Build Night 1

Introduction & Problem Definition

Team Meeting Agenda

- Onboarding (Team contract, Slack and Github)
- Go over the structure of this project
- Define the Online Portfolio Selection (OLPS) problem
- Introduce the OLPS survey paper
- Discuss a basic framework for OLPS
- Assign readings (i.e. homework)

🥳 Onboarding

Open Contract

Project Structure

Project Schedule

1. Welcome & Problem Definition (you are here!)
2. Baseline + Follow-the-Winner Strategies I
3. Follow-the-Winner Strategies II
4. Follow-the-Loser Strategies I
5. Follow-the-Loser Strategies II
6. Pattern-Matching Strategies I
7. Pattern-Matching Strategies II
8. Backtesting, Experimentation, and Comparison
9. Flex Week
10. Poster Work & Presentation Practice

How Each Week Will Look

1. Build Night starts off every week. Discuss previous homework/readings and progress.
    a. Go ahead and solve problems/answer questions that came up in the previous week.
    b. Review the readings that cover the new material OR work on code.
    c. Do a quick code review/repo check with me.
    d. At the end of the Build Night, go over progress with the whole group
2. Meeting outside of Build Nights without me present to work on things
    a. Write code, discuss readings, (towards the end) work on poster
3. (Some weeks) Meeting with Faculty Advisor to update them and receive guidance

Problem Definition

Portfolio selection, aiming to optimize the allocation of wealth across a set of assets, is a fundamental research problem in computational finance and a practical engineering task in financial engineering.

Simply put:
We figure out how much money should go to each stock or asset in our portfolio based on previous performance.

OLPS Example

Stock	One-day Change ($)
AAPL	– 0.50
GOOG	– 3.35
FB	+ 2.16
MSFT	+ 0.01

OLPS Example

Stock	One-day Change	Allocation Signal
AAPL	– 0.50	Allocate little less
GOOG	– 3.35	Allocate a lot less
FB	+ 2.16	Allocate a lot more
MSFT	+ 0.01	Allocate about the same

OLPS Example

Stock	One-day Change	Allocatio
AAPL	– 0.50	Allocate l
GOOG	– 3.35	Allocate a lot less
FB	+ 2.16	Allocate a lot more
MSFT	+ 0.01	Allocate about the same

How much less?
How much more?

OLPS Framework

ALGORITHM 1: Online portfolio selection framework.

Input: $\mathbf{x}_1^n$: Historical market sequence
Output: S_n: Final cumulative wealth

Initialize $S_0 = 1, \mathbf{b}_1 = \left(\frac{1}{m}, \ldots, \frac{1}{m}\right)$
for $t = 1, 2, \ldots, n$ **do**
    Portfolio manager computes a portfolio $\mathbf{b}_t$;
    Market reveals the market price relative $\mathbf{x}_t$;
    Portfolio incurs period return $\mathbf{b}_t^\top \mathbf{x}_t$ and updates cumulative return $S_t = S_{t-1} \times \left(\mathbf{b}_t^\top \mathbf{x}_t\right)$;
    Portfolio manager updates his/her online portfolio selection rules ;
end

Homework

About Homework

- Very important to the success of your project
- This week:
  - Read Intro, Sections 1/2 in OLPS survey paper (you do NOT have to fully get the math, but please try to understand Example 2.1)
  - Python & Numpy Tutorial (linked to on Github)