Doubly Robust Thompson Sampling with Linear Payoffs

Python3 based implementation of the paper "Doubly Robust Thompson Sampling with linear payoffs" under review at [NeurIPS2021]. In this repository, you can generate Figures of the paper!

Directory tree

```
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|-- experiment.py
|-- plot.py
|-- algorithms.py
|-- figure1.sh
|-- requirements.txt
|-- README.md
```

- `algorithms.py` contains the Thompson Sampling (TS), Balanced Linear Thompson Sampling (BLTS), and the proposed Doubly Robust Thompson Sampling (DRTS).
- `experiment.py` contains the simulation environments and evaluation of cumulative regrets and estimation error.
- `plot.py` plots the results generated by `experiment.py`
- `figure1.sh` contains a quick start that reproduces the result in the paper.
- `requirements.txt` contains the dependencies to run the codes.

Requirements

- python 3
- numpy
- scipy
- sobol_seq
- matplotlib
- tqdm

Quick start

First to install the dependencies,

```
pip install -r requirements.txt
```

To generate Figure 1 in the paper simply run,

```
sh figure1.sh
```

This code will generate the cumulative regrets and estimation error plots of TS, BLTS, and DRTS, when d=10, 30, and N=3, 10.

If you want to change the settings, use

```
python experiment.py -d 5 -N 7 -seed 1324 -T 10000
```

to evaluate performances of the three algorithms for T=10000 rounds when d=5, and N=7, with seed 1324.

After running `experiment.py`, the estimation error and cumulative regrets are saved in `.txt` format. Then run

```
python plot.py -d 5 -N 7
```

to plot the results of d=5, and N=7.

Example results

We introduce our example results in our paper.

Figure 1. Comparison of cumulative regrets with best hyperparameters.

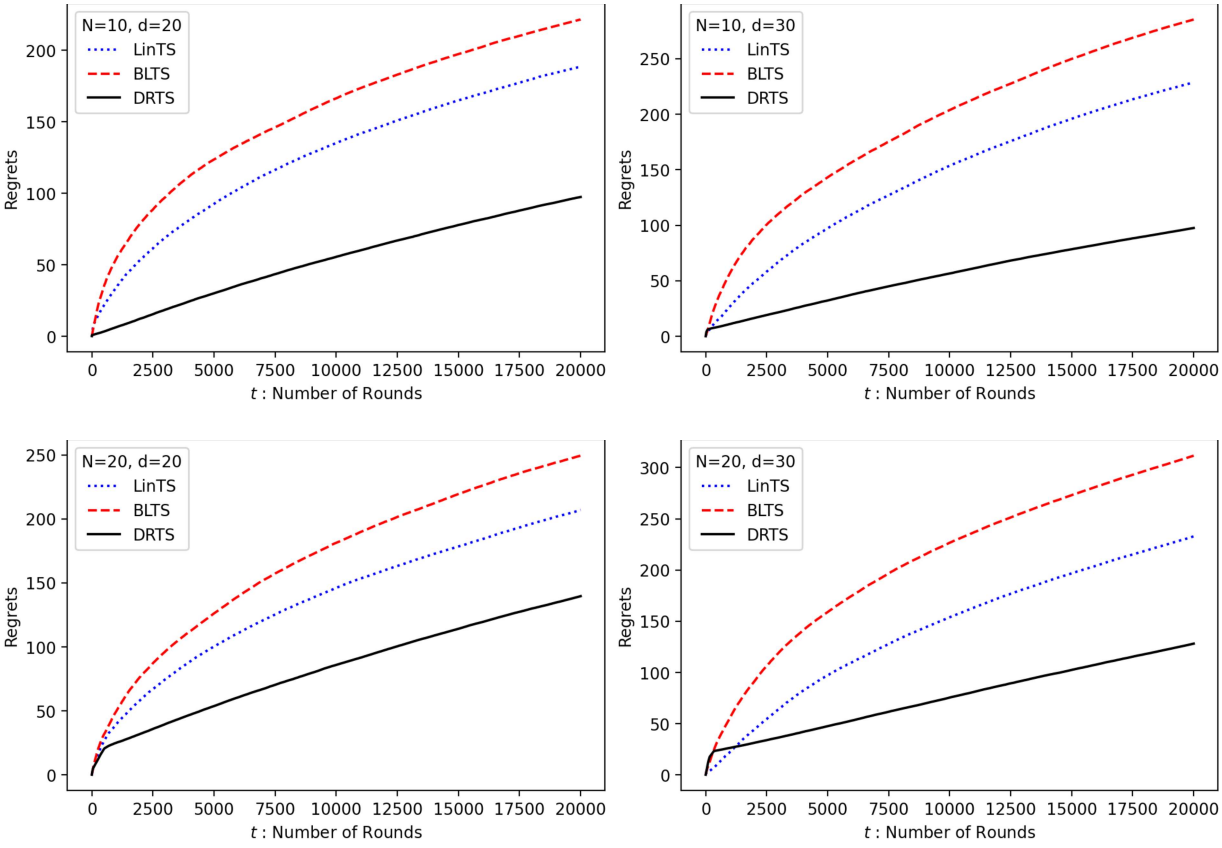

Figure 2. Comparison of estimation error with best hyperparameters