CS221 Fall 2016 Project [p-proposal]

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1 Scope

1.1 Elliott Wave Principle

Elliott Wave Principle (EWP) is a hypothesis that stock market price can be modeled as a sequence of waves which shapes follow some defined rules. EWP suggests we can predict the future market price more accurately than a random chance by recognizing the wave pattern.

1.2 Input and output behavior

Given a history of a stock market, the system outputs a predicted price 30 days later. For example:

Input AAPL stock data (Dec 12, 1980 - Oct 22, 2016), obtained from `https://finance.yahoo.com/quote/AAPL/history?p=AAPL`

Output $123 (Predicted closing stock price of Nov 22, 2016)

1.3 Evaluation metric to success

Taking a history of some stock price, the evaluation process runs the system against some past subrange of the period and compares the output to the actual price. We use the mean squared error as the evaluation metric.

2 Baseline and Oracle

2.1 Baseline

The baseline approach uses Uniform Cost Search to find the wave structure with simlified Elliott Wave rules below. Then, based on the wave of today, it predicts the price after 30 days.

1. There are five impulse waves (1, 2, 3, 4, and 5), followed by three corrective waves (A, B, and C).
2. The input data (stock history) is a substring of the five waves.
3. Each wave may have nested waves. Except the wave which ends at the end of the input data, these substructure must have all eight waves.

4. Wave 2 never retraces more than 100% of Wave 1.

5. Wave 3 is longer than Wave 1 and 2.

6. Wave 4 does not enter into the same price territory as Wave 1.

Running the baseline implementation against some stocks, we got the following baseline.

Stock	Start Date	End Date	MSE
AAPL	2011-06-20	2012-09-17	410.8
AAPL	2013-06-24	2016-05-09	1110.9
QDX	2006-10-02	2008-03-10	193.7
RUT	2011-10-03	2016-02-08	51167.3

2.2 Oracle

The oracle approach asks an expert opinion (Shiva Sunder) to label the wave structure. Then, for each day in the history, it calculates the mean squared error between the wave and the actual price. It gives the accuracy of prediction given Elliott wave classification is perfectly correct.

Oracle produced these values.

Stock	Start Date	End Date	MSE
AAPL	2011-06-20	2012-09-17	58.0
AAPL	2013-06-24	2016-05-09	358.5
QDX	2006-10-02	2008-03-10	28.3
RUT	2011-10-03	2016-02-08	26372.9

3 Challenges and Topics

- Incorporate more complex Elliott rules into the search problem.
- Define some mathematical curve of X nested level Elliott wave. Use linear regression to find the parameter to fit.
- EWP is an old theory and can be out dated in the current stock behavior. Reinforcement Learning may be able to find the new rule (policy).

References

- `https://en.wikipedia.org/wiki/Elliott_wave_principle`
- `http://studyofcycles.com`