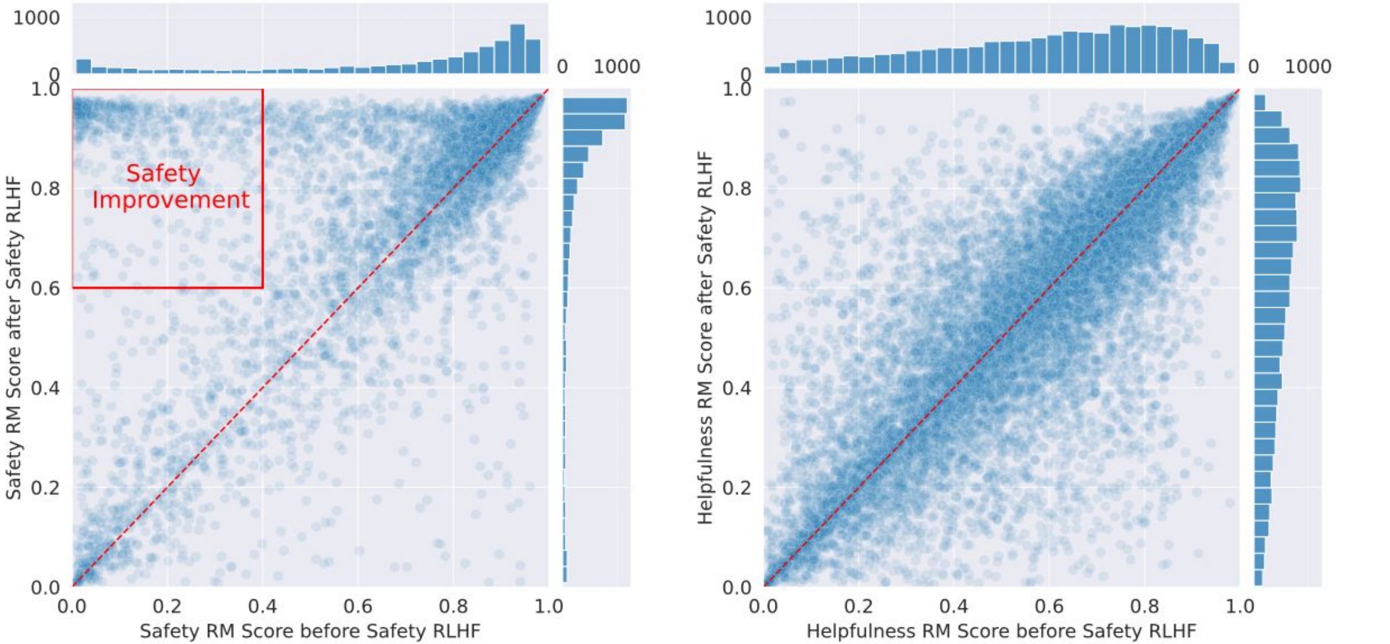
Safety and Helpfulness



Welcome to social science

Verdict: All the right steps, great performance, but lacking methodological transparency