Polynomial Ensemble for Stock Prediction

Definition

$f(x)$ is a set of polynomials for a specific stock.

Set Description

This set can be described as:

$$\left\{ f(x) \mid f(x) = ax^5 + bx^4 + cx^3 + dx^2 + ex + f \right\}$$

where:

- Each coefficient (a, b, c, d, e, f) is unique to each polynomial, and determined through a polynomial regression of a random 5 points.

Ensemble Bundle

Take many $f(x)$'s like this (N of them) and create a bundle:

$$\mathcal{F} = \{f_1(x), f_2(x), f_3(x), \ldots, f_N(x)\}$$

where each $f_i(x) = a_i x^5 + b_i x^4 + c_i x^3 + d_i x^2 + e_i x + f_i$

Ensemble Functions

The bundle $\mathcal{F}$ has the following functions:

1. rankBuyOrSell(buyDate, sellDate)

This function returns how many of the $f(x)$'s return positive change, and how many return negative change:

$$\text{positive} = |\{f_i \in \mathcal{F} \mid f_i(\text{sellDate}) - f_i(\text{buyDate}) > 0\}|$$

$$\text{negative} = |\{f_i \in \mathcal{F} \mid f_i(\text{sellDate}) - f_i(\text{buyDate}) < 0\}|$$

Returns: (positive, negative)

2. average()

This function returns the average function:

$$h(x) = \frac{1}{N} \sum_{i=1}^{N} f_i(x)$$

Expanded form:

$$h(x) = \frac{f_1(x) + f_2(x) + f_3(x) + \cdots + f_N(x)}{N}$$

Returns: A polynomial function $h(x)$ of degree 5

Example Usage

Given $N = 100$ polynomials for Stock XYZ:

- $\mathcal{F} = \{f_1(x), f_2(x), f_3(x), f_4(x), f_5(x)\}$
- `rankBuyOrSell(Jan 1 1999, Feb 12 2004)` might return: (positive: 70, negative: 30)
- `average()` returns: $h(x) = \frac{1}{100} \sum_{i=1}^{100} f_i(x)$

Challenging for a human to do by-hand, but not so challenging for a computer. Nothing in this algorithm expands beyond O(n) complexity.