Building Reproducibile AI

”The Earth is Flat!! My ambigously defined experiment with says so”

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October 6, 2022

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ML as a Science

- Foundationally, Machine Learning is a beautiful clusterf*ck.

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- Foundationally, Machine Learning is a beautiful clusterf*ck.
- Proudly.

THIS IS YOUR MACHINE LEARNING SYSTEM?
YUP! YOU POUR THE DATA INTO THIS BIG PILE OF LINEAR ALGEBRA, THEN COLLECT THE ANSWERS ON THE OTHER SIDE.
WHAT IF THE ANSWERS ARE WRONG?
JUST STIR THE PILE UNTIL THEY START LOOKING RIGHT.
DATA
ANSWERS

ML as a Science

Imagine having to go debug that.

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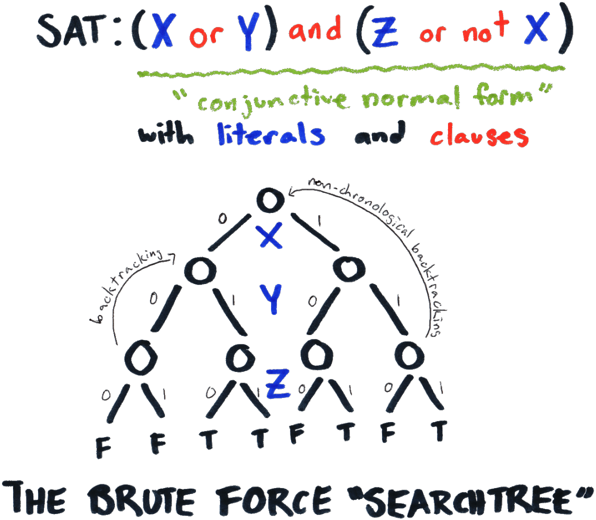
Pip

Package managers are SAT solvers:


SAT: (X or Y) and (Z or not X)
" conjunctive normal form "
with literals and clauses
non-chronological backtracking
backtracking
X
Y
Z
0
1
F F T T F T F T
THE BRUTE FORCE "SEARCHTREE"

Pip, chill!

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```
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263
(ml) [jinen@workstation ~]$ pip-chill | wc -l
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Both achieve the same result; `pip-chill` is just more readable and less cluttered.

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Git

Git is a version control system for text-based files.

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It has a lot of additional functionality; file merging, branching and the utilities to observe, modify and update any commit from the repository's git history.

GitHub

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GitHub is merely a service that hosts git servers. Above git, it adds CI/CD scripting, code scanning, as well as release hosting.

Authentication

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Linus Torvalds didn't sign commits; as a result: [link]

Branching Strategy

Feature branches on projects with a with a lot of contributors can get cluttered.

Using a `<contributor>/<feature>` naming strategy allows developing branches that are easy to recognize and classify.

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DVC

Naive solution for data versioning.

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Naive solution for data versioning. It works by bucketing data and storing it into a cache.

But it works!

MLFlow

MLFlow is a framework for experiments logging.

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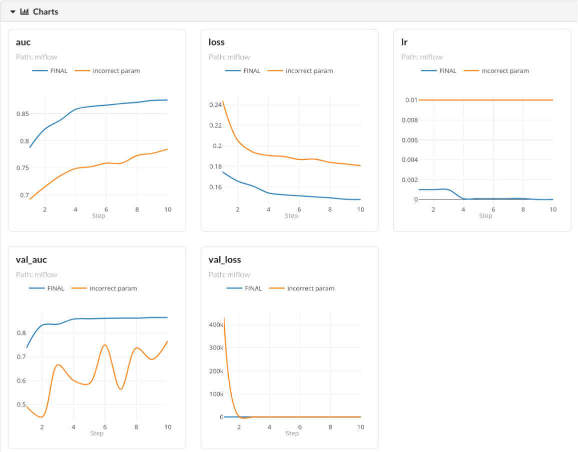
It allows us to make observations between two runs without an active involvement within the experiments.



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CookieCutter

This forms a skeletal for our repository.

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Developing a codebase using python modules, is made much easier, due to the structure offered by CookieCutter. Directory Structure: [link]

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We can use **Module-Based Development** to ensure to ensure path conditions are maintained without updating the environment.

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Functionally, it follows the structure define within CookieCutter. As for execution:

```
$ python -m folder.subfolder.subfolder.pythonscript
```

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Benefits:

- Structured, debuggable code.
- `$PYTHONPATH` is automatically resolved.
- Relative imports work by default!

Let's Code!

```
$ ssh -L 8888:localhost:<n> \
workshop@schema.acm.cs.purdue.edu
```

Password: `workshop`; replace `<n>` with 2000 `< n <` 65000.

```
$ start-exercise
```

Workshop Series Review

Any questions for me?

Thank you!

Have an awesome rest of your day!

Slides: `https://cs.purdue.edu/homes/jsetpal/mlops.pdf`
Exercise: `https://cs.purdue.edu/homes/jsetpal/code.tar.gz`