AI, Analytics & Actuaries

AI transforming professional work

Changing nature and understanding of risk

Transforming finance & mitigation of risk (insurance)

Actuaries: Opportunity for innovation
AI/Machine learning: a quick primer
What is Artificial Intelligence (AI)?

• Ability of a machine to perform cognitive functions we associate with human minds
  • Perceiving, reasoning, learning, and problem solving
  • Examples: robotics, computer vision, natural language processing, virtual agents

• AI is best thought of as augmented intelligence.

• **Machine learning** is the process by which the machine gains intelligence
What is machine learning?

• Uses algorithms to find relationships in data to make predictions
• Not like traditional logic-based programming
• More akin to human learning: predict, “learn,” repeat
• Made possible by three developments:
  • Increased amount of digital data (Big Data)
  • Increased computing power (including storage)
  • Better algorithms (e.g. Predictive Analytics)
New technologies drive machine intelligence

Computer vision  Natural language  Cognitive agents  Robotics and autonomous vehicles

“Artificial Intelligence (AI) is intelligence exhibited by machines, with cognitive functions that are associated to humans. Cognitive functions include all aspects of perceiving, reasoning, learning, and problem-solving”
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Actuaries: Opportunity for innovation
AI, Machine learning, automation will change role of professionals

• Automate many functions
• Create superior predictions
• Change what actuaries do, from prediction to judgment and creativity
Greater computer “intelligence” shifting human tasks to those that require more technological, social and emotional skills

United States and Western Europe

All sectors

<table>
<thead>
<tr>
<th>Large portion time spent today in physical and basic cognitive skills...</th>
<th>Total hours billion</th>
<th>... in the future, time spent on these skills will decrease while skills such as tech, social and emotional will grow</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours in 2016</td>
<td>% of time</td>
</tr>
<tr>
<td>Physical and manual skills</td>
<td>31</td>
<td>-14</td>
</tr>
<tr>
<td>Basic cognitive skills</td>
<td>18</td>
<td>-15</td>
</tr>
<tr>
<td>Higher cognitive skills</td>
<td>22</td>
<td>8</td>
</tr>
<tr>
<td>Social and emotional skills</td>
<td>18</td>
<td>24</td>
</tr>
<tr>
<td>Technological skills</td>
<td>11</td>
<td>55</td>
</tr>
</tbody>
</table>

SOURCE: McKinsey Global Institute analysis
## AI will change what professionals do

<table>
<thead>
<tr>
<th>Category</th>
<th>Skill</th>
<th>Projected change in hours worked, 2016-2030, %, U.S., all sectors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Higher cognitive skills</strong></td>
<td>Advanced literacy and writing</td>
<td>-10</td>
</tr>
<tr>
<td></td>
<td>Quantitative and statistical skills</td>
<td>-2</td>
</tr>
<tr>
<td></td>
<td>Critical thinking and decision making</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Project management</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Complex information processing and interpretation</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Creativity</td>
<td>40</td>
</tr>
<tr>
<td><strong>Social and emotional skills</strong></td>
<td>Advanced communication and negotiation skills</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Interpersonal skills and empathy</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Leadership and managing others</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Entrepreneurship and initiative-taking</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Adaptability and continuous learning</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Teaching and training</td>
<td>14</td>
</tr>
<tr>
<td><strong>Technological skills</strong></td>
<td>Basic digital skills</td>
<td>69</td>
</tr>
<tr>
<td></td>
<td>Advanced IT skills and programming</td>
<td>91</td>
</tr>
<tr>
<td></td>
<td>Advanced data analysis and mathematical skills</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Technology design, engineering, and maintenance</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>Scientific research and development</td>
<td>28</td>
</tr>
</tbody>
</table>
Adaptability and lifelong learning will be critical

**Examples of next generations skills**
- Lifelong learning aspiration/growth mindset
- Self-direction
- Comfort with change, uncertainty
- Creativity
- Critical thinking and problem solving
- Social intelligence
- Communication and influence
- Software development
- Design
- Product management
- Big data analytics
- Agile methodologies
- Lean management practices

**Changes in demand driven by AI**
- Increasingly critical
- Demand will increase as machines do knowledge-work
- Specific skills will change several times within a career

**Meta-skills**
- AQ

**Socioemotional skills**
- EQ

**Technical skills and knowledge**
- IQ
Nature of risk and our understanding of risk is changing, partly driven by AI

Transforming finance & mitigation of risk (insurance)

Actuaries: Opportunity for innovation
Global risk landscape is evolving quickly... which may change how risks are quantified. Some risks will be more difficult to insure, while other new insurable risks will emerge.
From a (reassuring) siloed typology of Global Risks...

Source: World Economic Forum
...to growing interdependencies transforming the risk landscape.
Increasing catastrophic risk borne by US Taxpayers

Major U.S. Hurricanes
Percentage of Total Loss Paid by the U.S. Government

- Diane (1955)
- Hugo (1989)
- Andrew (1992)
- Katrina (2005)
- Sandy* (2012)
- HIM** (2017)

Sandy was classified as a Superstorm when it hit the US coast

** HIM: Hugo, Ivan and Maria
Property: Changing nature of risk

• Not just about insurance, but about risk mitigation and avoidance

• **Property risk:** coastal flooding risk increases due to rising sea levels

• Mitigation strategies:
  • Hard engineering (sea walls, storm surge barriers)
  • Nature-based defenses (marshes, mangroves)
  • Getting out of the way (moving people/infrastructure)

• **Property insurer risk:** Spreading wildfire risk in California
Morbidity: Changing nature of risk

• **Mortality & morbidity risk:** loss of biodiversity affects health and socio-economic development

• Lack of access to sufficient variety & quality of food → micronutrient malnutrition (2 billion people)

• Half the world’s plant-based calories provided by three crops: maize, rice and wheat (famine/ malnutrition risk)

• **Health insurer risk:** Gene therapies that can cure chronic diseases but carry million dollar price tag
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AI will change our understanding of risk: potential consequences

<table>
<thead>
<tr>
<th>Frequent risks</th>
<th>Severe risks</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Unmeasurable</td>
</tr>
<tr>
<td></td>
<td>Metastasizing</td>
</tr>
<tr>
<td></td>
<td>Social &amp; economic burden</td>
</tr>
</tbody>
</table>

- Measurable
- Tech-based
- Too much data: “Risks of one”; threatens notion of risk pooling

- Aggregating and synthesizing “very big” data
- Measure, instead of predict
- Working with ecosystem partners

Life/Health: Mortality, Morbidity
P&C: Auto, Property

Life/Health: Longevity
P&C: Catastrophes, Cyber

- Modeling uncertainty
- Building integrated service solutions beyond risk transfer
- Working with ecosystem partners

Therefore, new risk skills needed
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Opportunity for innovation

• AI/automation will transform how insurance is sold & administered
  • Underwriting/measuring risk
  • On-line sales environment
  • “Automated” claims processing

• AI (understanding of risk) and changing nature of risk will change what insurance needs to accomplish: understand, prevent & finance

• What will insurance look like 50 years from today?
Skills to meet the challenge

• **Understand data science** to harness its insights
  • Big data (data structures), data visualization
  • Analytics: models being used and how to work with them

• **Build the EQ/AQ skills**
  • Cross-functional data analytic teams
  • Communicate with data scientists
  • Communicate with regulators

• **Build creativity**: design the solutions to meet tomorrow’s evolving changing risks, using insights of AI

**Foundational skills:** math, finance, business, actuarial math, risk
Questions
Thank you!