Directional Change

A new way to summarize price movements

Edward Tsang

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The Story So Far…

To beat your competitors, find opportunities before others

Innovation is the key!

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AI ≈
Knowledge Representation
+
Search

How you represent knowledge
determines what you can
reason about

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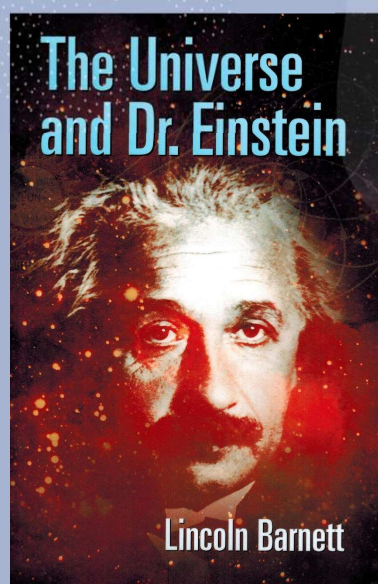
What is time?

Albert Einstein:

"… time has no independent existence apart from the order of events by which we measure it"



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"How did you travel to here?"

- I could give you a second-to-second account of my position, direction and velocity
  - How useful is that?
- **Data** is useless unless we extract **Information** from them

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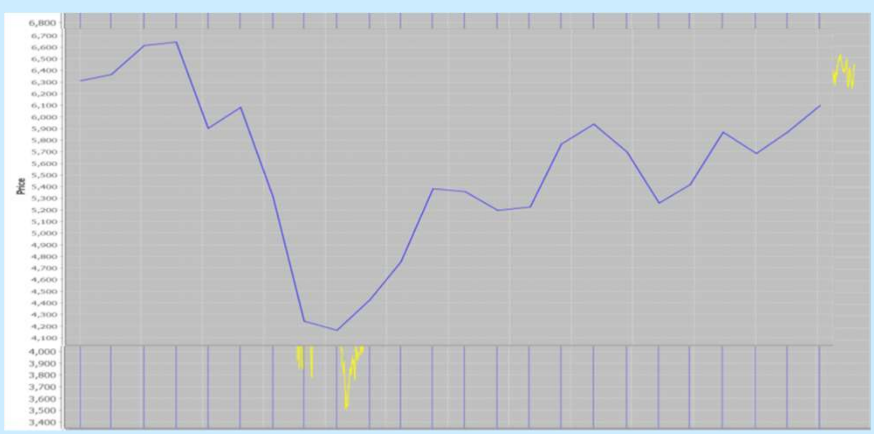
How Price Movements Are Recorded



- Interval-based summary, e.g. with daily closing prices

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Problem with interval-based Summary

- Important movements not captured

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Directional Changes (Zig-Zag)

Attempt to capture significant changes

Where significance is user-defined

Richard Olsen

Inventor

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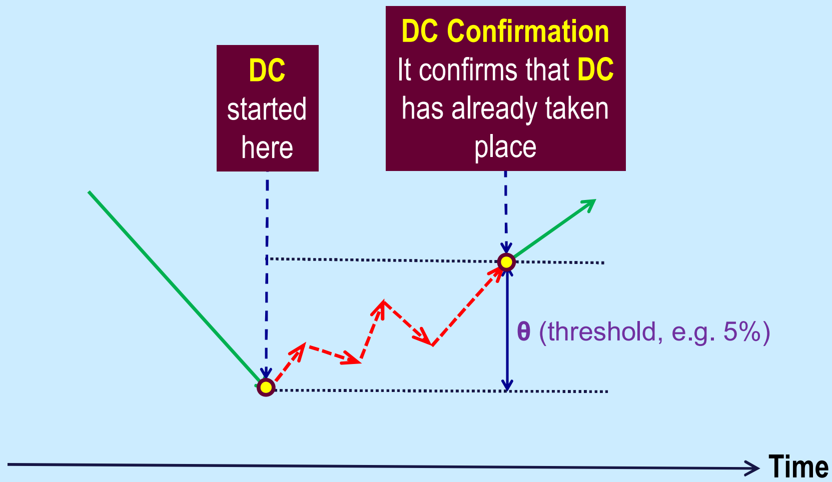
Directional Change (DC)



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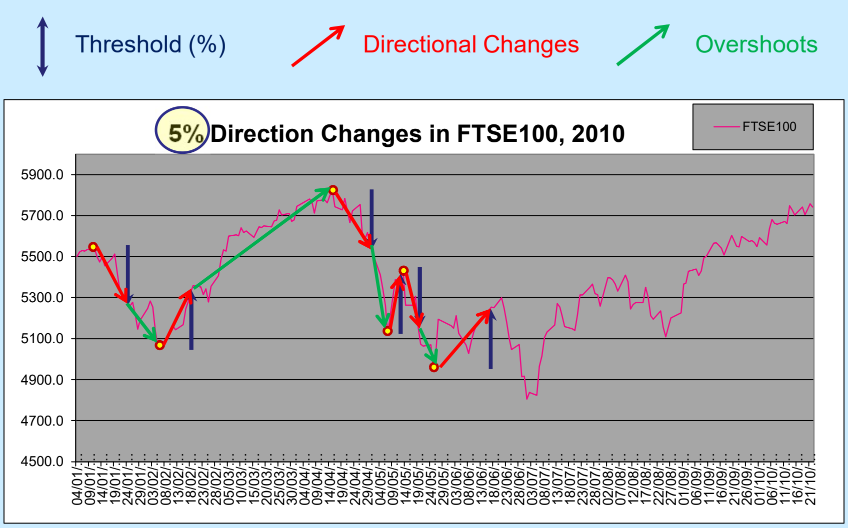
Directional Changes Definition



See video for more information http://www.youtube.com/watch?v=mbSbUKpWOno

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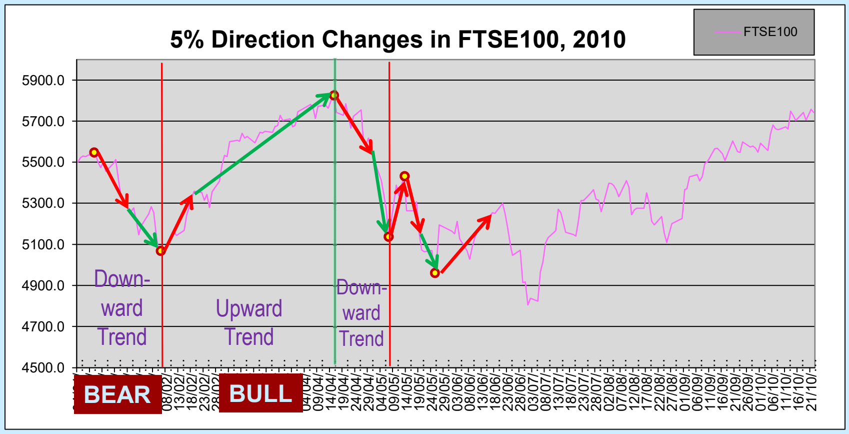
DC-based Summary

Threshold (%) Directional Changes Overshoots



See video for more information http://www.youtube.com/watch?v=mbSbUKpWOno

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Why Directional Changes?

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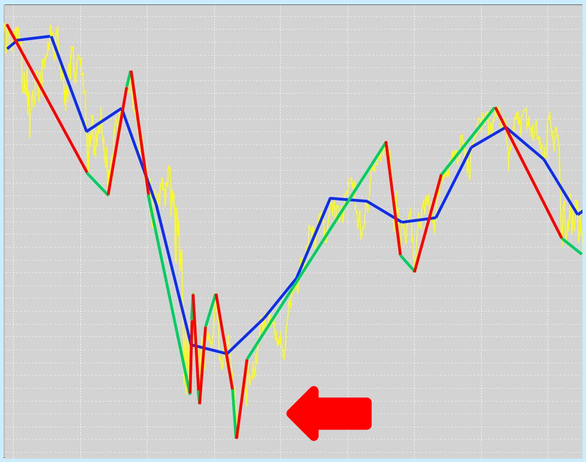
DC vs Interval Coastline



FTSE 100 June 2007 to October 2012

- With the same number of points
- DC captures significant changes missed by Intervals

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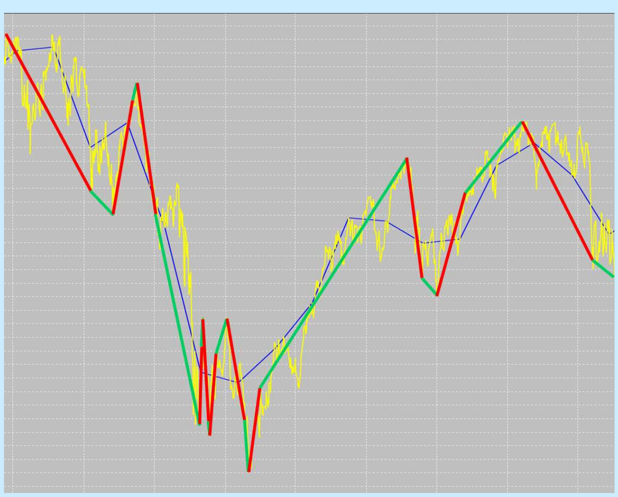
Potential for Profits



FTSE 100 June 2007 to October 2012

- Given perfect foresight:

  (Buy low, sell high)

  – Interval based return: 171%

  – DC-based return: 304%

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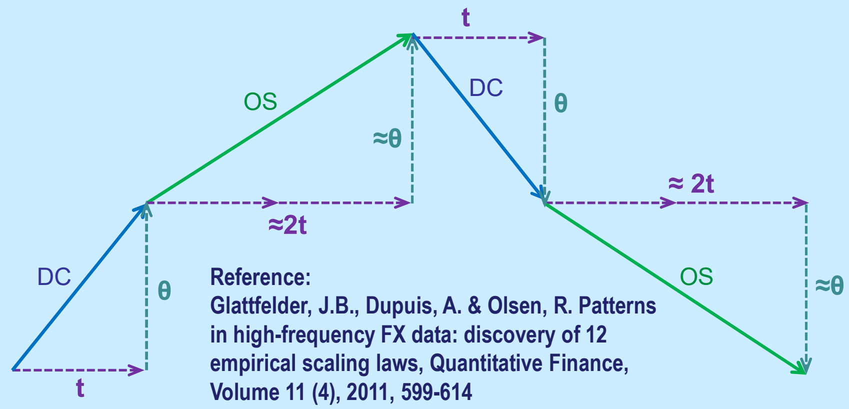
Statistical Properties Observed



- Average overshoot: same as threshold (approx.)
- Average overshoot time: approx. to 2 × DC time

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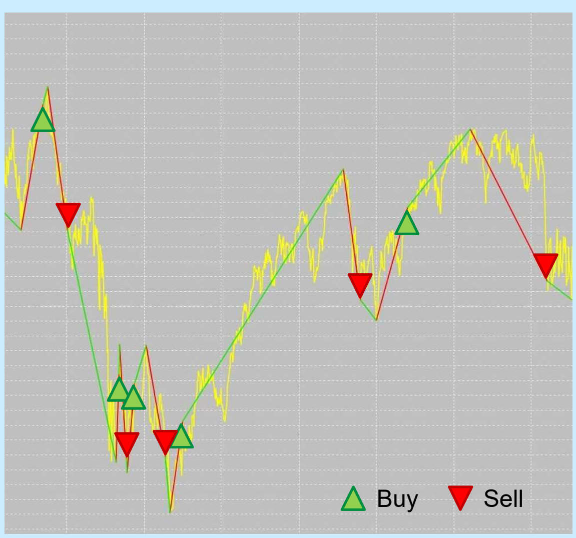
DC-based Algorithmic Trading



- Can trading algorithms be derived around DC?
- Research in progress

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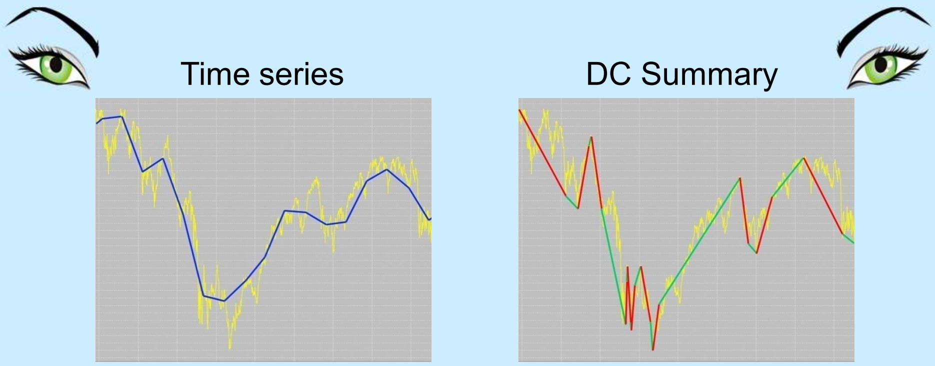
Time series + DC Summaries



- Seeing from two angles is better than one

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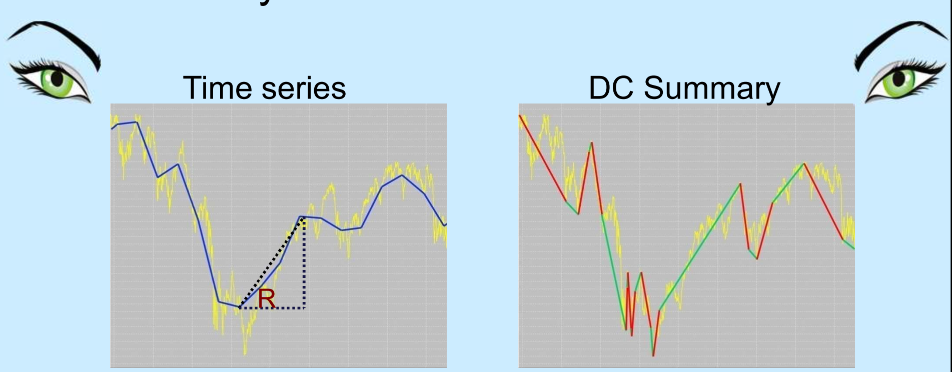
Finding corresponding info

- Time series and DC look at the same data
- What they see must be related



Volatility

What are the equivalence to
Return and volatility?

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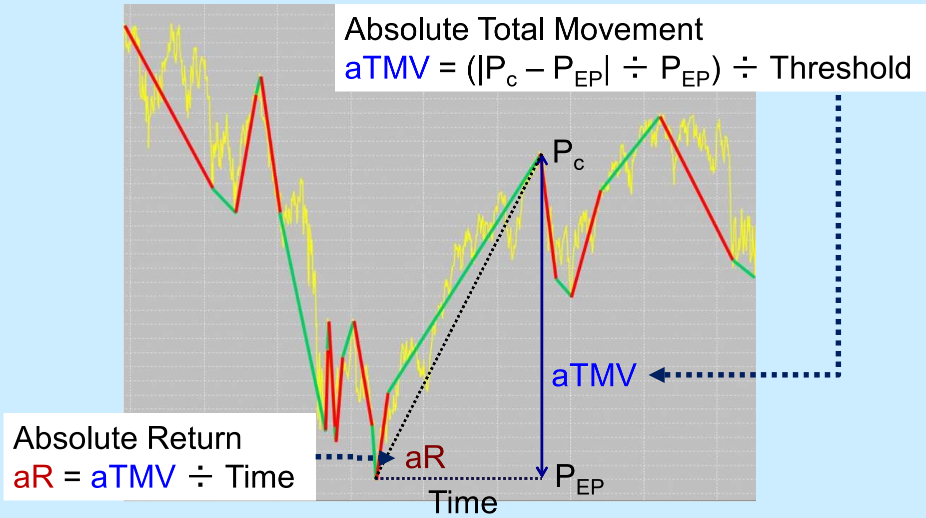
Indicators in DC



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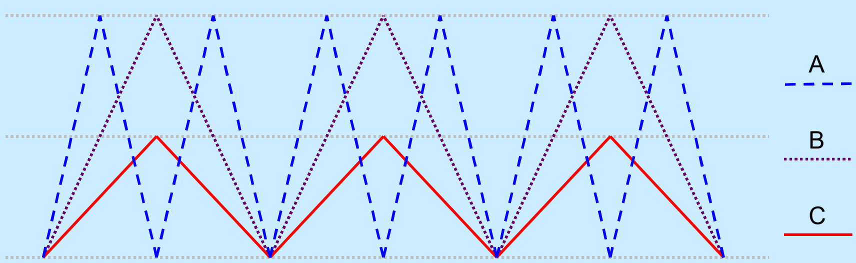
Measuring Volatility in DC

- How to measure volatility in DC?



Bigger overshoot → higher volatility
Higher frequency in trend changes → higher volatility
What else can we say about a DC summary?

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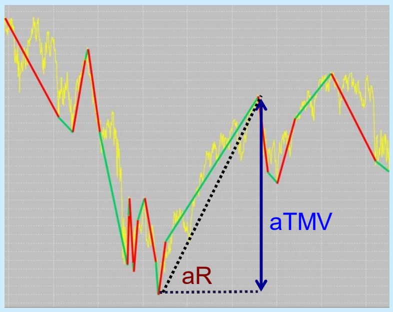
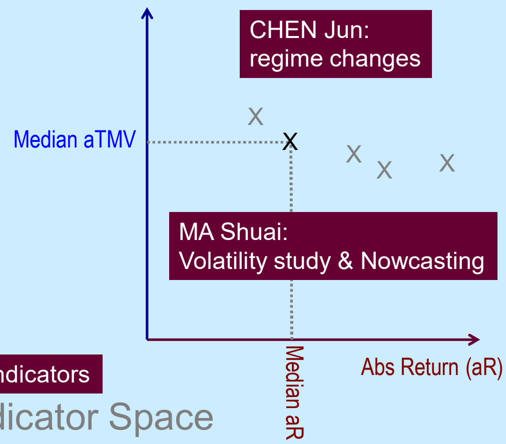
Profiles Positioning

Antoaneta Serguieva: Profiling LSE stocks

Shengnan Li: Jumps

CHEN Jun: regime changes





MA Shuai: Volatility study & Nowcasting

TAO Ran: defining indicators

Profile → position in Indicator Space

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Conclusion

- History recorded by events, not snapshots
  – So should market prices!
- Directional Change (DC) defined
- DC enables discovery of regularities not captured by time series
  – NOT a case of dropping time series!
- Two eyes are better than one

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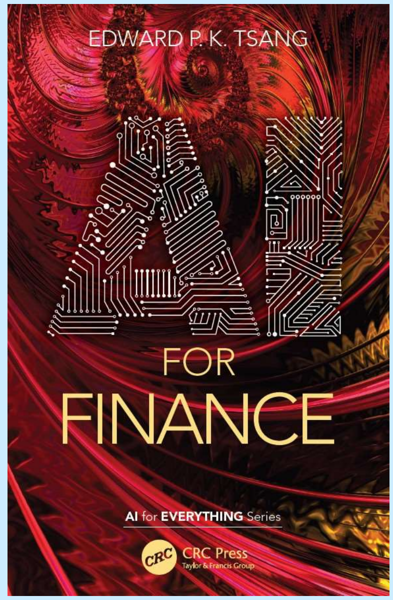
AI For Finance

Edward Tsang



https://www.bracil.net/finance/AIF-book2023/

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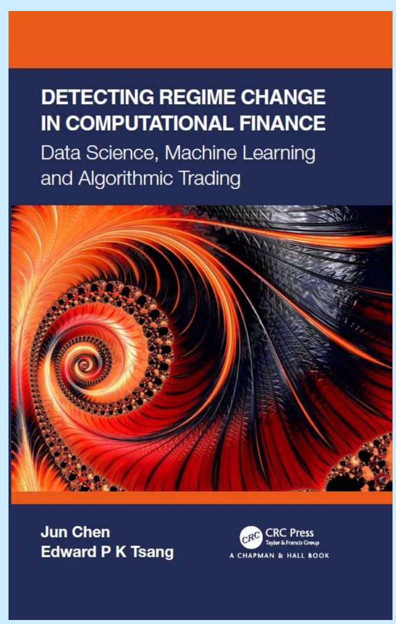
Jun (James) Chen
Edward Tsang



https://www.bracil.net/finance/RegimeChange-book2020

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