

Iterative Disambiguation: Towards LLM-Supported Programming and System Design

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Background & Context

The aspiration to instruct computers in natural language has been a long-standing challenge. Current Large Language Models (LLMs) like ChatGPT can succeed at generating and iterating on text and code through dialogue, but often fall short when handling complex tasks.

First-Class Artifacts?

One issue is the lack of a “first-class” status for content, which can lead to a cumbersome user experience as content gets scattered across chat messages, while the conversational context might be lost if generated code or text is directly injected into a document.

Artifact-Centered Iterative Disambiguation

We suggest exploring an emerging approach of *Iterative Disambiguation* of code, text, or other artifacts described using necessarily ambiguous natural language. LLMs can transform these ambiguous natural language instructions into specific code, text, and other content—by supplying plausible defaults where there are inherent ambiguities.

The user then engages in the process of *iterative disambiguation* and refinement, either adapting these defaults through direct content manipulation, or by specifying new desired instructions—in either case, to better match their true underlying or newly-discovered objectives.

Questions & Impacts

Moving structured iteration beyond dialog and script-like periodic re-execution into artifact-centered direct manipulation by both human and AI would represent a substantial extension of mixed-initiative interaction. Expanding access to general-purpose computing has the potential to substantially alter the answer to the question: **who** writes programs, and **why**?

Aided System Construction

[User] I'd like to stay abreast of developments in HCI having to do with LLMs. The ArXiv preprint server is a great place to start. Can we create a workflow that looks at yesterday's posts and shows me the titles, authors, and abstracts of any papers having to do with LLMs?

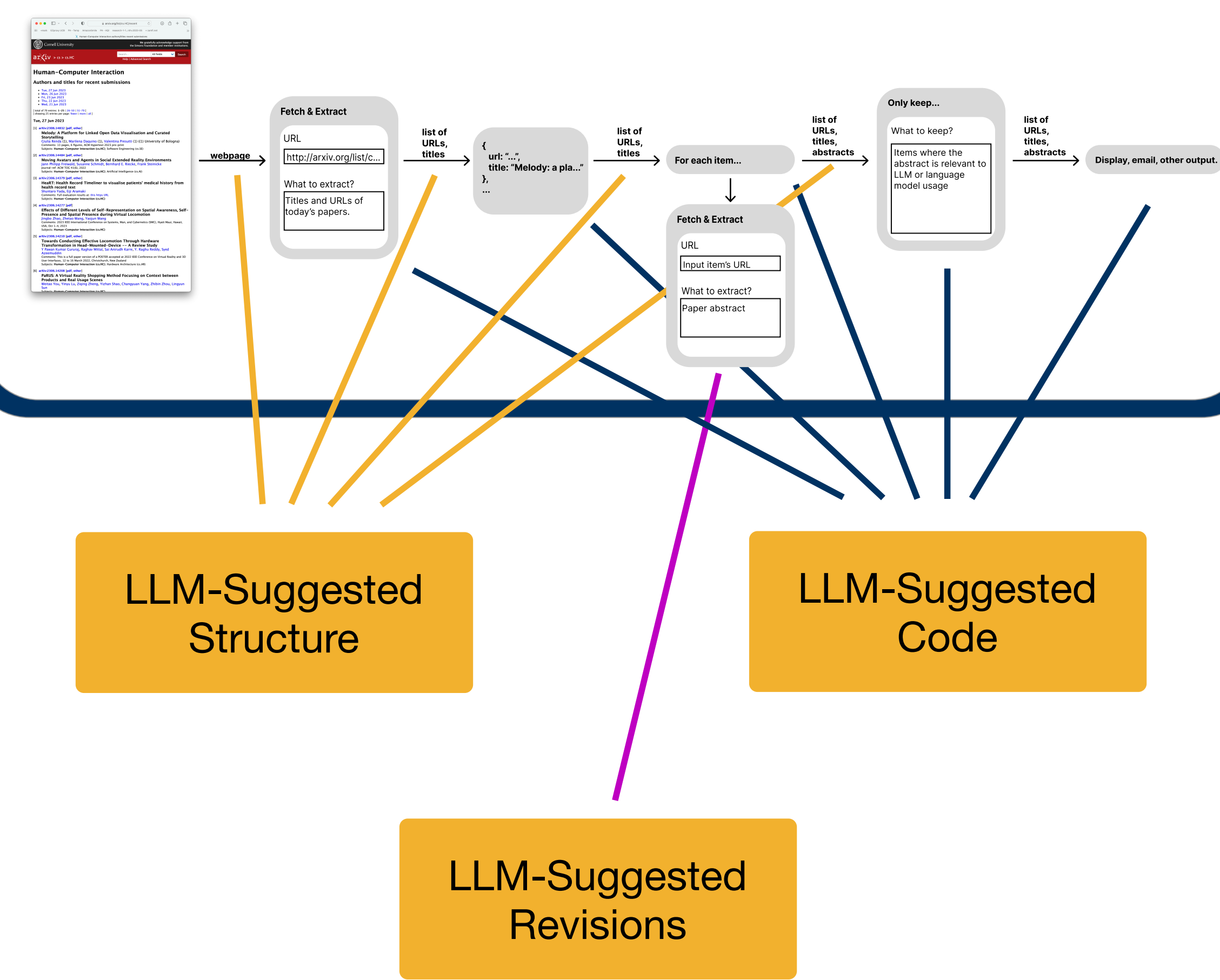
[Bot] Sure, I can help design a workflow for that using the components provided. This would be the desired workflow:

```
fetch(arXiv_yesterdays_posts_URL)
extract("list of posts including title, authors, and abstract")
filter(process("post includes 'LLMs' in the title or abstract"))
```

[User] Looks like the arxiv posts URL only includes titles and authors, not abstracts, but it does include a URL that can also be fetched for abstracts

[Bot] Given this new information, we will need to adjust our workflow to include fetching the abstract from the individual paper's URL. Here's the adjusted workflow:

```
fetch(arXiv_yesterdays_posts_URL)
extract("list of posts including title, authors, and paper URL")
map(fetch(paper_URL), extract("abstract of the paper"))
filter(process("post includes 'LLMs' in the title, authors, or abstract"))
```



Example System & Iteration Process

