Auto-Intent: *Automated Intent Discovery and Self-Exploration for Large Language Model Web Agents*

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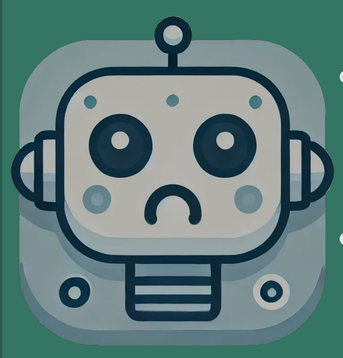
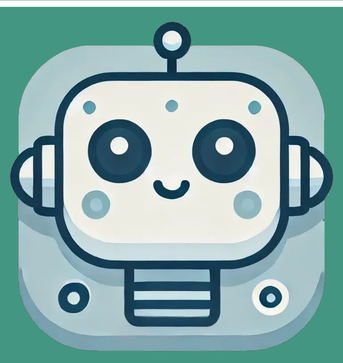
Auto-Intent: Data-driven, efficient approach to turning pre-trained LLMs into target domain decision-making agents

Pre-trained LLM Agent



- Insufficient domain knowledge
- Few-shot examples give limited info

Auto-Intent



Pre-trained LLM

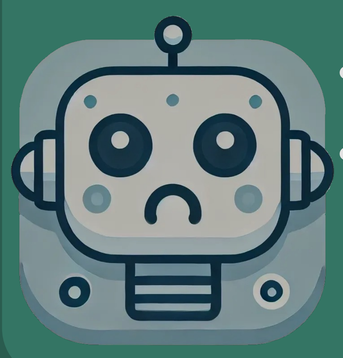
Small, domain-fine-tuned *intent predictor*

Top-k predicted "*intents*" as hint

1. Specifying job type
2. Specifying salary range
3. Opening salary filter

⋮

Small, domain-fine-tuned agent



- Weak reasoning
- Weak generalization capabilities

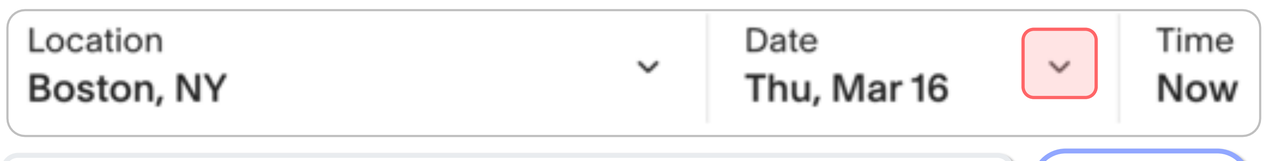
Decision-making tasks in target domains

Intents z_t

Very concise natural language phrases (2-3 words)

- Natural language → well generalizable
- Concise → better intent space exploration
  → easier learning with small LMs

Intent Discovery $z_t = \mathcal{M}_{\texttt{extract}}(o_t, a_t, z_{1:t-1})$



Observation o_t:
Task: Check pickup restaurant available in Boston, NY on March 18, 5pm with one guest
Web page: `<html> … <div> <input id=3 text date thu, mar 16 /> <button id=4 button date, selected value is thu,> <svg id=5 /> </button> </div> … </html>`

Action a_t:
CLICK
`<svg id=5 />`

Intent Extractor (LLM) $\mathcal{M}_{\texttt{extract}}$

Intent z_t: opening date picker

Previous intents $z_{1:t-1}$: (1) selecting service type, (2) selecting location, …, (4) finalizing location

Intent Predictor $\mathcal{M}_{\texttt{intent}}$

is trained to predict intents discovered for demo data.

For inference, it predicts top-k intents via beam search:

$$\hat{z}_t^1, \ldots, \hat{z}_t^k \sim \mathcal{M}_{\texttt{intent}}(o_t, a_{1:t-1}, z_{1:t-1})$$

Mind2Web Experiments

Method	Cross-task		Cross-website		Cross-domain	
	Elem. acc	Step SR	Elem. acc	Step SR	Elem. acc	Step SR
SeeAct (GPT-4V)	46.4	40.2	38.0	32.4	42.4	36.8
MindAct (Mistral-7B)	53.7	50.1	41.7	38.1	43.5	40.3
ICL (GPT-4)	46.9	41.7	45.0	40.0	45.3	41.3
+ **Ours** (Mistral-7B)	53.3	47.3	49.3	42.0	48.8	44.1
ICL (Llama-405B)	50.4	43.6	46.8	39.9	47.1	41.6
+ **Ours** (Mistral-7B)	**56.3**	**50.4**	**51.1**	**43.6**	**49.5**	**44.6**

Generalization Results and Analysis

Method	Task SR
ICL (GPT-4)	19.0%
+ **Ours** (Mistral-7B)	23.8%
ICL (Llama-405B)	14.3%
+ **Ours** (Mistral-7B)	19.0%

Cross-benchmark generalization from Mind2Web to WebArena

Intent recall increases as k increases

Please check out our paper for details & more results!