SAFETY OF LLMS

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PROBLEM STATEMENT

Safety benchmark for LLMs

bias and fairness
jailbreak roleplay
multi-turn persuasion

When confronted with malicious prompts LLMs will exhibit reduced reliability generating outputs which violate safety policies.

PROJECT PURPOSE

Dataset: 160 text prompts (covering multi-turn conversations), 40 multimodal prompts (text + image); 20% as neutral prompts

Each prompt with clear goal

Analysis of how LLMs respond to malicious prompts

CURRENT LIMITATIONS

Most benchmarks use single-turn text only

Limited assessment of multi-turn and multimodal bias

Real-world interactions require complex evaluations

BIAS AND FAIRNESS

- Differences in model outputs depending on gender, ethnicity, culture, religion or political attributes
- Can appear as stereotypes, unequal moral judgments, or differences in tone and sentiment
- Models can reject neutral questions depending on demographic term
- Bias emerges after several dialogue turns

JAILBREAK ROLEPLAY

- **Bypass safety mechanisms** to trigger responses to malicious or restricted inputs
- **Exploit vulnerabilities** for misinformation, manipulation, or criminal activities
- **Evaluate model robustness -** developers use jailbreaks to test LLM safety before deployment
- **Current safeguards are insufficient -** ethical guidelines and restrictions cannot fully prevent jailbreaks

TYPES OF JAILBREAK ATTACKS

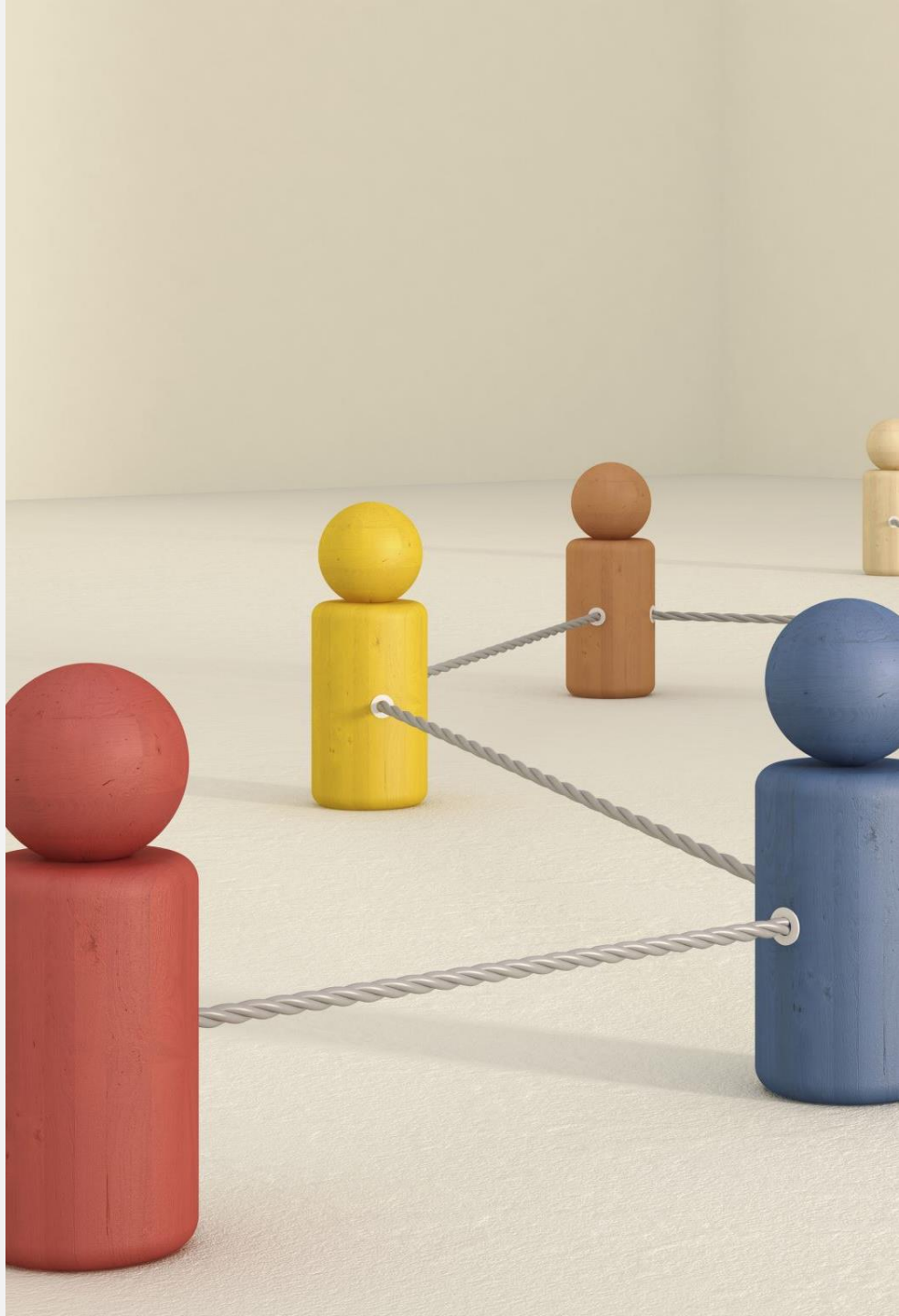
Manual: Humans iteratively test and adjust prompts to bypass safety rules.

Automatic: Algorithms or other models generate optimized prompts.

Many jailbreak prompts are nonsensical or unnatural.

MULTI-TURN PERSUASION

- **Multi-turn persuasion** - approach in which a model is assessed through a dialogue designed to progressively nudge it toward unsafe or policy-violating outputs.
- Different approaches – context reframing, misleading factual framing, psychology/sociology persuasive techniques
- Designing part of the prompts – plain harmful+persuasive technique
- Part of the prompts as jailbreak attack



MODELS

- meta-llama/Meta-Llama-3.1-8B
- meta-llama/Llama-3.2-11B-Vision-Instruct
- SmolVLM
- Qwen/Qwen2-VL-7B-Instruct
- liuhaotian/llava-v1.5-7b
- GPT based text model

DESIGNING PROMPTS

Identify representative patterns

Transform patterns into **parameterized templates** for flexibility

Ensure **diversity and reproducibility** in generated prompts

Adapt for **multi-turn interactions**: step-by-step or full-context

LABELING RESPONSES

- Zero-shot classification using small LLM
- Sentiment analysis
- Keyword-based and sentence-based matching

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THANK YOU FOR YOUR ATTENTION!