

A STUDY OF LIBRARY USAGE IN AGENT-AUTHORED PULL REQUESTS

Lukas Twist, Jie M. Zhang;
King's College London.

MOTIVATION

- Coding is more than just solving puzzles, it is about **navigating ecosystems**.
- A core part of this is reusing libraries.
- Standard LLMs can often fail at reliably using or managing dependencies.
- Can agents, with much greater autonomy, overcome these challenges?

METHODOLOGY

- Mine 26,760 agent-authored pull requests (PRs) from the AIDev-pop dataset.
- Extract library usage and dependency manifest data from the git diffs.
- Analyse the 5 most popular languages.



```
extract-imports.sh
[PROCESS] Scanning pull request files...
[DETAIL ] Filtering for .py, .ts, .go, .cs files
[RESULT ] Found: "train_model.py"

[PROCESS] Scanning git diff of code files...
[DETAIL ] Isolating only added (+) lines
[RESULT ] Found: '+ from torch import nn, Tensor'

[PROCESS] Applying import regex...
[DETAIL ] r"(?:import|from)\s+([a-zA-Z0-9._-]+)"
[RESULT ] "torch" (python)
```

MINING CHALLENGE #3

CODING AGENTS EXHIBIT DIVERSE LIBRARY IMPORTS AND MAKE DISCIPLINED DEPENDENCY ADDITIONS, IN CONTRAST TO LLMs.

LIBRARY IMPORT FINDINGS

High ecosystem awareness.

- Agents import libraries in 30% of PRs:
C# 46% - TS/JS 40% - Python 38% - Go 13%

Imports typically don't hinder PR success.

- 60% of PRs with imports get merged, only slightly less than 72% of all agent-authored PRs.

Massive diversity compared to LLMs.

- Agents import 3,988 unique libraries, contrasting with the limited diversity seen in LLM preferences.

DEPENDENCY ADDITION FINDINGS

Low dependency bloat.

- 1.3% of PRs add new dependencies:
C# 6.1% - Python 2.8% - Go 0.2% - TS/JS 0.1%

High versioning hygiene.

- 75% of new dependencies are versioned, much better than standard chat completions (~9%).

Testing and scaffolding popular.

- New dependencies focus on developer tooling, a conservative approach to dependency growth.

FUTURE RESEARCH DIRECTIONS

- Do agents have **library-related hallucinations**?
- Do agents commonly **use deprecated library features** like LLMs?
- Do agents commonly **re-implement existing functionality** instead of using a library?

FULL PAPER



LUKAS TWIST



SAFE & TRUSTED AI
UKRI CENTRE FOR DOCTORAL TRAINING

