C&C Expert Labs

AI Skills 2021

Ana Echeverri

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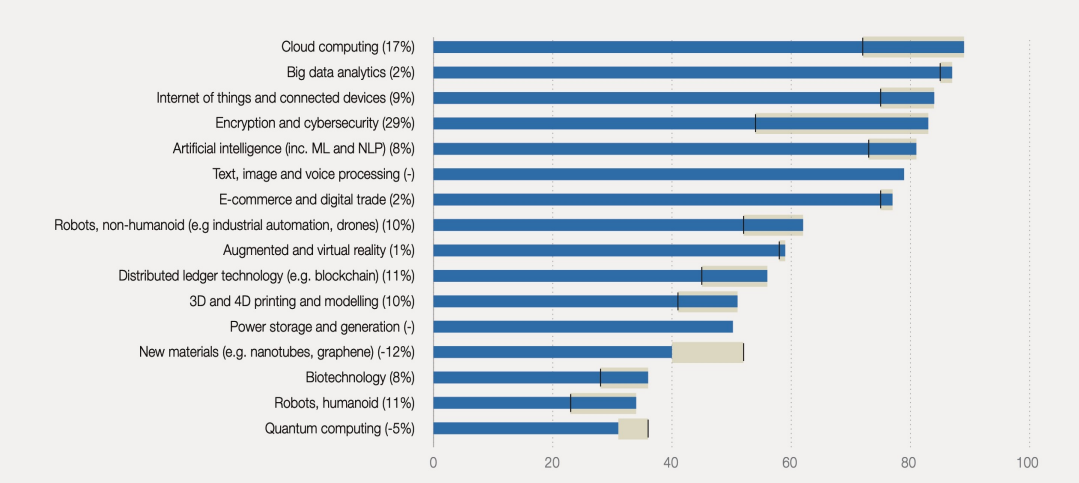
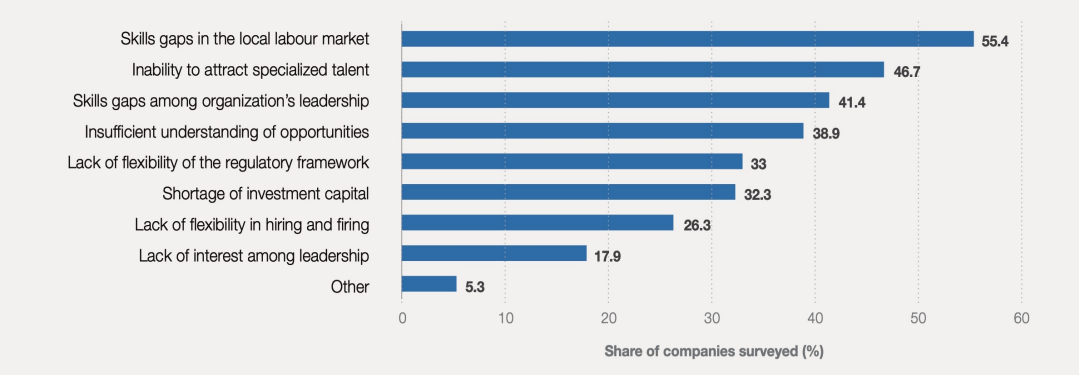
Technology Adoption is accelerating, yet skills gaps are the #1 barrier





Technologies likely to be adopted by 2025 (by share of companies surveyed)

World Economic Forum Future of Jobs 2020

Skill Gaps are the #1 barrier to technology adoption

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Data Scientists and AI Specialists... Highest skills demand

↗ Increasing demand

1	Data Analysts and Scientists
2	AI and Machine Learning Specialists
3	Big Data Specialists
4	Digital Marketing and Strategy Specialists
5	Process Automation Specialists
6	Business Development Professionals
7	Digital Transformation Specialists
8	Information Security Analysts
9	Software and Applications Developers
10	Internet of Things Specialists
11	Project Managers
12	Business Services and Administration Managers
13	Database and Network Professionals
14	Robotics Engineers
15	Strategic Advisors
16	Management and Organization Analysts
17	FinTech Engineers
18	Mechanics and Machinery Repairers
19	Organizational Development Specialists
20	Risk Management Specialists

Source

Future of Jobs Survey 2020, World Economic Forum.

Data and AI

1. Artificial Intelligence Specialist
2. Data Scientist
3. Data Engineer
4. Big Data Developer
5. Data Analyst
6. Analytics Specialist
7. Data Consultant
8. Insights Analyst
9. Business Intelligence Developer
10. Analytics Consultant

Engineering

1. Python Developer
2. Full Stack Engineer
2. Javascript Developer
4. Back End Developer
5. Frontend Engineer
5. Software Developer Dotnet
7. Development Specialist
8. Technology Analyst

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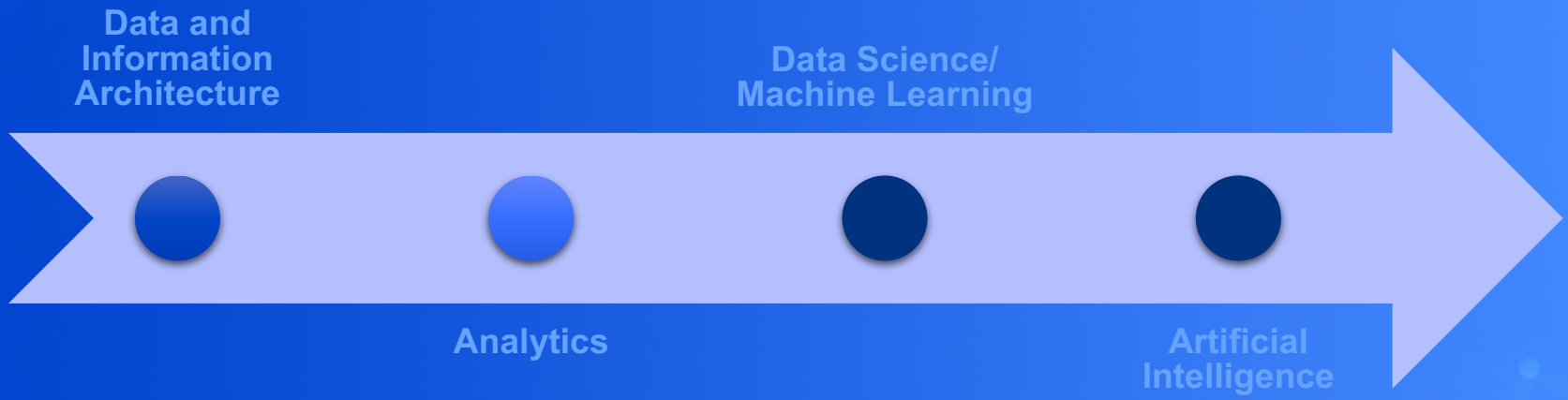
”Every company will become an AI company."

Arvind Krishna, IBM’s CEO

On the road to AI, a continuum of skills is essential



Skills development in DS, ML and AI are strategic in preparation for a world of embedded AI

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What is AI?

What does it mean to me?

Defining Intelligence in Humans

Interact with the world through our senses

Ability to learn

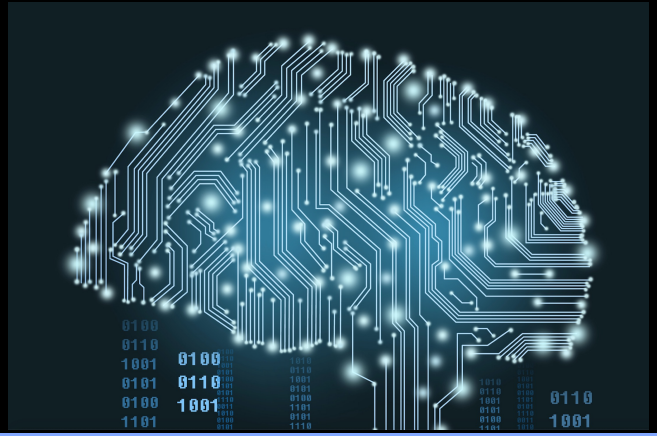
Ability to reach conclusions

Ability to make decisions

Ability to explain decisions

Defining Artificial Intelligence

which aims to simulate human intelligence using machines and data



Interact with the world through robotics, visual or speech recognition, text processing, tone/empathy analysis, etc.

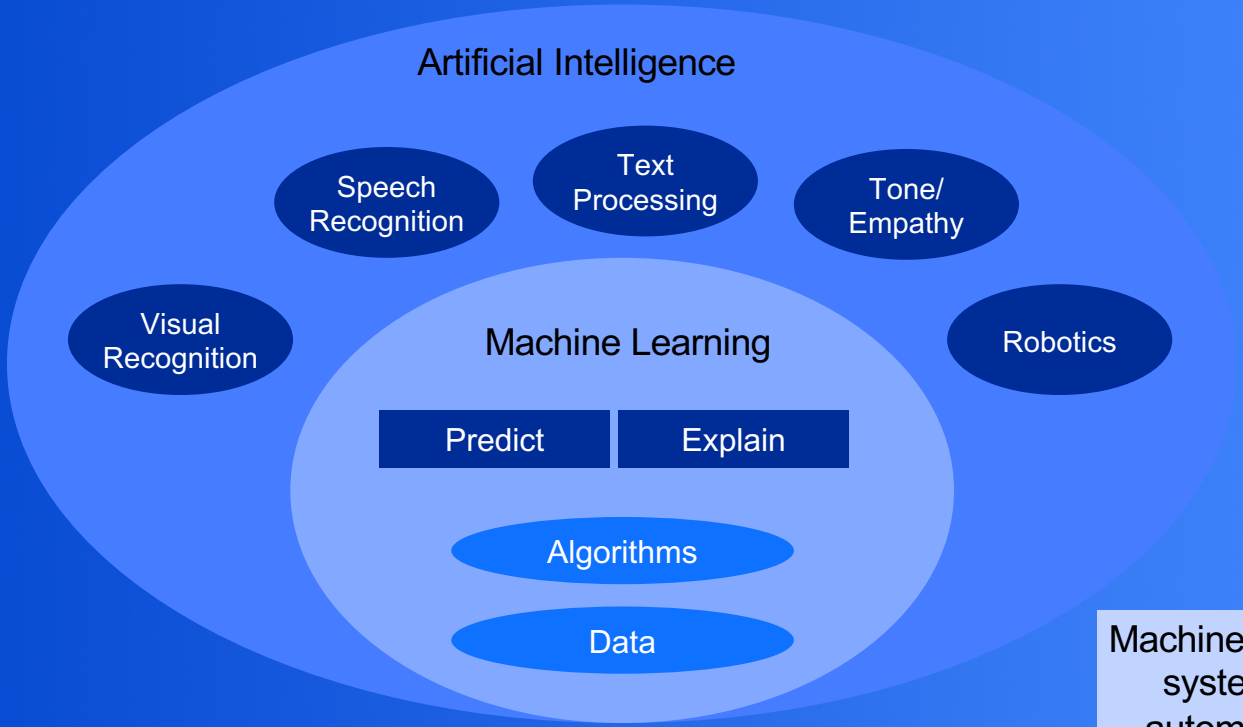
Ability to learn from data

Ability to reach conclusions

Ability to make decisions

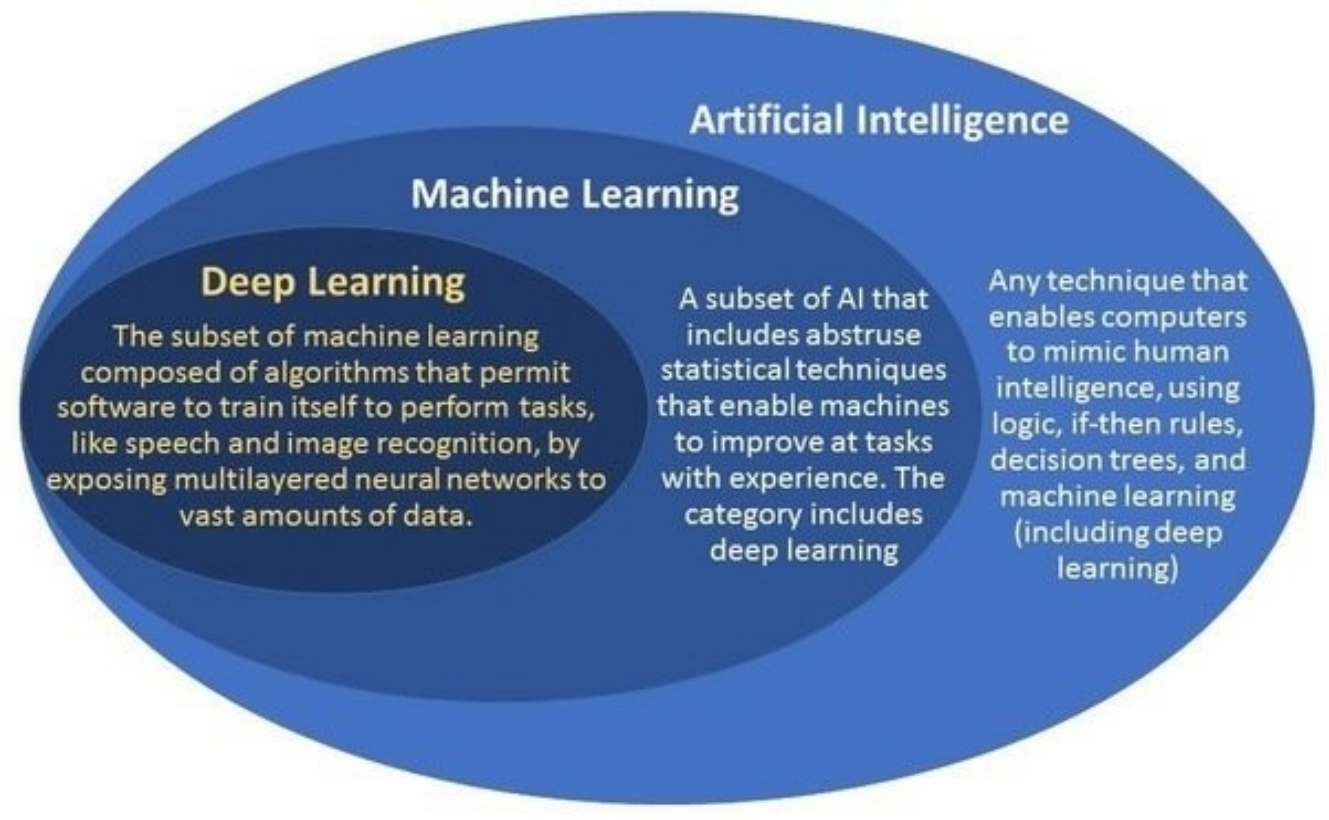
Ability to explain decisions

This is AI in a nutshell



Machine Learning provides systems the ability to automatically learn and improve from experience without being explicitly programmed

New skills are required beyond “Learning a new product”



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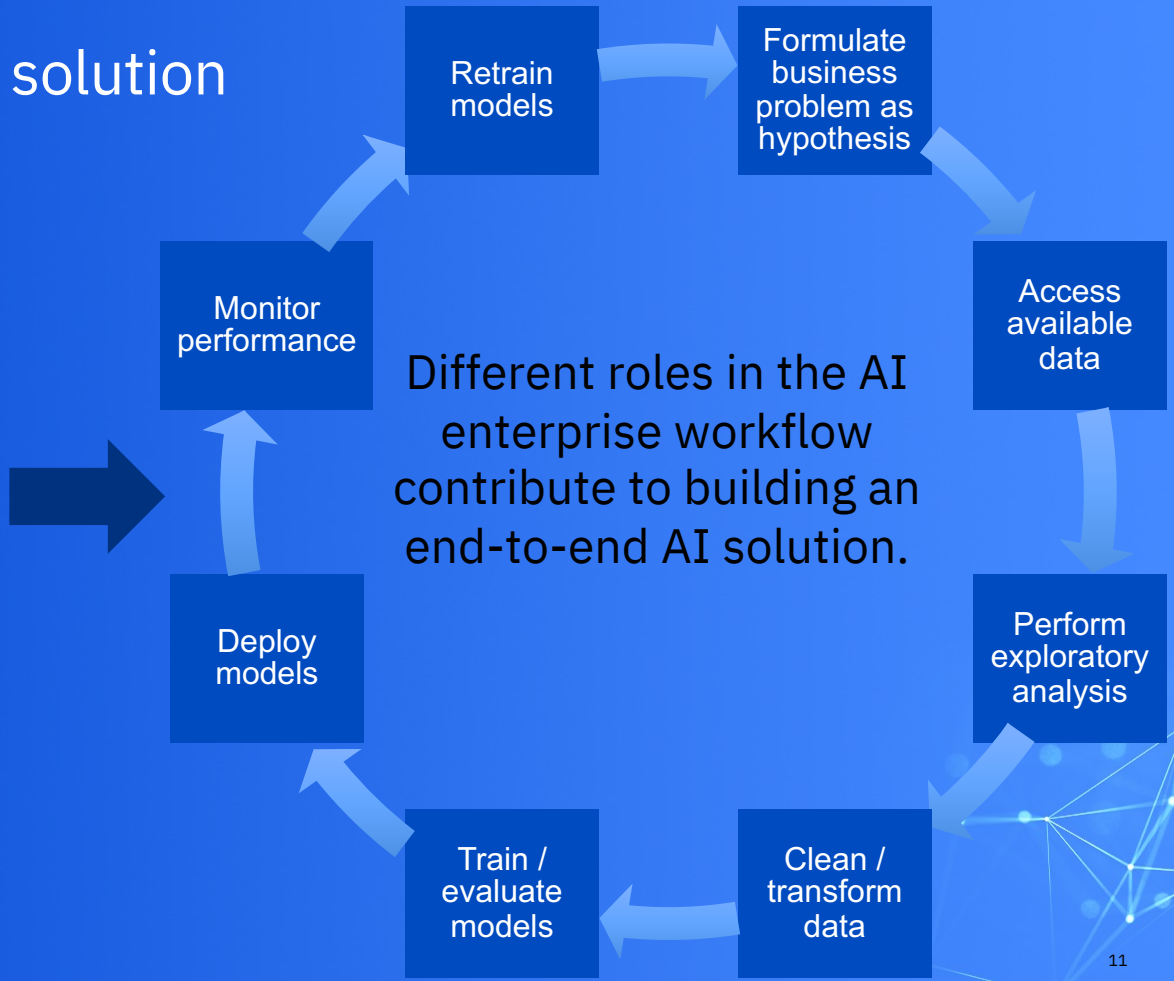
AI Implementation Cycle
Building an end-to-end AI solution



Different roles in the AI enterprise workflow contribute to building an end-to-end AI solution.

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Skills needed for AI implementation

Skill development is often necessary when shifting toward AI.

Some existing roles need to evolve for successful adoption of AI:

- Business stakeholder
- Business analyst
- Developer
- DevOps/IT

Business Stakeholder

Business Analyst

Developer

DevOps/IT

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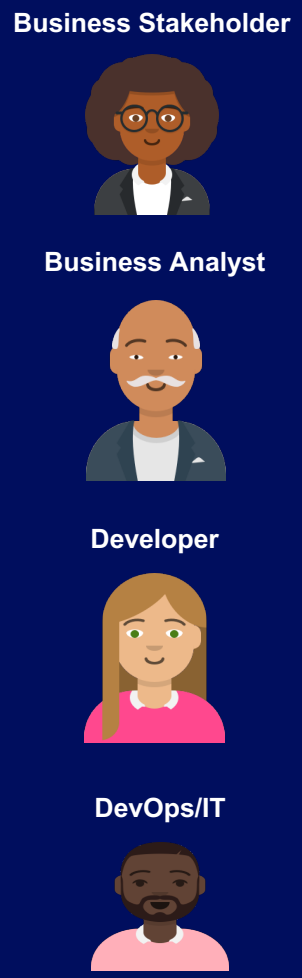
Skills needed for AI implementation

About these roles:

- **Business stakeholder**: Understand the AI process and solution business value, use data to inform business problems, be familiar with hypothesis testing, and monitor AI solutions.
- **Business analyst**: Understand the AI process and success indicators, apply knowledge of metrics and provide business metrics reporting, and apply new insights into the business strategy.
- **Developer**: Continuously develop AI skills, schedule and monitor package releases, oversee the monitoring process, and support DevOps.
- **DevOps engineer**: Develop and maintain platform solutions / pipelines for AI implementation.



Skills needed for AI implementation

Talent and workflow needs for AI are different than the typical organization.

Other roles may or may not exist in your organization.

- Data engineer
- Data scientist
- User researcher / designer
- Data steward

Data Engineer / IT

Data Scientist

User Researcher / Designer

Data Steward

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Skills needed for AI implementation

About these roles:

- **Data engineer**: Architect highly scalable data systems and ensure data is ready for machine learning (ML) applications.
- **Data scientist**: Identify MVP use cases, develop predictive models, build ML pipelines, recommend AI algorithms and methods.
- **User researcher / designer**: Design methods and collect data for business use cases.
- **Data steward:**Develops and utilizes data governance processes to support data quality, usability and evaluation.

Data Engineer / IT

Data Scientist

User Researcher / Designer

Data Steward

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Relevant AI Skills Competencies

Probability, Statistics, Linear Algebra	Computer Programming/Visual Tools	Data Science Methodologies	Data Preparation
Model Building (Supervised/Unsupervised/Deep/Reinforcement)	Model Use - prebuilt Models	Model Deployment	Big Data
Visual Recognition	Text Processing	Speech Recognition	Tone/Empathy

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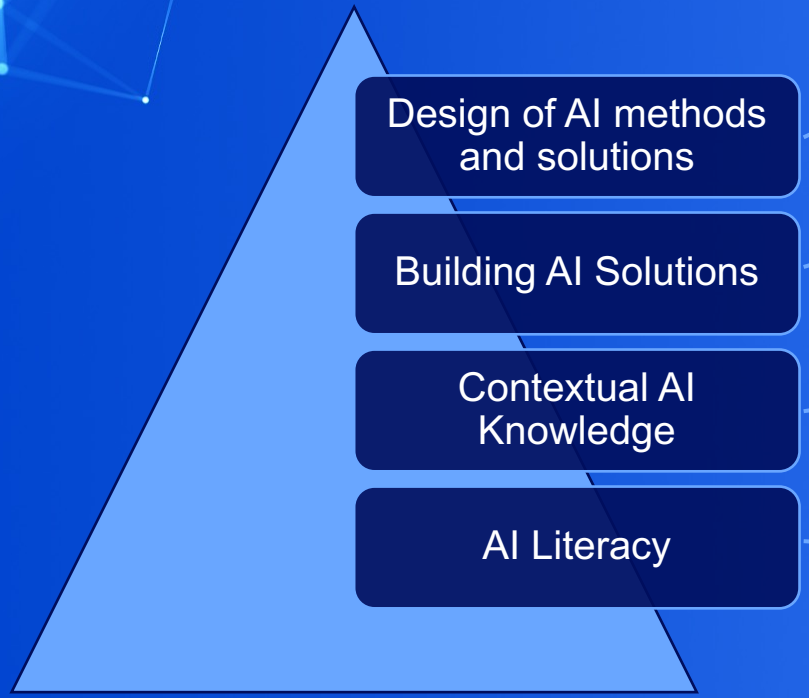
AI Skills Progression



- Design and develop novel AI solutions, platforms and new technologies

- Develop DS/AI Solutions
- Identify and fit DS/AI solutions to relevant problems
- Manage end to end AI production process

- Leverage expertise in other domains to use AI solutions
- Develop domain strategies using AI technologies
- Manage inputs and use outputs of AI models

- Conceptual understanding of facts
- Able to interact with tools that enable AI or are driven by AI
- Communicate about AI at a base level

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AI Literacy
Knowledge for everyone – Technical and Non-Technical Roles

What is Data Science	What is Artificial Intelligence	What business goals can I impact through AI?
Which technology capabilities can I use?	What data do I need?	How do I think about AI in my business?

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AI Literacy
Learning Path Recommendations:
Coursera.org/ibm

AI Foundations for Businesses (20 hours)	Introduction to Data Science (4 months)	AI Foundations for Everyone (3 months)
• Introduction to AI • What is Data Science? • Elements necessary to build AI Solutions in an organization	• Working with data • Tools • Methodologies • Databases and SQL	• ML, Deep Learning, AI definitions • AI Applications, Use Cases • Ethical Concerns with AI • Build a simple chatbot
Introductory	Foundational	Foundational

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Contextual AI Knowledge
Leveraging pre-built frameworks– Technical Roles

Working with complex data types	Human - AI Interaction	Visual Recognition: working with images, videos	Natural Language Processing
Tone and Empathy	Working with complex documents	Using deep learning frameworks (i.e.: Keras, Pytorch, Tensorflow)	Scaling ML models with Spark

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Contextual AI Knowledge Learning Path Recommendations: Coursera.org/ibm

Applied AI (7 months)

- AI Applications/Use Cases
- IBM Watson Services and APIs
- Limited coding skills are used to build AI applications through the integration of Watson Services

AI Engineering (8 Months)

- Utilize libraries such as Keras, Pytorch, Tensorflow applied to industry
- Object Recognition and computer vision
- Image and video processing
- Text analytics, Natural Language Processing
- Recommender systems

Beginner

Intermediate

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Building AI Solutions
Building Models from scratch

Probability, Statistics, Linear Algebra	Computer Programming (Python, R, Scala)	Business Domain Knowledge	Data Science Methodologies
Data Preparation	Data Visualization	Model Building (Supervised/Unsupervised/Deep/Reinforcement)	Model Validation and Selection

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Building AI Solutions Learning Path Recommendations: Coursera.org/ibm

Data Science Certificate (10 Months)	Advanced Data Science (4 Months)	ML for the Enterprise (3 months)	AI Enterprise Workflow (4 months)
• Tools • Methodologies • Python for DS • Databases • Data Analysis • Data Visualization • Machine Learning	• Scalable Deployments • Signal Processing • Deep Learning Frameworks: Keras, Tensorflow, Pytorch	• Exploratory Data Analysis • Supervised Models • Unsupervised Models • Deep Learning • Reinforcement Learning • Survival Analysis • Time Series	• Simulation of a real-world scenario • Connecting Business priorities to technical implementations • Connecting OSS (Python) to IBM Technologies • Connecting ML to specialized AI models - Visual Recognition and NLP • Model Deployment AI in Production
Beginner	Advanced	Advanced	Advanced

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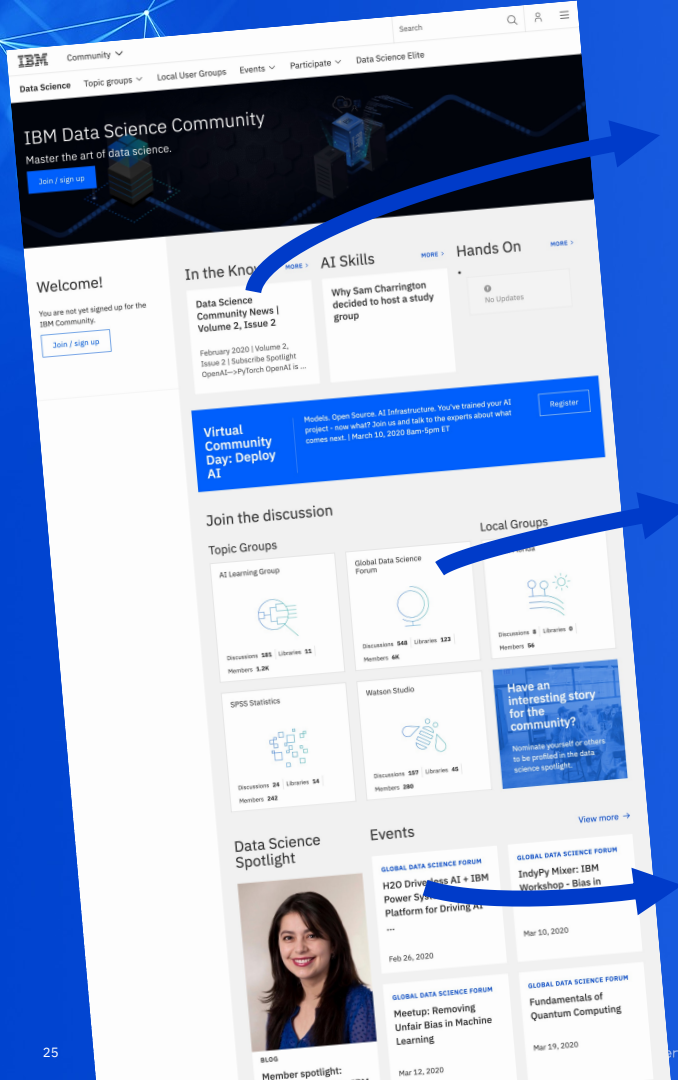
Take any opportunity to learn!

Universities	Digital Courses	Bootcamps	Books
Study Groups	Conferences	IBM's Digital Subscriptions	IBM's Instructor-led workshops



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