Effective Programming Practices for Economists

Reproducible Research

What does pytask do?

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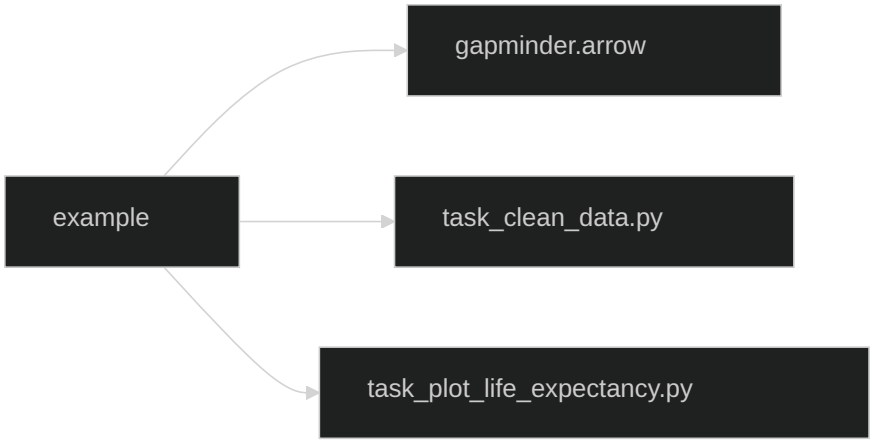
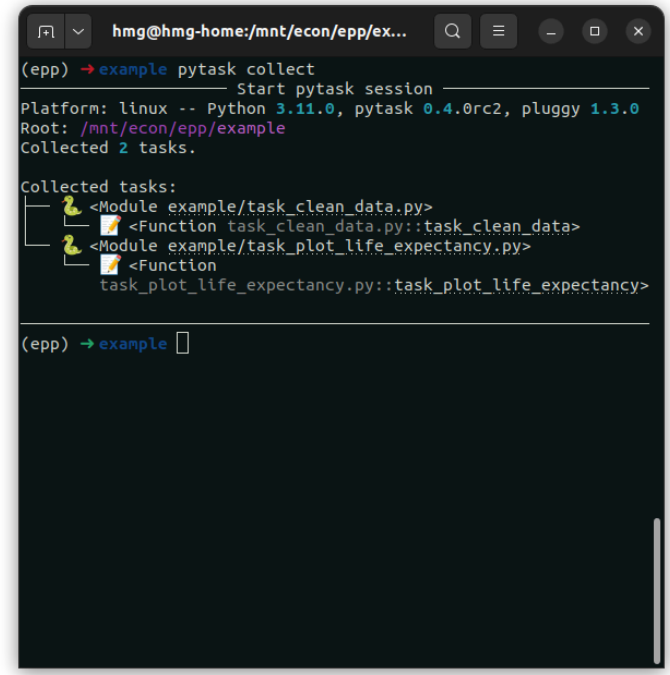
A tiny example project



- `example/task_clean_data.py`
  - Contains the function `task_clean_data`
  - If called, the function reads in `example/gapminder.arrow` and produces `example/bld/data.pkl`
- `example/task_plot_life_expectancy.py`
  - Contains the function `task_plot_life_expectancy`
  - If called, the function reads in `example/bld/data.pkl` and produces `example/bld/life_expectancy.svg`

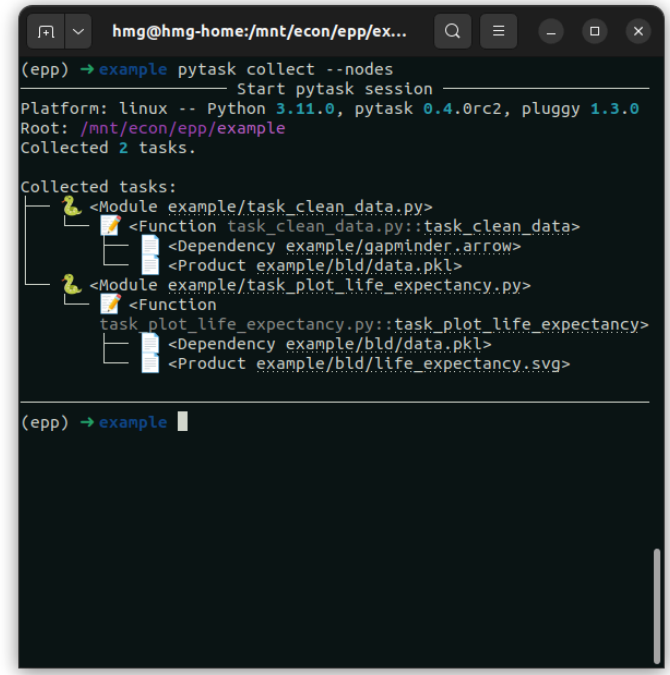
Step 1: collection

- Go through all folders in working directory
- Collect all files with name `task_XXX.py`
- Go through those files and collect all functions that start with `task_`
- Task functions and their (default) inputs will be used to construct the workflow

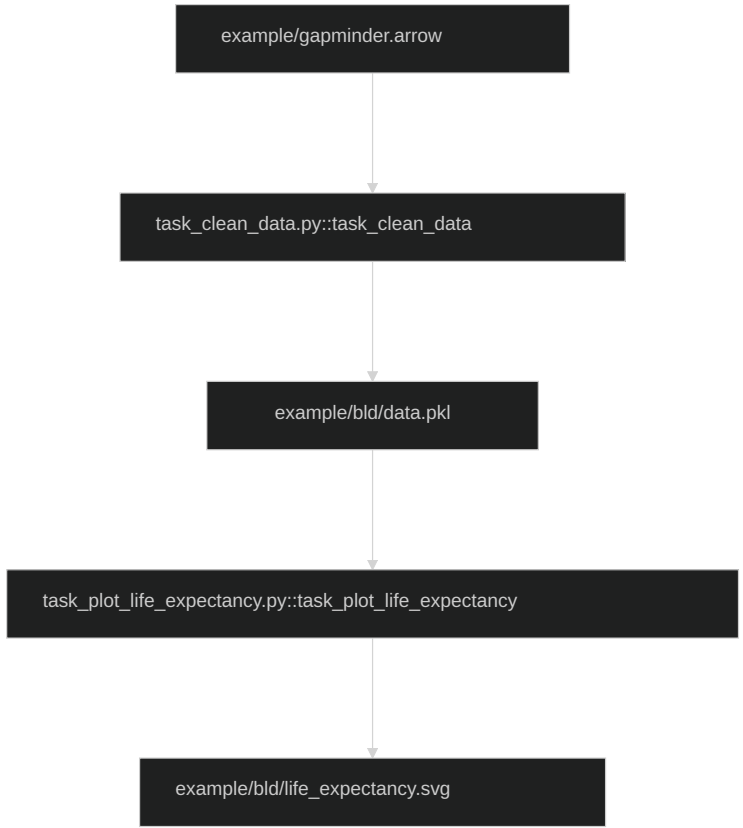


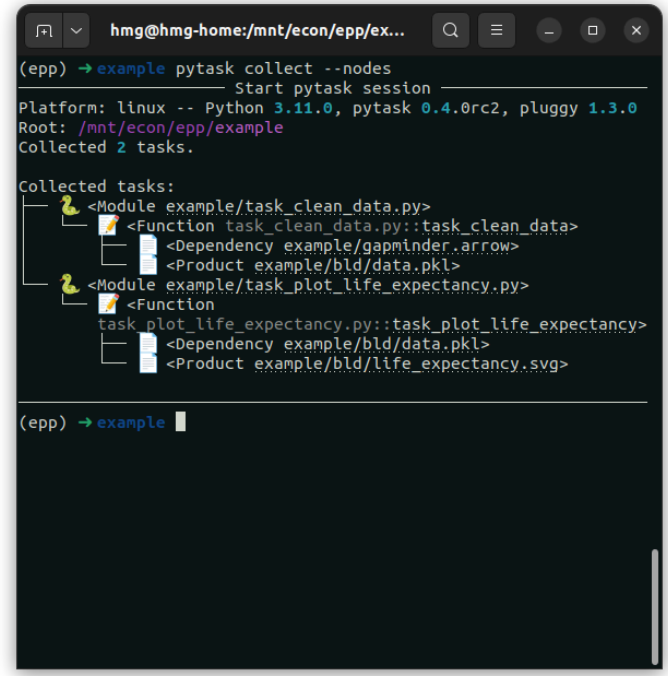
Step 2: Dependency graph (DAG)

- Inspect function signatures to build a dependency graph
- `produces` describes function output
- Other arguments are function dependencies
- DAG structure enables to determine an order of execution that respects dependency structure (topological sort)



Can you see the DAG?





Step 3: Track changes and execute

- Pytask knows which files should need to be generated
- Also keeps track on when code or products have changed
- Functions are only run if:
  - They have changed
  - A dependency has changed
- Huge time savings in large empirical projects!

Run for the first time

```
hmg@hmg-home:/mnt/econ/epp/example
(epp) ➜ example pytask
═══ Start pytask session ═══
Platform: linux -- Python 3.11.0, pytask 0.4.0rc2, pluggy 1.3.0
Root: /mnt/econ/epp/example
Collected 2 tasks.

| Task                                                | Outcome |
|---|---|
| task_clean_data.py::task_clean_data                 | .       |
| task_plot_life_expectancy.py::task_plot_life_expectancy | .       |

Summary
 2  Collected tasks
 2  Succeeded        (100.0%)

═══ Succeeded in 1.22 seconds ═══
(epp) ➜ example
```

Delete plot and run again

```
hmg@hmg-home:/mnt/econ/epp/example
(epp) ➜ example rm bld/life_expectancy.svg
(epp) ➜ example pytask
═══ Start pytask session ═══
Platform: linux -- Python 3.11.0, pytask 0.4.0rc2, pluggy 1.3.0
Root: /mnt/econ/epp/example
Collected 2 tasks.

| Task                                                  | Outcome |
|---|---|
| task_plot_life_expectancy.py::task_plot_life_expectancy | . |

Summary
  2  Collected tasks
  1  Succeeded                  (50.0%)
  1  Skipped because unchanged  (50.0%)

═══ Succeeded in 0.87 seconds ═══
(epp) ➜ example
```

Delete cleaned data and run again

hmg@hmg-home:/mnt/econ/epp/example

```
(epp) ➜ example rm bld/data.pkl
(epp) ➜ example pytask
═══ Start pytask session ═══
Platform: linux -- Python 3.11.0, pytask 0.4.0rc2, pluggy 1.3.0
Root: /mnt/econ/epp/example
Collected 2 tasks.

┃ Task                                                  ┃ Outcome ┃
┃ task_clean_data.py::task_clean_data                   ┃ .       ┃
┃ task_plot_life_expectancy.py::task_plot_life_expectancy ┃ .       ┃

Summary
 2  Collected tasks
 2  Succeeded        (100.0%)

═══ Succeeded in 0.95 seconds ═══
(epp) ➜ example
```