Artificial Intelligence: Vision of the Future Automation Innovation Conference 2017

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O1 AI & Cognitive Computing – What is the difference?

Today's discussion

02 Enterprise Applications of Artificial Intelligence

03 Evolving your Artificial Intelligence Capability

AI & Cognitive Computing What is the difference? •

AI as Sense-Think-Act



Sense

Artificial Intelligence is becoming ubiquitous intelligence with the ability to see, hear, speak, smell, feel, understand gestures, interface with your brain, and dream



Think

AI is helping us do tasks faster, better and cheaper – **Automated Intelligence;** helping us make better decisions – **Augmented Intelligence**, or even taking over what we do – **Autonomous Intelligence** CADE METZ BUSINESS 03.16.16 7.00 AM

IN TWO MOVES, ALPHAGO AND LEE SEDOL REDEFINED THE FUTURE

Libratus, the poker-playing AI, destroyed its four human rivals

Sorry, fellow humans: It wasn't even close.

Act

Artificial Intelligence is equaling or surpassing humans in a number of other tasks – playing games, driving cars, recommendations (movies, books, finance, research), etc.

More Formally...



	Statistics	Econometrics	Optimization	Complexity Theory	Computer Science	Game Theory		
FOUNDATION								

Enterprise applications of AI fall under four categories



Artificial Intelligence vs Cognitive Computing

Artificial Intelligence

- The study of agents that receive percepts from the environment and perform actions. (Russell and Norvig)
- The science and engineering of making intelligent machines, especially intelligent computer programs (John McCarthy)

Cognitive Computing

- Cognitive computing is the simulation of human thought processes in a computerized model.
- Cognitive computing involves selflearning systems that use data mining, pattern recognition and natural language processing to mimic the way the human brain works.

AI covers a wide range of capabilities that spans the foundational, cognitive, system, and sensory layers.

What is Artificial Intelligence?

Artificial Intelligence can be defined as the theory and development of systems that can continuously sense its environment, think, make decisions, and take actions that influence the environment to achieve its goals.



AI is becoming an essential component for enabling analytics maturity

	Backwar	d-looking	Forward-looking			
	Descriptive Analytics	Diagnostic Analytics	Predictive Analytics	Prescriptive Analytics	Adaptive & Autonomous Analytics	
Analytics Maturity Spectrum	Describe, summarize and analyze historical data (What happened?)	Identify causes of trends and outcomes (Why it happened?)	Predict future outcomes based on the past facts and future simulations (What could happen?)	Recommend 'right' or optimal actions or decisions (What should be done?)	Monitor, decide, and act autonomously or semi-autonomously (How do we adapt to change?)	
of AI	Descriptive and diagnostic with assisted intelligence patterns in large, complex	analytics can be enabled by using AI to uncover datasets	 Predictive and prescriptive with augmented intelliger into the implications of dec 	analytics can be enhanced nce to provide deeper insight ision making	 Adaptive analytics are driven by autonomous intelligence 	

· Al also is pivotal for tapping into unstructured data sources such as text, audio, video, and images

Benefits

- into the implications of decision making
- · Useful techniques include agent-based simulation, reinforcement learning, etc.
- intelligence
- Al learns with new information over time

Increasing Sophistication & Impact

The AI Revolution is here, and goes beyond automation; huge opportunity exists for both productivity & consumption gains.



Are you ready to exploit the opportunities from AI & overcome the challenges?

Source: Sizing the Prize, World Economic Forum, Dalian, 2017, PwC - AI Lab.

02

Enterprise Applications of Artificial Intelligence



Organizations carry out a huge number of activities and make countless decisions across the value chain that are being optimized with AI



- Customer Experience
- Innovation Rate

- Customer Satisfaction
- - Inventory Turn

Text Data

Assisted ntelligenc

Automation

Automating business processes will result in significant costs savings (3x over offshoring) and productivity increases resulting from reduction in labor needs (110-140m knowledge workers by 2025) **PwC - AI Lab Case:** Robotic Process Automation of end-to-end loan processing at a major US Bank

RPA Capabilities



Document Image Capture OCR functionality with the ability to

identify specific fields

and words



Data Entry

systems

Automated data entry and transfer across disparate



Rules-Based Triggers

Automatically initiate repeatable tasks Scrape from live web pages and documents

Data

based on key words

Outbound Logistics



Operations & Development

- Demonstrate benefits of RPA in a Proof of Concept within the Loans processes
 - (a) Loan onboarding, increases, payments, billing, maintenance
 - (b) Loan enquiries/processing;
 - (c) Reconcile cash breaks and reports;
 - (d) Document onboarding;
 - (e) Payment applications;
 - (f) Build/run reports
- Cost reduction of \$30-35M



Inbound Logistics Process Mining discovers performance bottlenecks in existing processes and process simulation can be used to resolve these bottlenecks *Models*



Text Data

Assisted itelligence

ugmented ntelligence process simulation were used to identify ideal pathways and resolution of process bottlenecks

Process mining and

Source: Using process mining to bridge the gap between BI and BPM. IEEE Computer Society, 2011.

PwC - AI Lab Case: Process mining of event log containing events of sepsis cases from a hospital to streamline patient pathways



A comprehensive NLP architecture and a NLP pipeline are critical for automating cognitive processes and generating insights



Text Data

Cognitive process automation goes beyond traditional robotic process automation by combining process learning, large-scale machine learning, and NLP to automate processes that are more complex

Automation

Source: Using process mining to bridge the gap between BI and BPM. IEEE Computer Society, 2011.

PwC - AI Lab Case: Using Machine Learning and NLP to automate pharmaceutical adverse event detection



- PwC AI Lab developed an end-to-end pipeline using natural language processing, machine learning and a big data architecture to automate the extraction of adverse events from clinician notes
- PwC AI Lab's solution improves the case ingestion and review process, which can reduce workforce needs by 3x over the next 10 years

Outbound Logistics



Operations & Development



Inbound Logistics

AI in Healthcare



Audio

Autom

Assisted Intelligence

Augmented Intelligence Deep learning and speech analytics on audio data is enabling companies to better understand customer and sales/service rep behaviours

PwC - AI Lab Case: Sales & Customer Service Management – Audio Deep Learning



- Several of the findings from this analysis, including suggested interaction frequencies, channel patterns, and improvements to sales scripts were incorporated into sales training programs
- PwC AI Lab worked with a client interested in answering the question: "what makes an effective sales call?"
- Using speech-to-text APIs from commercial providers as well as PwC AI Lab proprietary deep learning models, we extracted useful features from tens of thousands of call transcriptions and call metadata.
- This information was combined with structured transaction data to gather additional insights.

Outbound Logistics



Operations & Development



Inbound Logistics

Gamification of Strategy

Multi-agent collaborative systems, digital twins, computational social choice and cloud platforms were used to evaluate large-scale goto-market strategic scenarios for ridesharing and autonomous vehicles **PwC - AI Lab Case:** Gamifying Strategy: Rideshare/AV



Which cities to enter and how to price and compete in this market?

PwC - Al Lab | 20

Gamification of Strategy

Assisted ntelligenc

Multi-agent collaborative systems, digital twins, computational social choice and cloud platforms were used to evaluate large-scale goto-market strategic scenarios for ridesharing and autonomous vehicles

PwC - AI Lab Case: Gamifying Strategy – Rideshare/AV

Project: Simulate adoption of personal mobility solutions

Vehicle Fleets (Driverless, Electric, Sharing)







Simulating demand, charging and utilization by geography



Modeling demand for vehicle miles travelled



- To capture the complexities of customer choice, the dynamic model was built as an Agent-Based model, where consumers made choices based on their own characteristics and experience
- Over 200,000 strategic scenarios were simulated to explore the 'least regret'
 strategy to enter and dominate markets
- Insights helped senior executives select the right strategies for each market and make strategic and operational decisions
- Recently won the 2017 AI Alconics award at the AI Summit

Outbound Logistics



Operations & Development



Inbound Logistics

Building AI Capability

PwC - Al Lab | 22

03

Benefiting from AI requires separating myths from facts

Myth 1:	Fact 1: Artificial Intelligence is an interdisciplinary area with many distinct sub-fields		AI Uses
Artificial Intelligence is a distinct monolithic area of study			Searching, Querying & Conversing
			Describing, Classifying, Understanding & Visualizing
Myth 2: All types of problems can be solved by a single	Fact 2: Different types of problems require		Diagnosing, Discovering & Reasoning
your favorite solution)	solutions to be used		Trending, Forecasting, Projecting & Predicting
Myth 3: Machine Learning automatically (magically)	Fact 3: Machine Learning requires a laborious process of acquiring and cleansing large amounts of data, selecting, training, and guiding the algorithm		Simulating, Learning, Optimizing, & Adapting
intervention			Recognizing, Sensing, and Recommending

Areas of focus for Enterprise AI





- Cognitive/Intelligent process automation .
- Process mining and learning •
- Chatbots •

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Virtual assistants



Supervised machine learning

Unsupervised machine learning

Convolutional neural nets, LSTM

Getting started with Enterprise AI





People Impacts of Automation & Augmentation



Five success factors to derive maximum benefits from artificial intelligence, big data, and analytics

01

Start from business decisions

02

Demonstrate value through pilots before scaling



05

Fail forward – test and learn culture

03

Blend intuition and data-driven insights

04

Address 'big data' – don't forget 'lean' data

Thank you.

Get in touch.

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Artificial intelligence (AI) is a source of both huge excitement and apprehension. What are the real opportenties and thread for your business? Drawing on a detailed analysis of the business impure of AI, we identify the most valuable commercial opening your market and how to take adventuge of them.

Sizing the prize What's the real value of AI for your business and how can you capitalise?





strategy+business

A Strategist's Guide to Artificial Intelligence

As the conceptual side of computer science becomes practical and relevant to business, companies must decide what type of AI role they should play.

BY ANAND RAD

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