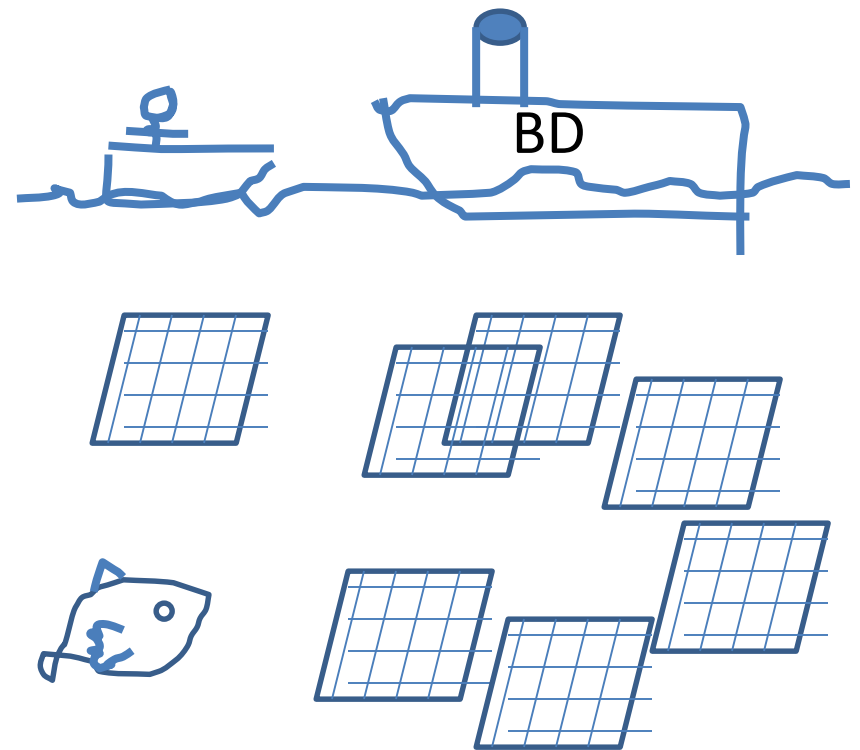# Robots need not apply – Why complex business problems require creativity
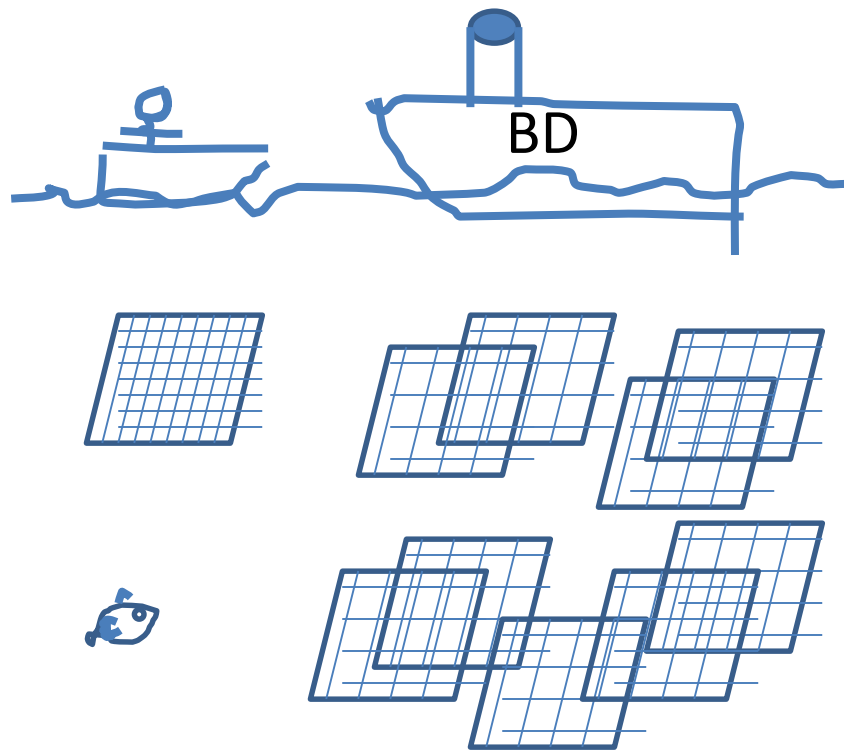
NextSpace

13 Apr 2017

Parable of fisherman trying to catch foresight in a predictive net

- SS Big Data can help fisherman (entrepreneur) catch big fish (simple problems) by placing multiple nets
- Many-net strategy works for big fish

BD

Harder to help if problems complex, fish small, and nets must be fine

- SS Big Data nets would need right placement AND overlap to catch tiny fish (complex problems)
- Many-net strategy no substitute for fine nets

No big-data solution for complexity

- Premise 1 (Ashby, Jaynes): Causes and predictive factors need info content as high as what they cause or predict

- Premise 2 (Fisher, Pareto, Akaike, Pearl): Data mining cannot replace hypothesis-driven learning about complex results since even large numbers of relevant low-info factors unlikely to have high-enough info content when combined

Causal and predictive factors must have high impact

C has impact on E to extent that changes in E accompany changes in C
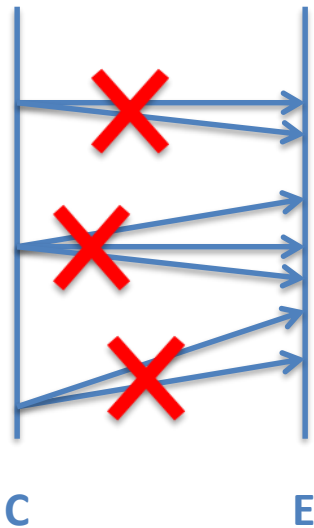
C   E
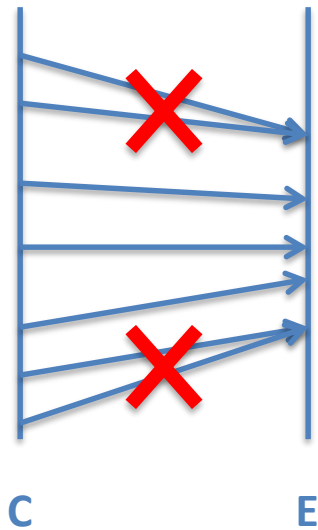
- Baseball ERAs lack it
- Clean water has high impact on health outcomes
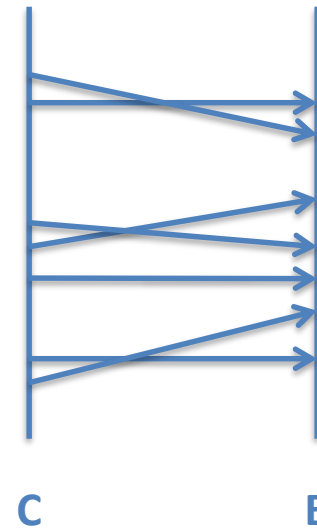- But small business lending has little impact on economic growth

But they must also have high info content

Here predictive factor C <u>lacks info content</u> needed to explain outcome E

Law of Requisite Variety says C needs info content <u>at least as high</u> as E to explain it
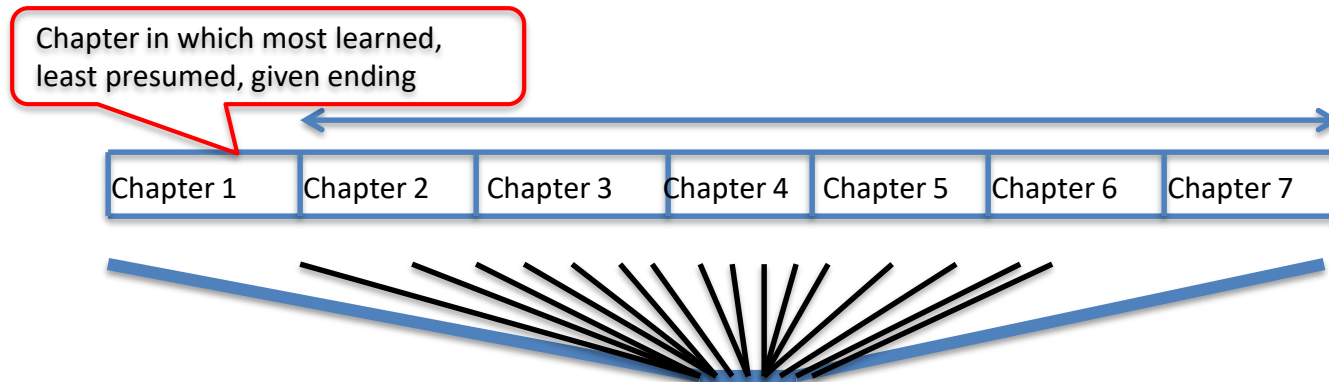

C   E

- Baseball batting AVGs lack it
- Recipes have greater info content than lists of ingredients

C   E

Info content, root causes and creativity

- Predictive factors with high info content resemble root causes…

- …and early chapters of novels

Chapter in which most learned, least presumed, given ending

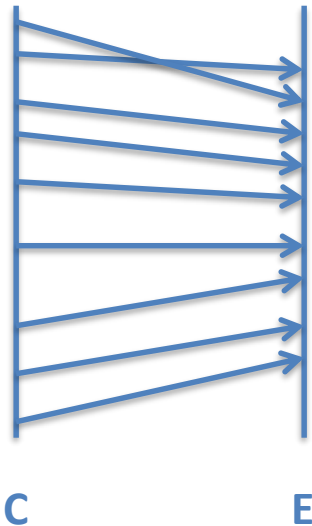| Chapter 1 | Chapter 2 | Chapter 3 | Chapter 4 | Chapter 5 | Chapter 6 | Chapter 7 |

Root cause analysis is where creative strategists shine
- Provoking creativity…
- …and then testing it

Impact and info content confer predictive power together

High causal power (info content) and relevance (impact) mean high predictive power

Big data dilemma:

- Moneyball found stats with more impact than ERAs…
- …and more info content than batting AVGs

- Since data mining metrics widely shared and heavily aggregated, they have <u>low</u> info content
- But real organizations must manage complex outcomes with increasingly <u>high</u> info content

It's not that big data lacks data

- Big data strategy: to explain high-info outcomes with many low-info factors…

- …but what about degrees of freedom?

- Big data solution: increase frequency of measurement

Degrees of freedom problem

- A three-legged stool cannot test the evenness of a floor in three dimensions
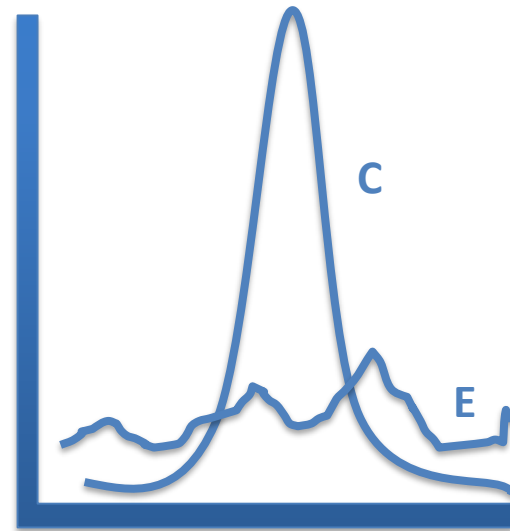
What big data lacks is information (1)

- Deeper problem: factors must be independent to add info content in aggregate
- But if independent, law of large numbers ensures predictions of most formulas combining them will be simple…
- …and cluster around an average…
- …like C

Info content of aggregate C of many independent low-info factors unlikely to match info content of complex outcome E

C

E

- Which may be why Pareto said only a vital few factors explain any outcome

What big data lacks is information (2)

- Limit on clinics close to hospital but far from one another…
- …a close analog to…
- …limit on independent factors all relevant to an outcome

Hospital (outcome)
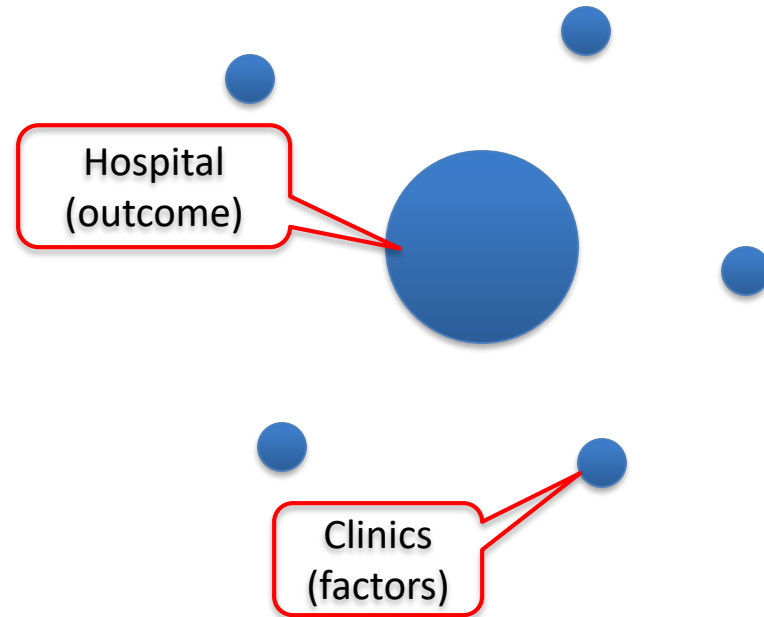
Clinics (factors)

Proximity to hospital ⇔ Relevance to outcome

Clinic spacing ⇔ Factor independence

Cannot have arbitrary amounts of both

Complexity requires creativity…

…and creativity requires experimentation…

- If your problem's complex you'll need a <u>few</u> high-info predictors…
- …in the form of <u>bold guesses</u> and deep hypotheses…
- …about <u>root causes</u>…
- …and you'll probably be wrong at first so you'll need to <u>experiment</u>

I. Set goals

III. Find new factors

II. Measure gaps
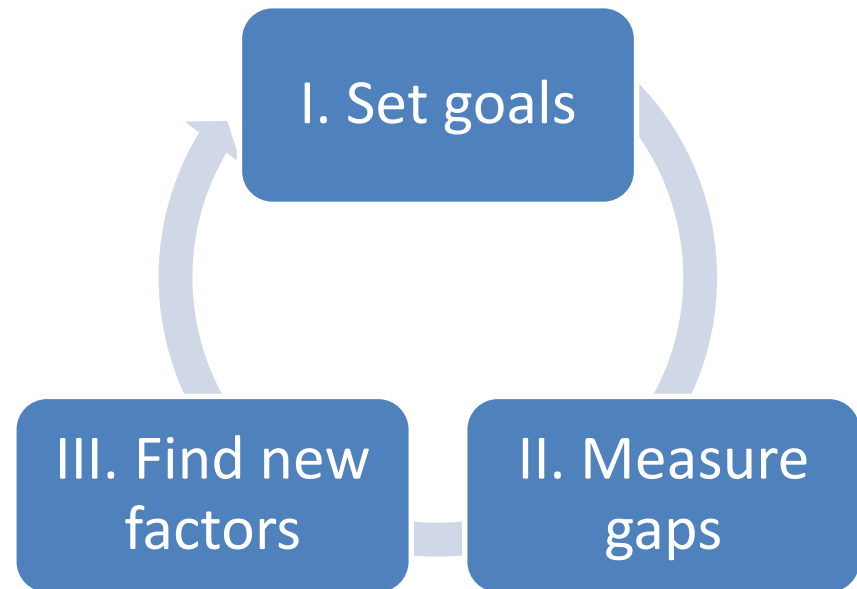
Which is what creative entrepreneurs and advisors do best

Will big data crowd out strategists?

- Machines already tell Walmart to place ammo near the diapers
  - ➤ Will they soon predict strategic outcomes?
  - ➤ Are we doomed?
- Complexity constrains problems computing power can solve by itself
  - ➤ Understanding why is power – especially in this market
  - ➤ It can also unleash our creativity