Times of Yore: Tedious and Hand-made

drilling a hole in rock:

2000 BC (San Xing Dui)

humans performing highly regular, repetitive tasks indicated spirit and discipline, union with divine
1930s: hand-computing log-tables

Mathematical Tables Project (WPA)

http://www.jplnooart.com/article/pd/S1209270001133F
Art
humans performing highly irregular, non-machine-reproducible tasks

Computation (esp. Probability)
- birthday problem
  - 23 people ~ 50%
  - 50 people ~ 97%
  - 44 presidents ~ 95% (73% three same)

Machine-Driven
leverage regular arrays of electrons

Times of Yore:
1930s: hand-computing log-tables

http://www.compileonline.com/execute_python_online.php

http://www.optimus.com/
Optispotter: improve High-Frequency Trading Research Turnaround time 5x-10x, reducing costs 90%

http://www.optispotter.com/
Computation

(esp. Probability)

birthday problem
23 people ~ 50%
50 people ~ 97%
44 presidents ~ 93% (73% three same)
No Algorithm

No Digital Data

Deep Knowledge

"Human in the Loop"

we are reaching a plateau with what can be achieved with highly regular arrays of electrons ... humans intervene!

while (OptimizationNeeded(params, data))
{
    UserAdjustments(params, data);
}
Deep Knowledge
No Digital Data

"emotional intelligence"

phone calls

Meetings
How to make $1 become $2?
Big, one-off decisions
• should we merge?
• should we cancel the deal?
• should we advertise this feature?

No Algorithm
Ing Prize: $1.6 million (1985 - 2000)

Go 碁

Go 五

圍棋 weiqi

바둑 baduk

$5 billion
media
advertising
education

http://papersjugyuu.com/ww-computer-go-program-han-takemitsu-masaki-4-stones/
Basic Rule #2: Territory

Each surrounded interstice = 1 point

Basic Rule #1: Surround Other Player's Stones

Each captured stone = 1 point

http://en.wikipedia.org/wiki/Go_(game)
Basic Rule #4:
No self-capture

White cannot play at A

Basic Rule #3:
No periodic behavior ("ko")

Must play elsewhere before recapturing
Complex Dynamics: Ko-fight

Local uncertainty, outcome determined by global configuration (IR/UV coupling)

Complex Dynamics: “Seki”

Dynamically-attained stable configuration
Complex Dynamics:
Middle-game

Here, computers tend to be much weaker than humans
Ing Prize: $1.6 million (1985 - 2000)

http://gogameguru.com/zen-computer-go-program-beats-takemiya-masaki-4-stones/

$5 billion

- media
- advertising
- education

Ing Cup ~ $400,000
Samsung Cup ~ $735,000
Toyota Cup ~ $300,000
cross-platform
  • runs in web browser
  • IE, Chrome, Firefox, Safari ...

powerful
  • fast and simple
  • big visual bang
  • extensive open source libraries

JavaScript
  aka Mocha
  aka LiveScript
  aka JScript
  aka ECMAScript ...

accessible
  • no separate compiler
  • directly edit in Notepad
  • don't need special training to hack
Google "D3.js"
Interactive Data-Slicing


http://nickqizhu.github.com/dc.js/
Force-based Layouts

No (Easy) Algorithm for defining potential collaborators, let people decide based on a reduced set of possibilities.

Marker Clustering

2D

3D

Grouping

http://www.quantumrepoire.com/results.html

how to optimize a global logistics network? people start thinking geographically, which relies on deep knowledge of local and global issues.
What is the next phase?
Regular arrays of human-computers?

Big Data = Little Privacy?
Secure Multi-party Computation (mod 11)
Secure Multi-Party Computation

Existing Applications

- Secure Auctions
- Secure Dating (secure multiplication)
- Corporate bench-marking
- “Millionaire Problem”

http://www.quantumrepoire.com/results.html

(Andrew Chi-Chih Yao: Protocols for Secure Computations (Extended Abstract) FOCS 1982: 160-164)

http://www.alexandra.dk/uk/Projects/Pages/SIMAP.aspx
We are reaching a plateau with what can be achieved with highly-regular arrays of human-computers. What intervenes, and what tool emerges?

Emerging Order/Disorder

What is the next phase?
Regular arrays of human-computers?

Big Data = Little Privacy?