nl2bash

Expanding and Improving Existing Datasets

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Motivation

- Bash can be difficult to learn
  - Commands are often unintuitive
- Even experienced users often have to look commands up

Example:

English: “Copy the first line from each text file in this directory into new_file.txt”

Bash: head -n1 *.txt > new_file.txt

Existing Architecture

- Tellina
  - Uses machine learning for natural language processing
  - Accuracy shown to correlate with its training dataset size
  - Currently not very accurate:

English: “Remove the first line from each text file in this directory”

Tellina Output: find . -type f -exec grep California {} \; -exec rm {} \;

Tellina Interface

How Tellina's Current Dataset was Generated

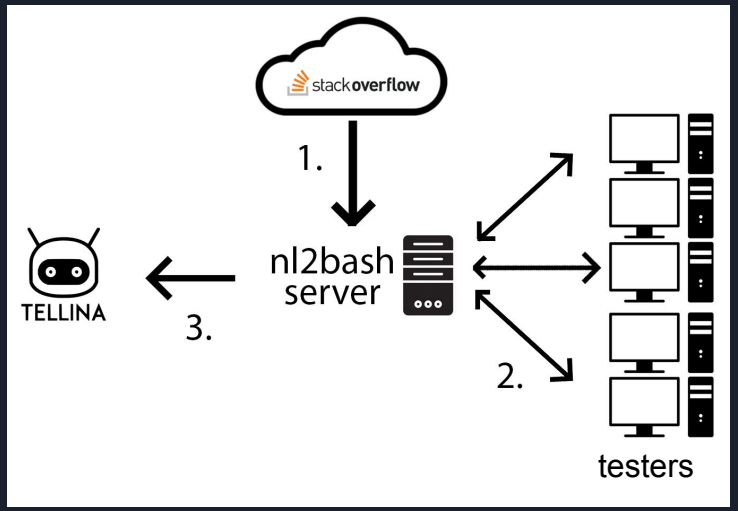
- Automated cleaning and filtering
  - Remove syntactically incorrect commands
  - Remove out-of-scope commands
  - Correct spelling errors in English commands

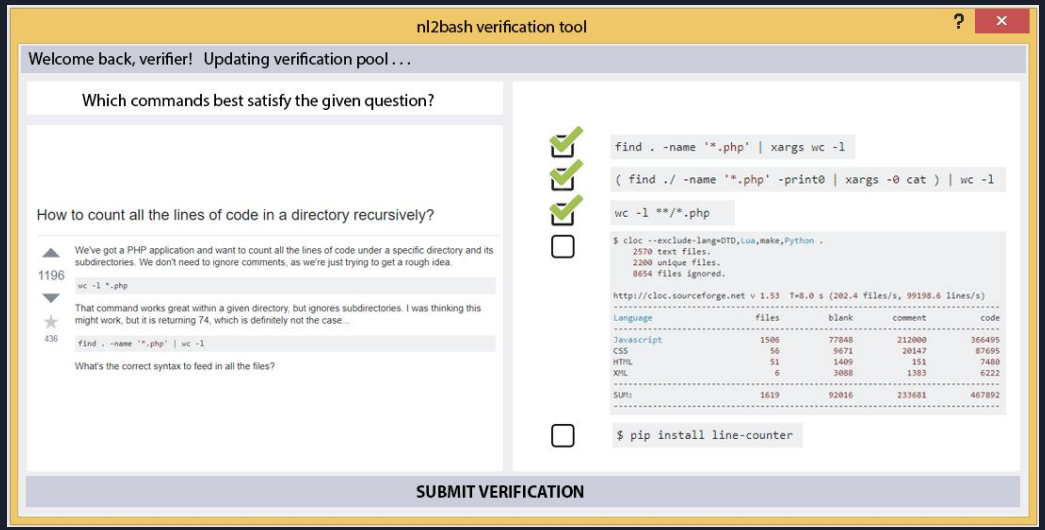
- Data collected by hand → 12,000 cleaned commands given descriptions generated by experts

Current Directions and Goals

- Main goal: **Improve the accuracy of Tellina**
- Directions:
  - **Expand Tellina's dataset**
    - Scrape resources such as Github and StackOverflow for English/Bash command pairs
    - Clean and verify this data - crowdsourcing
  - **Improve Tellina's dataset**
    - Develop better cleaning and verification tools to use on the existing dataset - crowdsourcing

Proposed Architecture and Interface





Proposed Implementation

- Web scraping tool to get bash commands and nearby descriptions (not expert written descriptions)
- Build on data cleaning
  - Experiment with heuristics to improve accuracy
  - Match Tellina's spec (no redirection, control flow, etc)
- UI for Testers (like mockup) to crowdsource verification
- Setup personal Tellina server using their repo's instructions
  - System to automate updating the model with new data

Evaluation

- Metrics
  - Translation accuracy - percentage of English/Bash pairs marked as correct
    - VS Tellina: Expert analysis on which output is better
  - Survey about UI (not the focus)
- Goal:
  - More accurate translation than the current version of Tellina (exact stats to beat are detailed in paper)

Conclusion

Improve and expand Tellina's dataset

Increase the accuracy of Tellina's command pair generation

Make it easier for people to learn and use Bash

Thank you! Any questions?

References

1. Lin, X. V., Wang, C., Zettlemoyer, L., & Ernst, M. D. (2018). NL2Bash: A Corpus and Semantic Parser for Natural Language Interface to the Linux Operating System. arXiv preprint arXiv:1802.08979.

2. Lin, X. V., Wang, C., Pang, D., Vu, K., & Ernst, M. D. (2017). Program synthesis from natural language using recurrent neural networks (Vol. 2). Technical Report UW-CSE-17-03-01, University of Washington Department of Computer Science and Engineering, Seattle, WA, USA.