ThatMetricTimeline (TMT)

A fully-open source experiment tracking library

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About me 🙋‍♂️

About me

Just a quick glance at my history:

- I'm originally from Rome, Italy 🤌
- Got my Master degree and later PhD in Pisa, Italy 👨‍🎓
- Now I work at STRG.at 👩‍💻
- I'm a Linux and open source enthusiast 🐧

About me: OSS contributions

In general, I enjoy contributing to OS software. Most relevant contributions are to:

- the `Hyprland` compositor (Contributor, `https://github.com/hyprwm/Hyprland`);
- the `hyprland-virtual-desktops` plugin (Author, `https://github.com/levnikmyskin/hyprland-virtual-desktops`);
- minor contributions to Telegram, Waybar, and many other projects I don't remember anymore;

That Metric Timeline: why?

TMT: Background

When working on a research project, experiments, their results and the code that generated them can easily get lost:

- git is not a solution, we don't commit every time we change a hyperparameter;
- some solutions were available, but they were overly complicated, or not open source;

TMT: Background

I wanted something that was:

- truly open source (read, you can contribute);
- simple (following KISS);

Where KISS means that `tmt` should be a simple software, with no unnecessary architectures, interfaces etc.
Even if this means the user needs to write their own little scripts around it.

That Metric Timeline: what?

TMT: what is it?

`tmt` (`https://github.com/levnikmyskin/that_metric_timeline`) is a Python library which:

- keeps a local "database" of your experiments, with names, descriptions, metrics etc;
- keeps local snapshots of the code that generated those experiments;
- is fully open source, fully offline, terminal-centric (read, you can run it on your servers);

TMT: snapshots

Code snapshots between different runs are created by:

- hardlinking all files that didn't change since last snapshot;
- copying only files that changed

Basically, this is to avoid your local storage explodes when you're convinced that those two layers are to blame for such a low F1, and you're determined to try all possible combinations by hand.

TMT: local database

`tmt` local "database" is actually a bunch of `json` files stored in the `.tmt` folder at the root of your repository.

You can simply read those files, but `tmt` exposes a few utilities to deal with them.

TMT: tracking your experiments

TMT: tracking your experiments

```python
from tmt import tmt_recorder

@tmt_recorder(name="some_experiment")
def train_and_predict(x_tr, y_tr, x_te, y_te):
    lr = LogisticRegression()
    lr.fit(x_tr, y_tr)
    preds = lr.predict(x_te)
    return {
      'f1': f1_score(y_te, preds),
      'accuracy': accuracy_score(y_te, preds)
    }
```

TMT: tracking your experiments

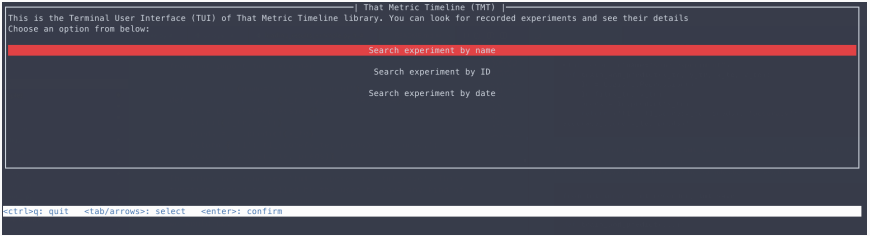
```
from tmt import tmt_recorder, tmt_save

@tmt_recorder(name="some_experiment_with_data",
↪  description="saving preds this time")
def train_and_predict(...):
  ...
  preds = lr.predict(x_te)
  tmt_save(preds, name='lr_predictions')
  return {
    'f1': f1_score(y_te, preds),
    'accuracy': accuracy_score(y_te, preds)
  }
```

TMT: tracking your experiments

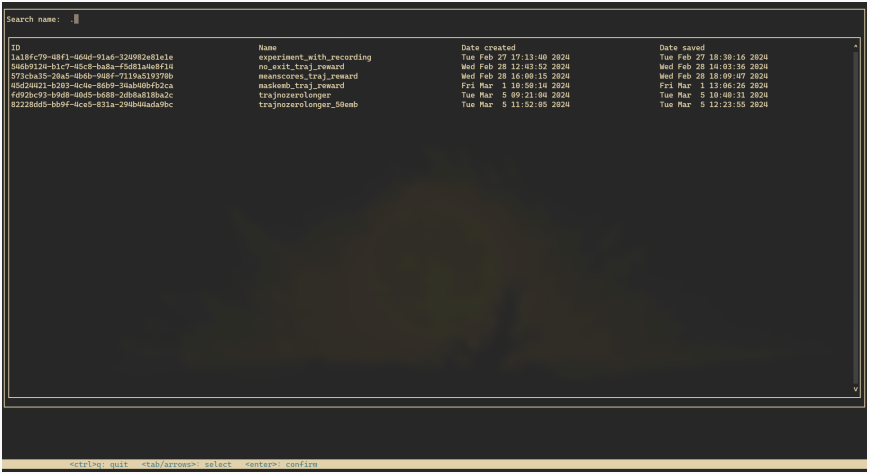
```
def train_and_predict(...):
  ...

if __name__ == '__main__':
    decorated =
    ↪  tmt_recorder(name=sys.argv[1])(train_and_predict)
    decorated(...)
```

TMT: searching and loading your experiments 🔎

TMT: the TUI interface



TMT: the TUI interface



TMT: the TUI interface

```
┤ Experiment: trajnozerolonger ├

ID:                                  fd92bc93-b9d8-40d5-b688-2db8a818ba2c

Name:                                trajnozerolonger

Description:                         Trajectory with no z ... <enter> to expand

Args:                                rl_strg/experiments/navigation/graph_trajectory_emulation/graph_trajectory_emulation.py --name trajnozerolonger --desc Trajectory with no zeros. Longe
                                     r trajectory -s

Date created:                        Tue Mar  5 09:21:04 2024

Metrics:                             <enter> to expand

Results path:                        <enter> to expand

Code snapshot path <enter to copy>:  /home/alessio.molinari/rl-strg/.tmt/snapshots/fd92bc93-b9d8-40d5-b688-2db8a818ba2c

Date saved:                          Tue Mar  5 10:40:31 2024

<ctrl>q: quit   <tab/arrows>: select   <enter>: confirm
```

TMT: loading from code

```python
from tmt import TmtManager

manager = TmtManager()
manager.set_entry_by_id('example')

for name, path in manager.results_paths():
    with open(path, 'rb') as f:
        res = pickle.load(f)

for name, res in manager.load_results():
    print(res.mean())

for name, val in manager.get_metrics():
    print(f"{name}: {val}")
```

TMT: loading from code

```
# If you need to do other stuff, like searching for
# experiments between two datetimes and so on
# you can access the `db` member like
d = some_date
manager.db.get_entries_greater_than_date(d)
```

`tmt` flaws, aka I might need your help

TMT: flaws and issues

`tmt` works and I use it more or less regularly, even today. However:

- since I finished my PhD, I don't really run so many experiments;
- I've been caught up in other open source projects;
- as a result, haven't been working on it for a while.

TMT: flaws and issues

Mostly:

- the TUI is cool, but a CLI would be more practical;
- accessing experiments (e.g., last run) should be more straight forward;
- `TmtManager` should be able to deal with more than one experiment;
- probably more;

Call for contributions

Contributing to open source is cool:

- you make the software you use your own 👩‍💻
- you get internet points 🧙
- you get resume points 🧑‍💼
- you get to deal with strangers that ask you all kinds of weird stuff on your github issues 🤩

`tmt` is a small project and it might be a good place to start :)

Call for contributions

Sometimes it can be scary to publish or contribute code, because we think it's not good enough, or it'll be judged harshly. But we all write bad code, and that's fine.

Thank you! 👋

Questions? 🙋

Using a custom save function

```
def my_save_fn(obj, path):
  np.save(path, obj)

def save_fn_path(obj, path):
  new_path = 'custom_path.npy'
  np.save(new_path, obj)
  return new_path

def train_and_predict(...):
  tmt_save(preds, name='lr_predictions',
  ↪  custom_save=my_save_fn, extension='.npy')
  tmt_save(preds, name='lr_predictions',
  ↪  custom_save=my_save_fn_path)
```