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GeneseeAcademy.com  
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Deep Learning

## Are You Prepared for Deep Learning?

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### Outline

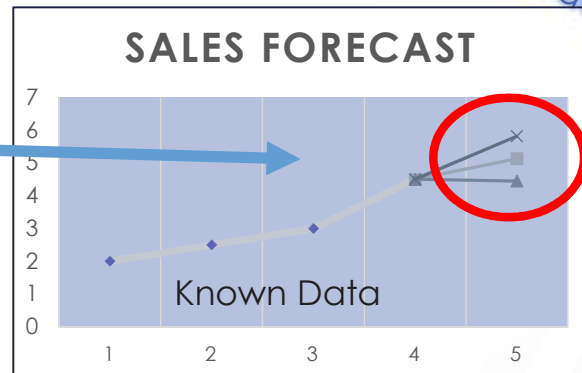
Deep Learning

- **FOCUS: Managerial Challenges of DL-enabled Systems**
  - ...as enabled by Artificial Neural Networks
  - ...as supported by IT infrastructures at scale
- **Imagine...** You are an IT manager who has been assigned responsibility for an analytic system enabled by deep learning. **How do you prepare?**
- **New Paradigms** – Thinking differently about analytics
- **New Values** – Evaluating analytic systems differently
- **Suggestions** for DL Preparation

# Generalizing Beyond Known Data

New Paradigms

- Versus... **Describing known data**
- **Consider the trend line**
- Analytics = Generalizing beyond known data



- Infer (**smartly guess**) dynamics of complex business systems
  - **Why did it happened?** ...to infer causality from correlations
  - **What will happened?** ...to infer aspects of future events
  - **What should happen?** ...to optimize plan for desirable objectives

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# Teaching by Example

New Paradigms

- Machines learn by example
  - Humans **teach** the machine!
- An analogy...  
Teaching a grade school class
- Be responsible for teaching with good examples

**Good examples → Smart Guesses**



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# Exceeding Human-Level Performance New Paradigms

**We humans have created tools smart enough to out-smart ourselves!**

...for specific tasks requiring 5-10 seconds of human thought  
...if there is lots of examples performing the task correctly

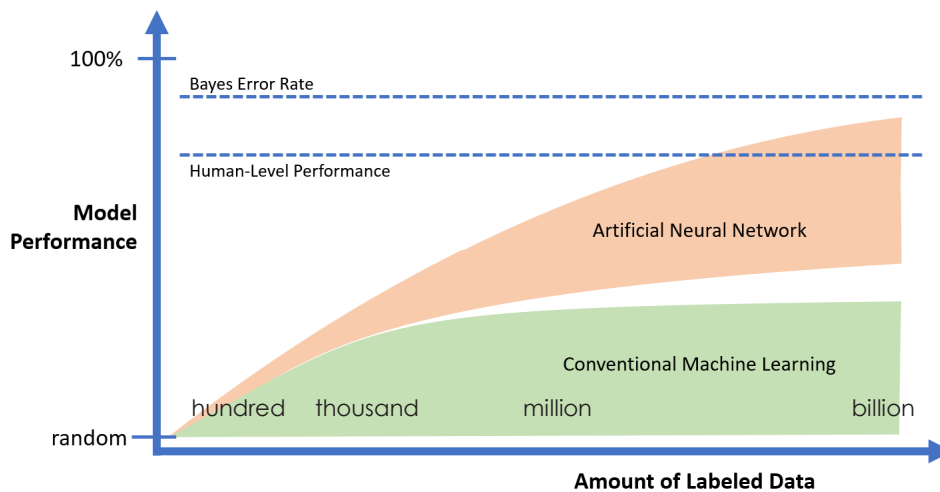


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# Data Drives Performance New Paradigms

- Whoever owns lots of data wins ...with DL!

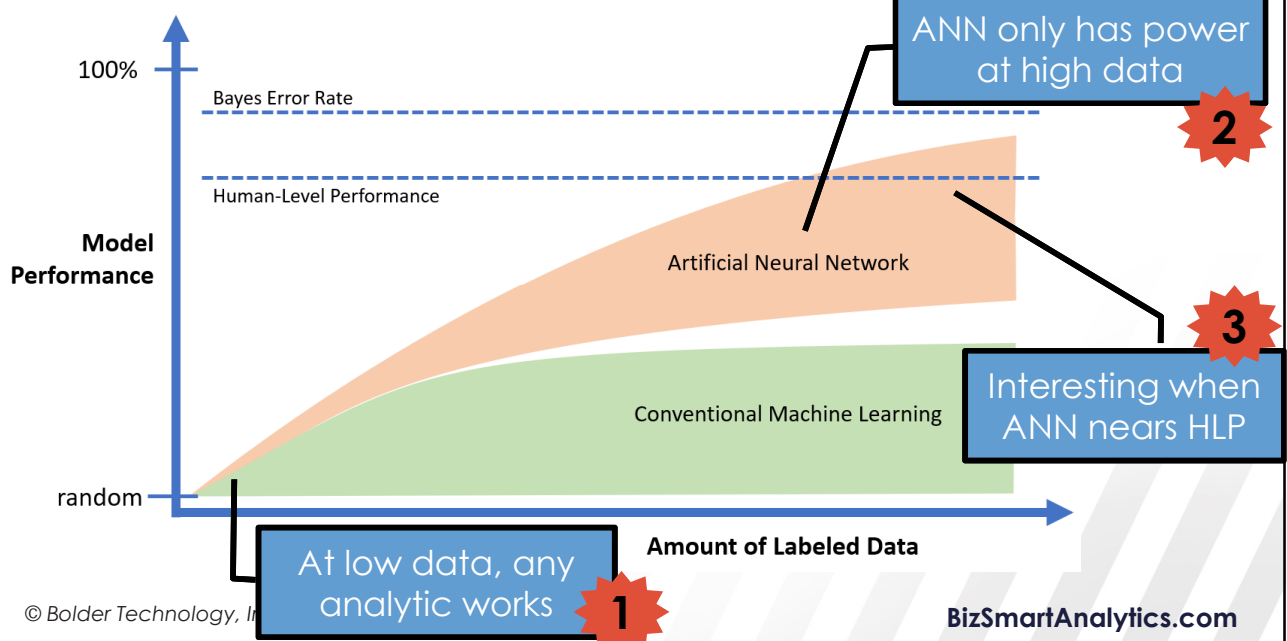


[ImageNet](#) has 14 million examples with 20 thousand categories

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## Power (and Weakness) of Deep Learning



## Human Intuition ↔ Machine Intelligence *New Paradigms*

- The Challenge is...

### Balancing/Blending Human Intuition & Machine Intelligence

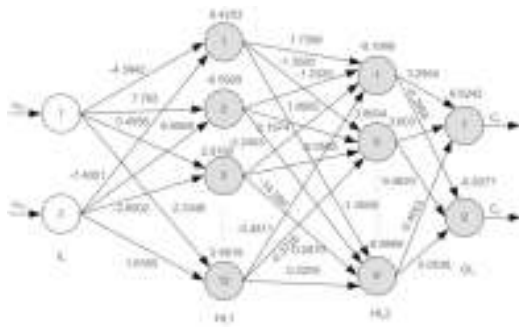
- Options...

1. Rely on human intuition & forget the machine
2. Automate with machine & eliminate the human
3. Augment the human with machine intelligence
4. Augment the machine with human intuition
5. Digital Double as a symbiosis of both

- **Take-Away:** Carefully design the Human-in-The-Loop points

# Coping with the Blackbox

- Magic happens inside those neural networks!
- Hence, BIG problem with interpretability!



- **Manage to the blackbox** by...
- Focus on outputs and then inputs



# Cultivating a Farm

- Not building a house! Not usual IT 'project'!
- **Continual effort** is required to mature DL models
- Invest slowly in DL efforts for the long-term



# Intelligent Effectiveness

New Values

**Efficiency is doing things right; Effectiveness is doing the right things**

by Peter Drucker

- **Cost Efficiency** is performing a specified task faster, cheaper and reliably
- **Intelligent Effectiveness** is customizing that task to match the needs of the specific situation
- Customizing procedures for unique situations for a “Unique Thing”

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# Million-Unique-Things (or MUT)

New Values

...where human intuition loses its mojo!

**Around a million-unique-things, human intuition to generalize beyond known data become unreliable**

- Managing a MUT requires lots of bits!
  - Volume-Velocity-Variety
  - ...which multiplies by velocity and variety of MUT data
- Information content - All about the bits!
- Examples with Features plus Labels
  - Future corporate IP...

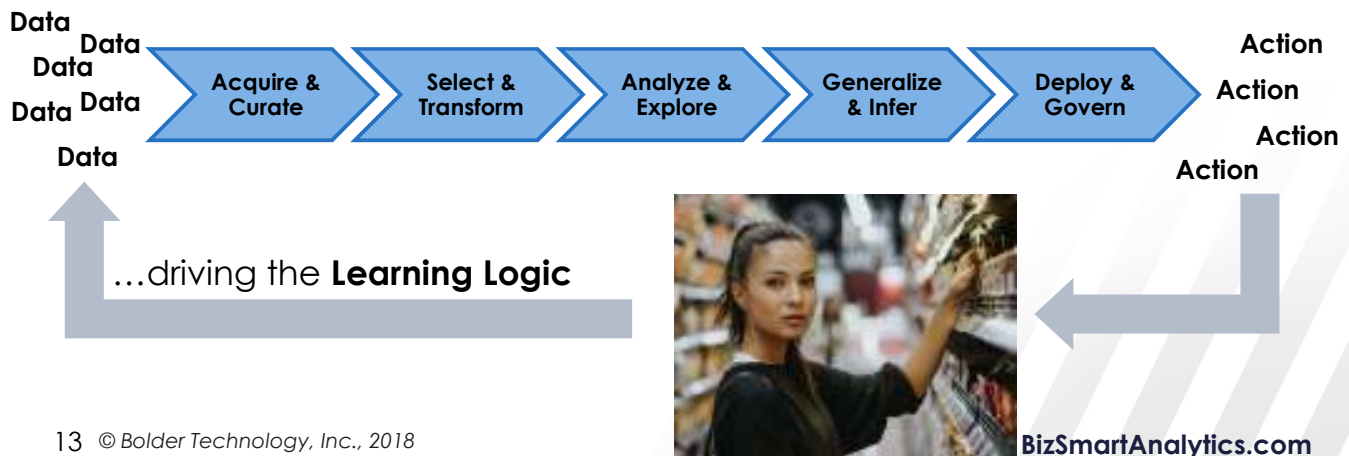
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# Analytic Value Chain

New Values

- From end-to-end, starting with data and ending with actions
  - Molding the behavior of the organization
  - ...affecting customers whose responses change the data



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# Learning as the Value Sustainer

New Values

- Shifting nature of enterprise software



- If business environment is...
  - **nonvolatile** and **simple**, then **static** logic
  - **nonvolatile** and **complex**, then **learned** logic
  - **volatile** and **complex**, then **learning** logic

Ref: [Andrej Karpathy, Software 2.0, 2017-11-11](#)

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## Suggestions for Short-Term DL Preparation

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### 1. Assess the potential business value

- Catalog opportunities for intelligent effectiveness
- Document specific use cases to operationalize
- Sketch the business financials across these use cases

### 2. Evaluate the ability to utilize DL techniques

- Got the data? Owe it? Enough of it? Is it labeled?
- Is this data well organized and governed?
- Acquire and develop internally the required skills

### 3. Conduct prototyping to discover what you don't know

- DL Innovation team: cross-functional, skill-building
- Cataloging potential uses cases

## Own the Responsibility

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- Monitoring/balancing benefits/costs for the organization and society
- **The ultimate challenge is...**

### Managing Super-Intelligence

- Exceeding Human-Level Performance for specific tasks
- Reinserting the human-into-the-loop
- Augmenting human intuition to augment machine intelligence

New Paradigms



## Questions?

- **BizSmartAnalytics.com** has a resource page
- **TowardsDataScience.com** contains articles
- **Patreon.com/BizSmartAnalytics** organizes & mentors peer groups of managers
- One-day hands-on **workshop** for tech-savvy IT managers on "Preparing for Deep Learning Systems" (local-only beta)
- **Study...** Interviews with IT managers involved with analytic systems
- If questions, email **richardh@bolder.com**

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