nl2bash

Initial Results and Discussion

Oisin Doherty (oisind),
Abhinav Gottumukkala (anak4569),
Hans Jorgensen (thehans),
Lauren Martini (lmartini)

Motivation (Recap)

- Bash can be difficult to learn with unintuitive commands.
- Everyone occasionally looks up man pages for commands.

Example:

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

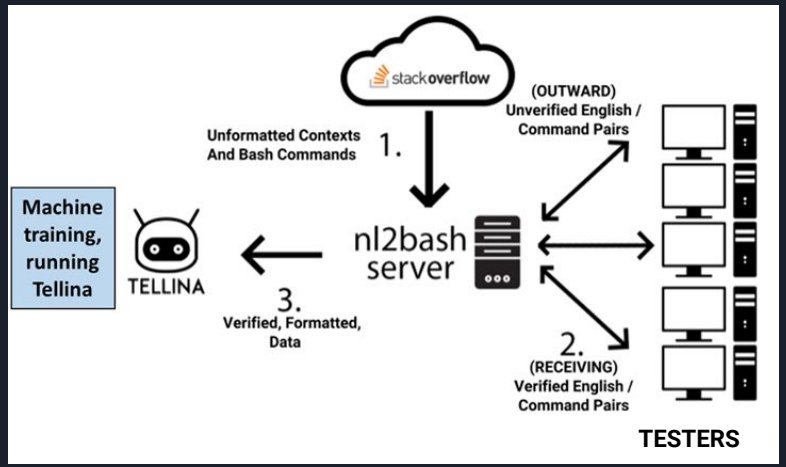
Bash:

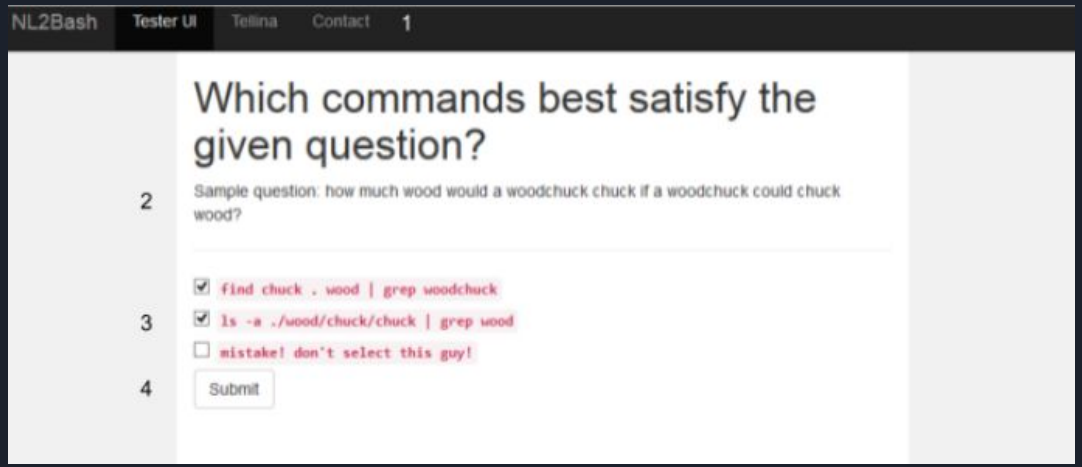
```
head -n1  *.txt > new_file.txt
```

Goals (Recap)

- Main goal: **Improve the accuracy of Tellina**
- Direction:
  - **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

Architecture and Interface (Recap)





Initial Results (.verify files)

3327013.verify


```
{
  "title":"How to determine the current shell I\u0027m working on?",
  "commands":[
    null,
    null,
    "ps -p $$ -oargs\u003d\nps -p $$ -ocomm\u003d\n",
    "ps | grep `echo $$` | awk \u0027{ print $4 }\u0027\necho $SHELL\n",
    "if [ ! -n \"$BASH\" ] ;then echo Please run this script $0 with bash; exit 1; fi\n"
  ]
}
```

Initial Results (.cm and .nl files) [2]

.nl

1. How to check if a variable is set in Bash?
2. Get program execution time in the shell
3. What's the best way to send a signal to all members of a process group?
4. How to concatenate string variables in Bash
5. How to concatenate string variables in Bash
6. Extract substring in Bash
7. Specify private SSH-key to use when executing shell command?
8. How to set a variable to the output of a command in Bash?
9. . . .

.cm

1. if [-z ${var+x}]; then echo "var is unset"; else echo "var is set to '$var'"; fi
2. $ help time
3. ps x -o "%p %r %y %x %c "
4. foo="$foo World"
5. > Hello World
6. echo 'someletters_12345_moreleters.ext' | cut -d'_' -f 2
7. ssh-agent $(ssh-add /somewhere/yourkey; git clone git@github.com:user/project.git)
8. OUTPUT="$(ls -1)"
9. . . .

Evaluation Methodology

- Metrics
  - Translation accuracy - percentage of English/Bash pairs marked as correct (automatic and manual analysis)
    - VS Tellina: Expert analysis on which output is better
  - Survey about UI

- Goal:
  - More accurate translation than the current version of Tellina against different metrics by any amount.

Initial Results (vs. Their Results) [1]

Model		BLEU1	BLEU3	TM1	TM3
Seq2Seq	Char	0.30 (0.24)	0.36 (0.27)	0.29 (0.35)	0.34 (0.38)
	Token	0.32 (0.10)	0.39 (0.12)	0.57 (0.53)	0.64 (0.59)
	Sub-Token	0.34 (0.19)	0.40 (0.27)	0.50 (0.41)	0.56 (0.53)
CopyNet	Char	0.29 (0.25)	0.37 (0.31)	0.33 (0.34)	0.39 (0.41)
	Token	0.40 (0.21)	0.49 (0.34)	0.58 (0.47)	0.66 (0.61)
	Sub-Token	0.44 (0.31)	0.50 (0.40)	0.51 (0.44)	0.57 (0.53)
Tellina		0.43 (0.29)	0.49 (0.32)	0.56 (0.51)	0.64 (0.58)

BLEU1/3: Bilingual Evaluation Understudy (top candidate vs. top 3 candidates)
TM1/3: Max percentage of close-vocabulary overlap (top candidate vs. top 3 candidates)
(Lin, Wang, Zettlemoyer, Ernst; p. 5, 12)

Next Steps

- Gather and verify much more data, enlisting others' help to perform manual verifications
- Train new models on novel data (via AWS) and further evaluate our results against Tellina's
- Host the site publicly and evaluate it with user feedback tests

Conclusion (Recap)

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

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.