The future of intelligence – will machines take over fund management?

Jonathan Wilmot
Founder, WilmotML
Former Head of Macro Investments, Asset Management
Credit Suisse
The Future of Intelligence
Will Machines Take Over Fund Management?
The Future of Intelligence

This is the first time in history that humans have had to contemplate the possibility that they will no longer be the most intelligent beings on the planet...
The Future of Intelligence

“Intelligence measures an agent’s ability to achieve goals in a wide range of environments.”

*Universal Intelligence: A Definition of Machine Intelligence*

by Shane Legg and Marcus Hutter (2007)

“Eventually, I think most jobs will be replaced, like 75-80% of people are not going to work for a living...”

Gary Marcus, Professor of Psychology, New York University.
Question I

Do you think super-intelligent machines will take over most human jobs?

1) Within 10 years

2) Within 20 years

3) Eventually

4) Never
The Future of Intelligence

“The idea of the singularity or super intelligence happening any time soon is preposterous. We should think of intelligent machines as a new set of very powerful tools, not as colleagues.”

From a recent speech by Daniel Dennet
Professor of Philosophy Tufts University

See also: From Bacteria to Bach and Back (2017)
The State of Fund Management
Why Passive is Passé: Post-Crisis vs Next Decade

US Real Bond Returns (CAGR)

- 1893-1900: 6.1%
- 1932-1939: 5.5%
- 2009-2016: 5.1%

US Real Bond Returns (CAGR)

- 1900-1910: -0.8%
- 1939-1949: -2.4%
- 2016-2026: ?

US Real Equity Returns (CAGR)

- 1893-1900: 11.9%
- 1932-1939: 19.1%
- 2009-2016: 16.1%

US Real Equity Returns (CAGR)

- 1900-1910: 5.7%
- 1939-1949: 3.2%
- 2016-2026: ?

Source: Credit Suisse GIRY, Thomson Reuters

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The Relentless Rise of Passive

Global AUM $tn

<table>
<thead>
<tr>
<th>Year</th>
<th>Active Core</th>
<th>Alternatives</th>
<th>Active Specialities</th>
<th>Solutions</th>
<th>Passive</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>59%</td>
<td>7%</td>
<td>20%</td>
<td>6%</td>
<td>8%</td>
</tr>
<tr>
<td>2008</td>
<td>49%</td>
<td>11%</td>
<td>21%</td>
<td>9%</td>
<td>10%</td>
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<tr>
<td>2014</td>
<td>39%</td>
<td>11%</td>
<td>23%</td>
<td>12%</td>
<td>15%</td>
</tr>
<tr>
<td>2015</td>
<td>39%</td>
<td>11%</td>
<td>22%</td>
<td>13%</td>
<td>15%</td>
</tr>
<tr>
<td>2020 Forecast</td>
<td>28%</td>
<td>13%</td>
<td>22%</td>
<td>18%</td>
<td>20%</td>
</tr>
</tbody>
</table>

Source: BCG, Thomson Reuters

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The Rise of Quant

Quants as % of Hedge Funds

Dec-03  Dec-06  Dec-09  Dec-12  Dec-15

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Source: Novus, Datastream
Everyone Is Doing It: AI Expertise vs AUM

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Source: Thomson Reuters
Question II

Do you think machines will take over fund management?

1) Within 10 years

2) Within 20 years

3) Eventually

4) Never
Where Do We Go From Here?
Problems and Potential
Is this a Leopard?
Two Big Problems

The Biggest Problem: Transparency – and therefore trust

The Second Problem: Is it just an arms race?
Machine Learning: A Small Family of Techniques

- Neural Networks
- Graphical Models
  - Bayesian Networks
  - Markov Models
- Ensemble Methods
- Statistical Models
  - Support Vector Machines
- Decision Trees

Deep Learning
Diversifying Across Models Improves Reliability

**Ensemble of models:** all models contribute, but some are weighted higher (red) for a given prediction. Can also use meta-ensembles.
Using a fundamental framework can increase explainability

Example: Deep Learning technique

Using fundamental framework/training can make process more transparent, while maintaining accuracy

Machine learning technique (original)

Machine learning technique (modified)

See “Explainable Artificial Intelligence”, DARPA

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Decision Process for Active Selection

Which assets are most likely to outperform in next period, given knowledge of current and all past regimes?

Overweight
Question III

Where do you see the greatest potential for machine intelligence in fund management?

1) Screening and filtering information for discretionary managers?

2) Security Selection?

3) Asset Selection?

4) Providing market timing indicators for discretionary managers?
Systematic strategy, no machine learning

Increasing Performance

Strategy using machine learning techniques

Strategy using combination of techniques, including Deep Learning

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The Super (Fund) Manager

“Armed with machine learning, a manager becomes a super-manager, a scientist a super-scientist, an engineer a super-engineer.”

Pedro Domingos

_The Master Algorithm_
“The most valuable companies in the future won’t ask what problems can be solved with computers alone. Instead, they’ll ask: how can computers help humans solve hard problems”

Peter Thiel
Zero To One