



Machine Learning for Business

Module 1: Basic concepts of machine learning

Day 1, 9.00 – 12.00

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Course Objectives

- Understand basic machine learning concepts
- Use R to prepare data for machine learning models
- Identify variables associating with the targets
- Use the following machine learning methods to perform predictive/prescriptive analytics
 - Regression and survival analysis
 - Decision tree and random forest
 - Association analysis and recommender engine
- Tune and evaluate the model





Schedule

 Day 1 18 Jan 18	 Day 2 22 Jan 18	 Day 3 29 Jan 18	 Day 4 8 Feb 18
 Day 5 15 Feb 18	 Day 6 22 Feb 18	 Day 7 26 Feb 18	 Day 8 8 Mar 18
<ul style="list-style-type: none">• Basic concepts of ML• R tutorial	<ul style="list-style-type: none">• Data exploration• Data preparation	<ul style="list-style-type: none">• Linear regression• Logistic regression	<ul style="list-style-type: none">• Poisson regression• Survival analysis
<ul style="list-style-type: none">• Decision tree• Random forest	<ul style="list-style-type: none">• Similarity and nearest neighbors• Clustering	<ul style="list-style-type: none">• Association analysis• Recommender engine	<ul style="list-style-type: none">• Parameter tuning• Data analytic thinking



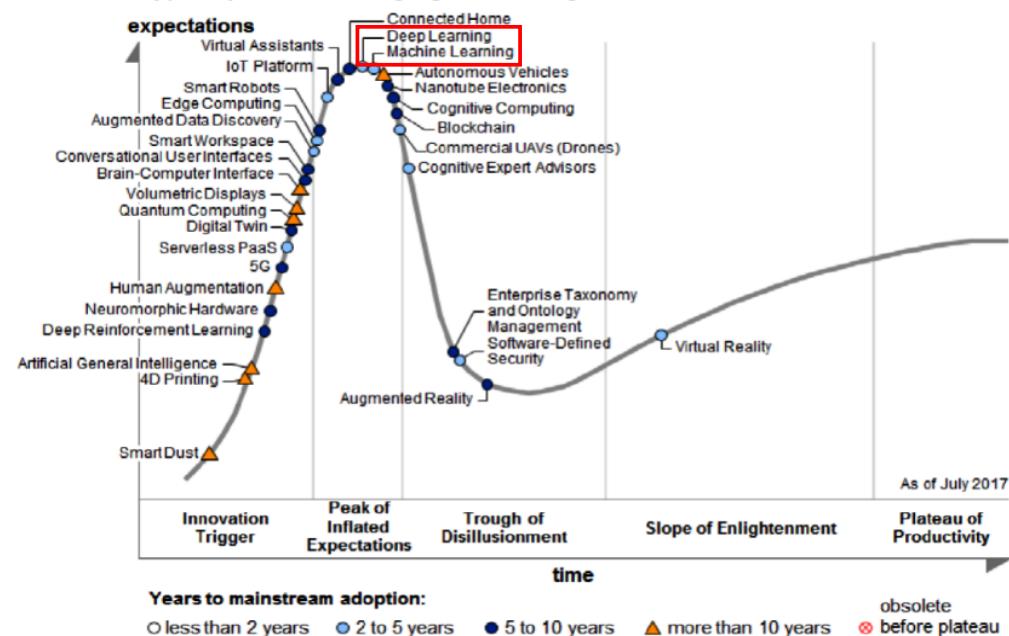
Module 1 Overview

- What is machine learning?
- Steps in machine learning
- Applications and case studies



Gartner

Gartner's Hype Cycle for Emerging Technologies, 2017



Note: PaaS = platform as a service; UAVs = unmanned aerial vehicles

Source: Gartner (July 2017)



Gartner 10 Strategic Tech Trends 2017

AI and machine learning (ML), which include technologies such as deep learning, neural networks and natural-language processing, can also encompass more advanced systems that understand, learn, predict, adapt and potentially operate autonomously.

Systems can learn and change future behavior, leading to the creation of more intelligent devices and programs.

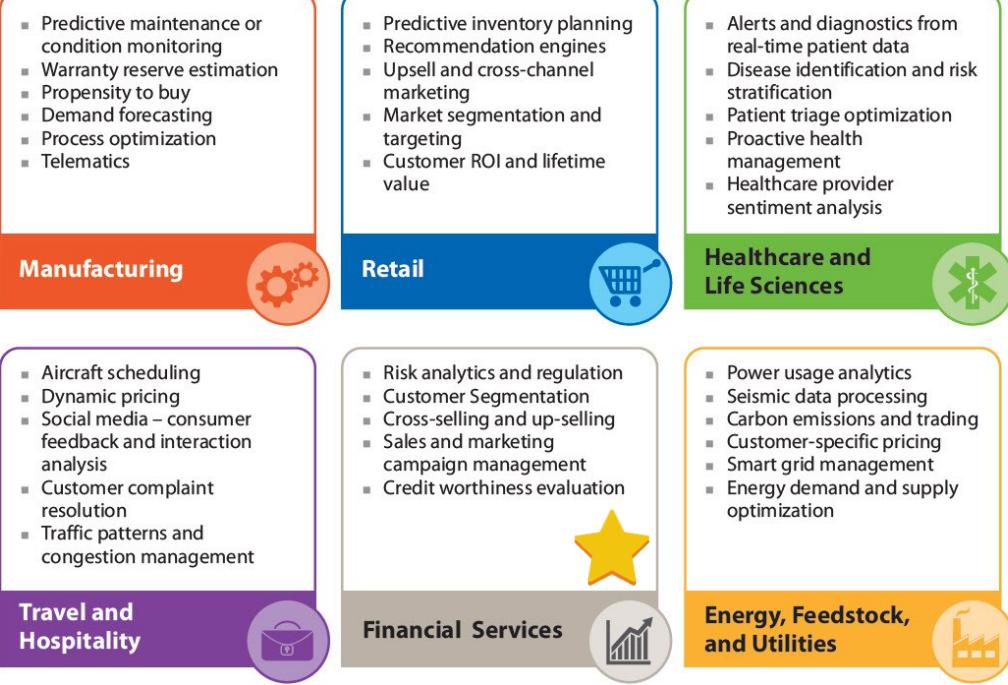
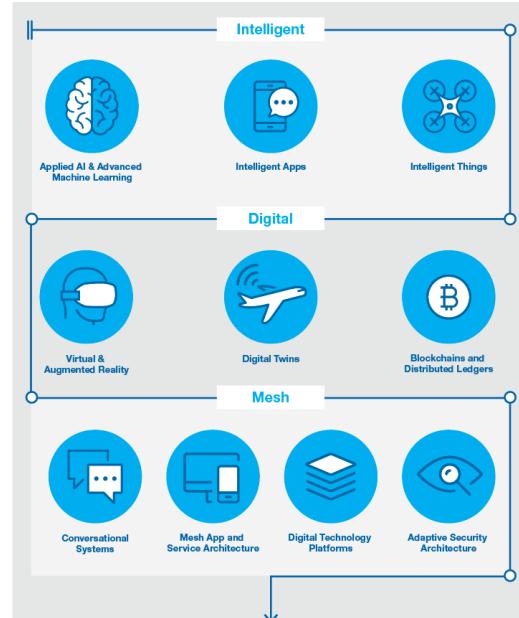
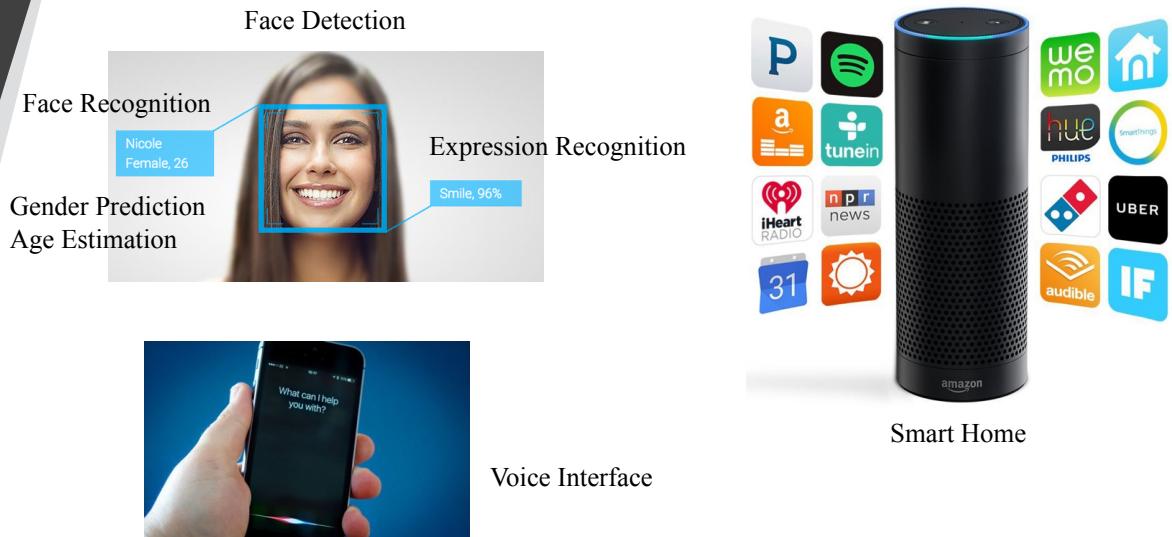


Figure 2: Machine Learning applications across industries





Consumer ML



What exactly is machine learning?

- Machine learning (ML) is a method of data analysis that automates analytical model building.
- Using algorithms that iteratively learn from data, machine learning allows computers to find hidden insights without being explicitly programmed where to look.



Why machine learning matter

- Automatic: Train it once and it can be run automatically
- Fast: With big data, work faster than human
- Accurate: Can predict groups more accurately than manual methods
- Scale: Able to handle large data

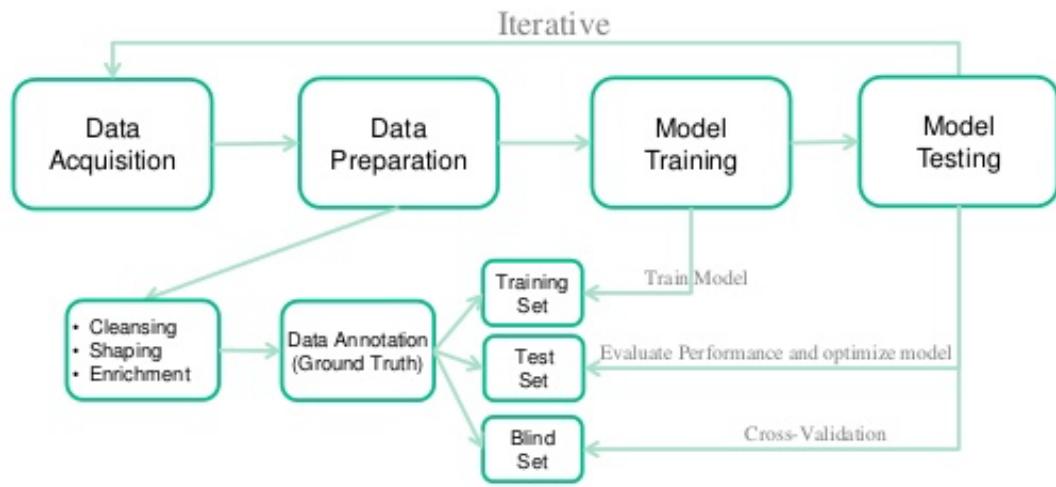


Activity 1: Machine Learning is All Around

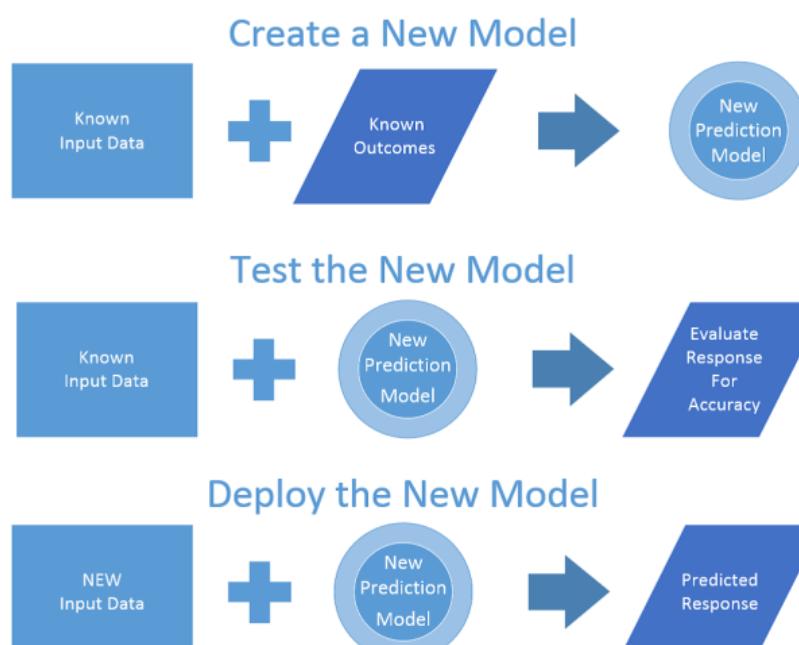
- I will randomly choose 5 participants in the class
- Give one example of things around you that has the machine learning functionalities
- Explain ML functionalities of things you selected



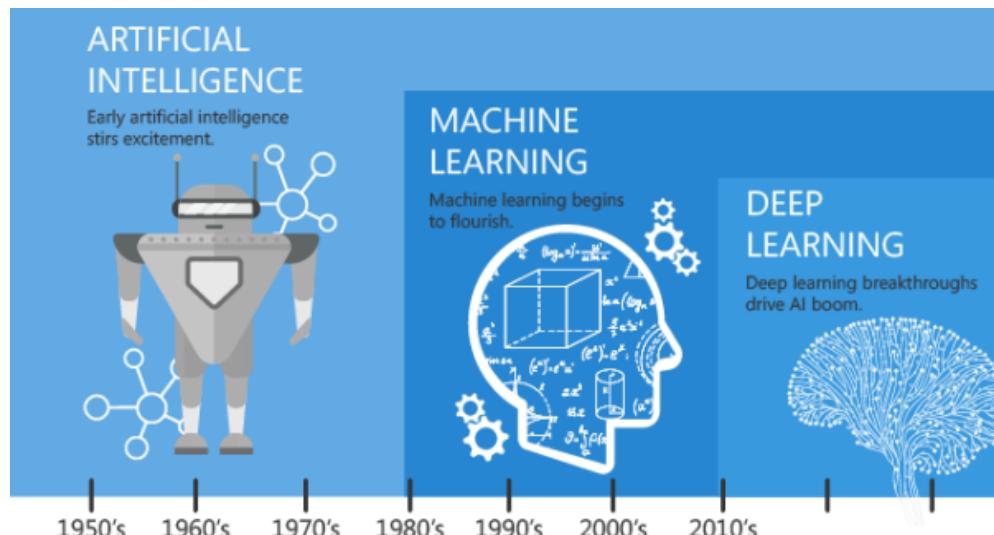
ML Workflow



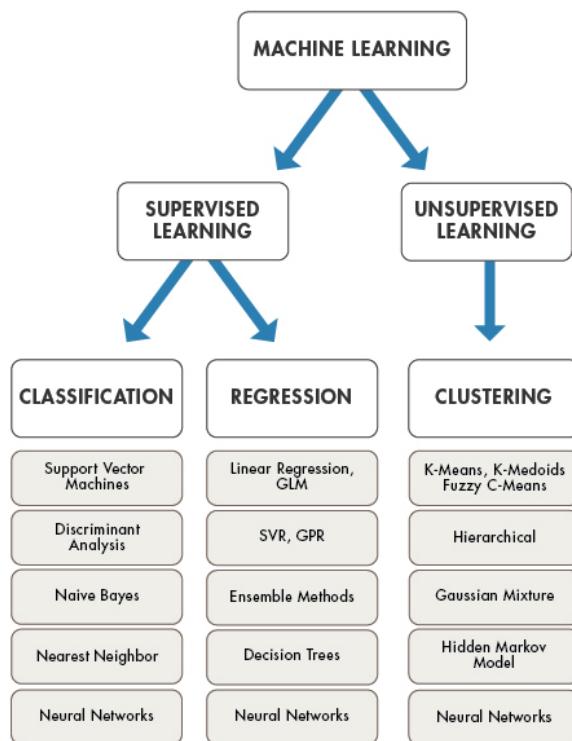
3 Steps at Work



Timeline



Types of ML

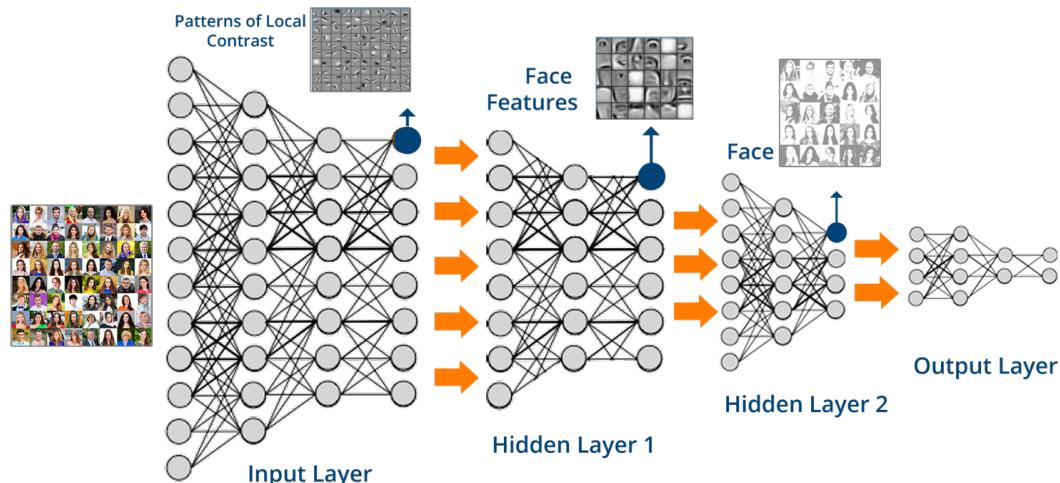


Style of Learning

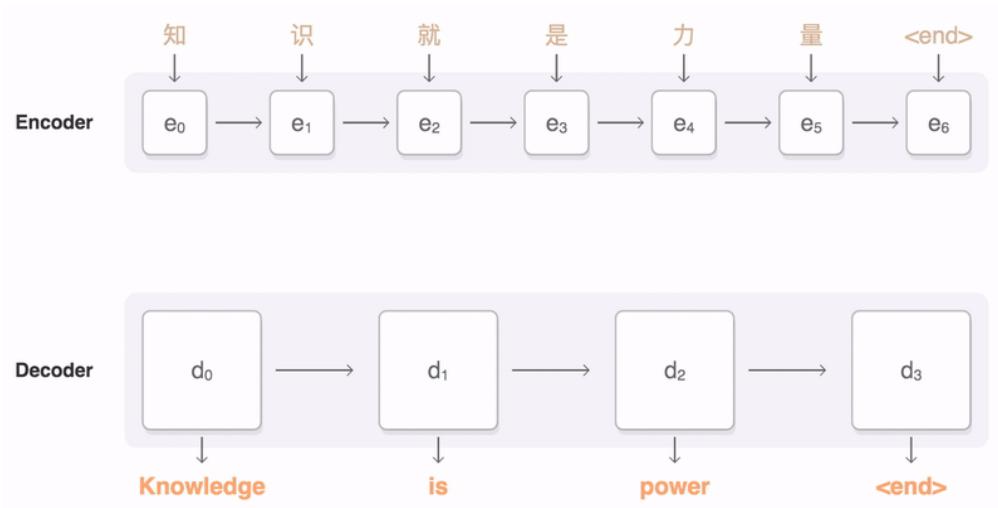
<ul style="list-style-type: none"> • Data has known labels or output 	<ul style="list-style-type: none"> • Labels or output unknown • Focus on finding patterns and gaining insight from the data 	<ul style="list-style-type: none"> • Labels or output known for a subset of data • A blend of supervised and unsupervised learning 	<ul style="list-style-type: none"> • Focus on making decisions based on previous experience • Policy-making with feedback
<ul style="list-style-type: none"> • Insurance underwriting • Fraud detection 	<ul style="list-style-type: none"> • Customer clustering • Association rule mining 	<ul style="list-style-type: none"> • Medical predictions (where tests and expert diagnoses are expensive, and only part of the population) 	<ul style="list-style-type: none"> • Game AI • Complex decision problems • Reward systems



Advanced Machine Learning



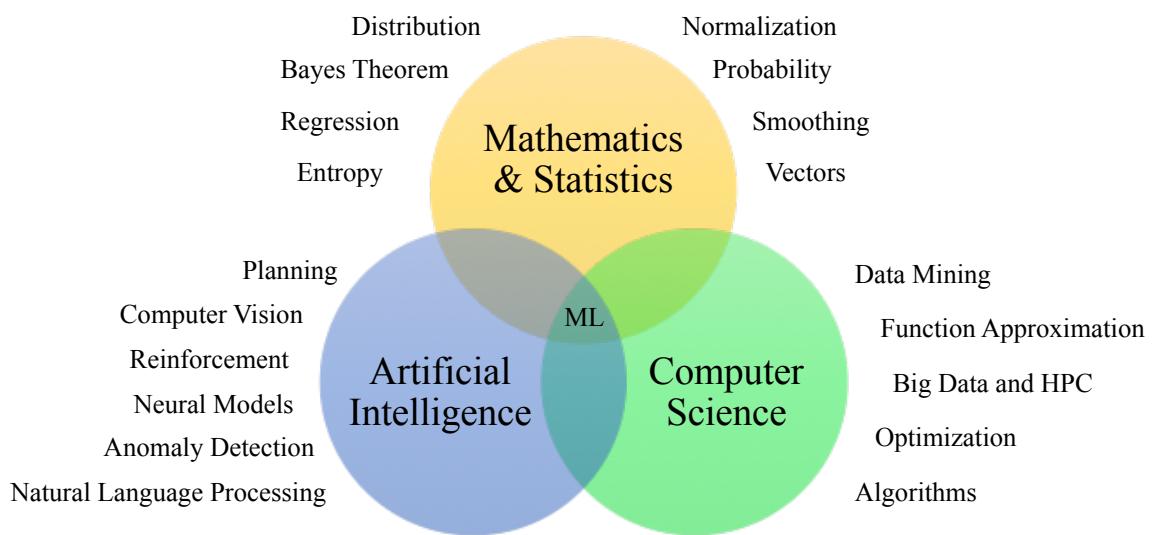
Advanced Machine Learning

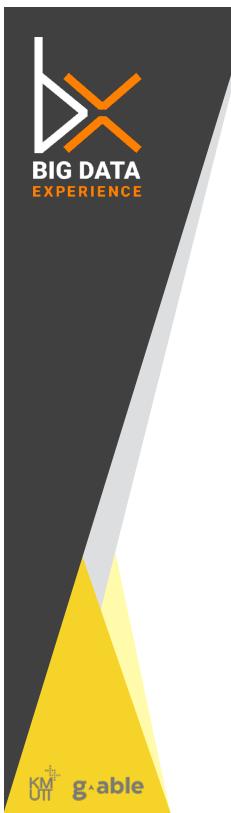


Known issues

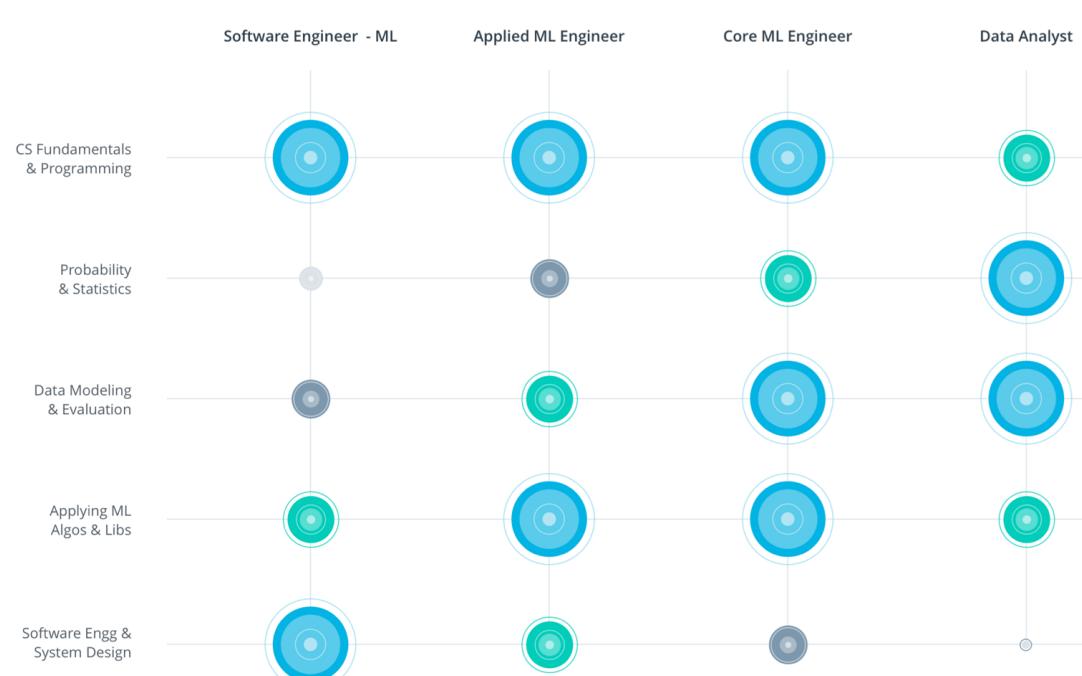
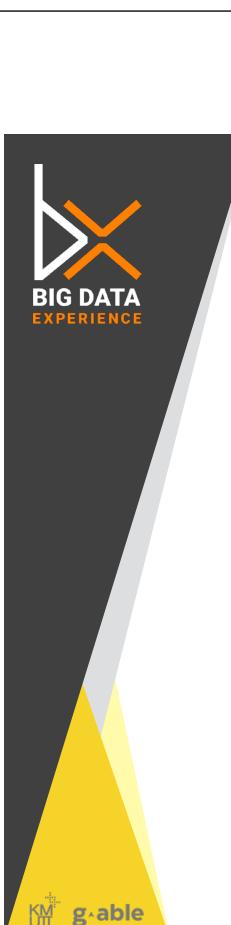
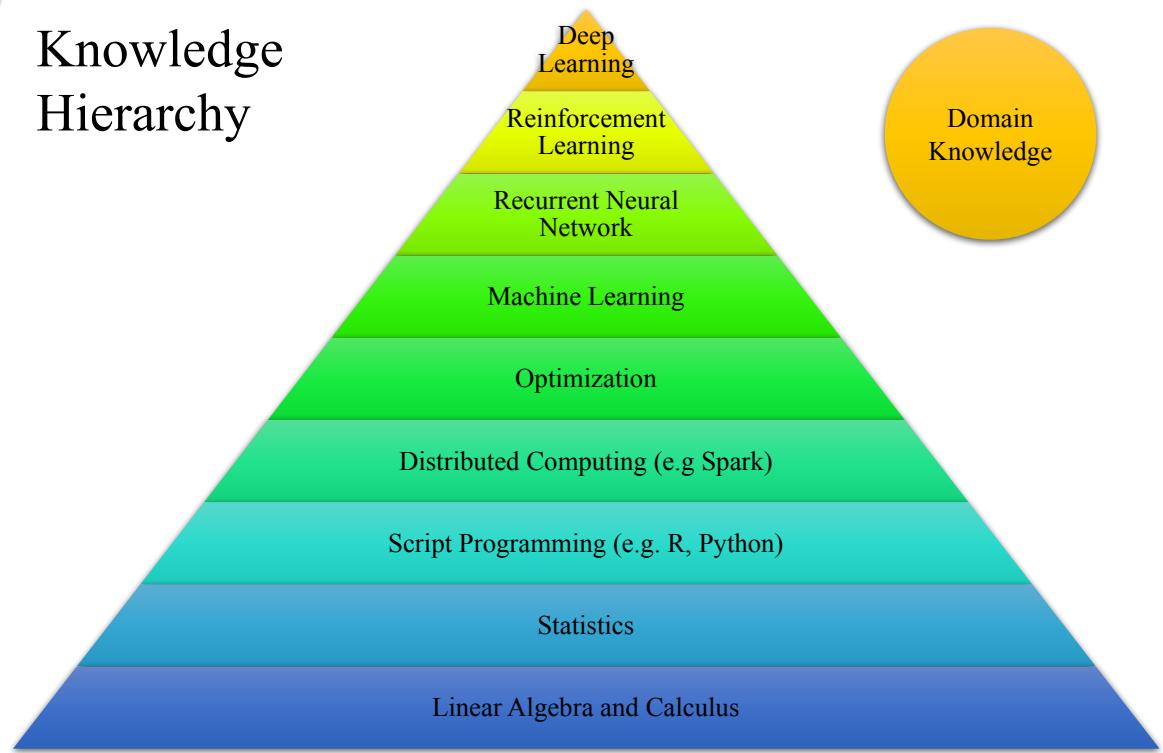
- Overfitting
- Specialized learning vs generalized learning
- Unbalanced data
- Noisy (uncleaned) data
- Optimization

Foundations



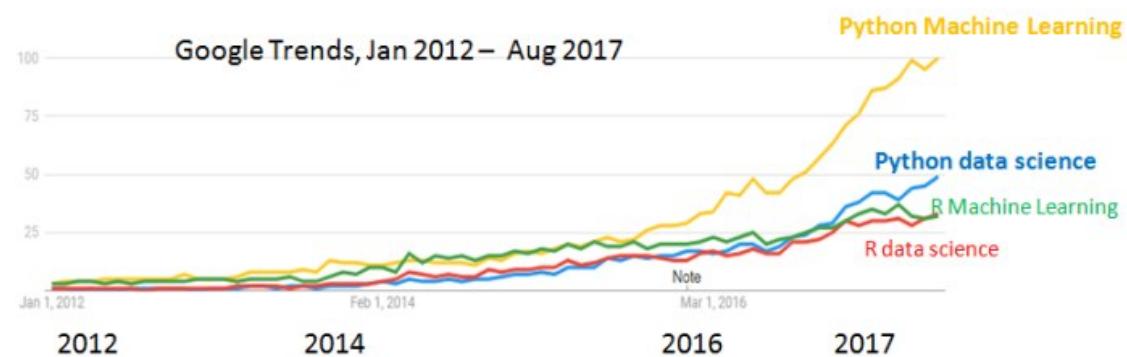


Knowledge Hierarchy



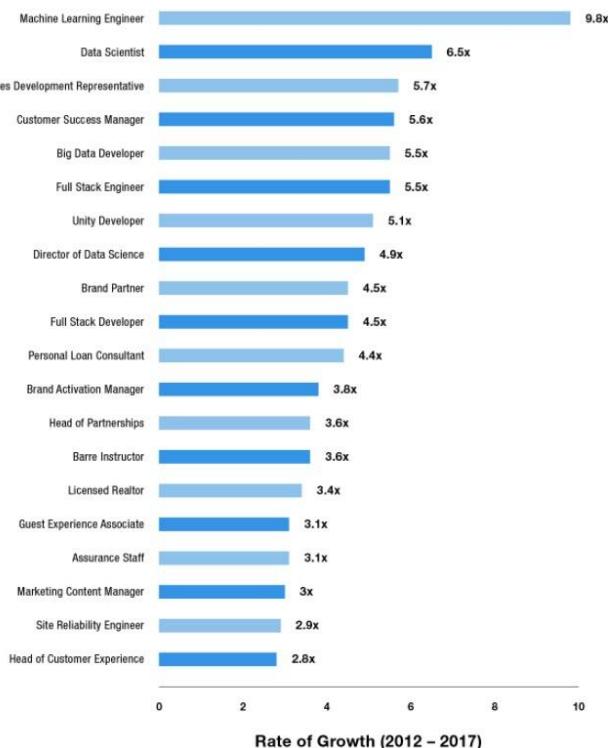


ML growing demand



Top 20 Emerging Jobs

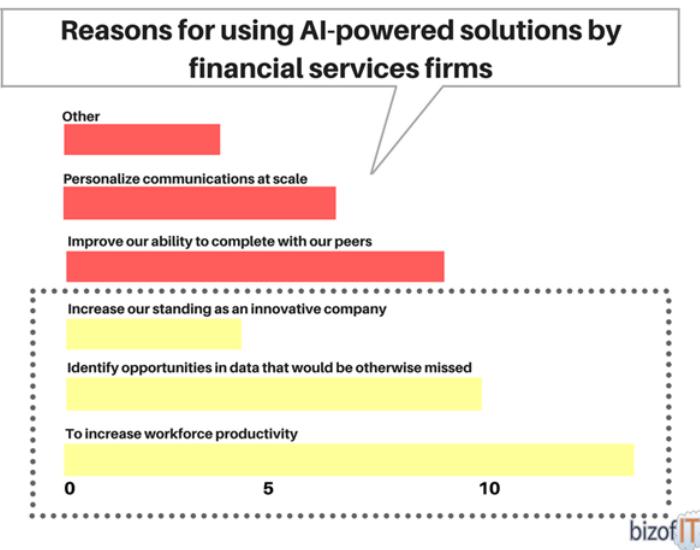
LinkedIn Economic Graph



Top 2:
Machine Learning Engineer
Data Scientist



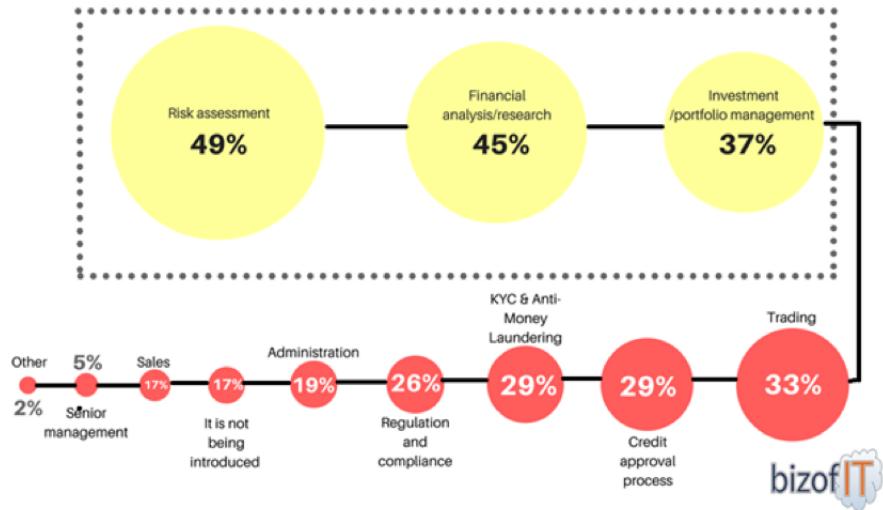
Case studies AI/ML in Banking



Case studies Top 5 applications

- Anti-money laundering (AML) pattern detection
- Chatbots
- Algorithmic trading
- Fraud detection
- Customer recommendation

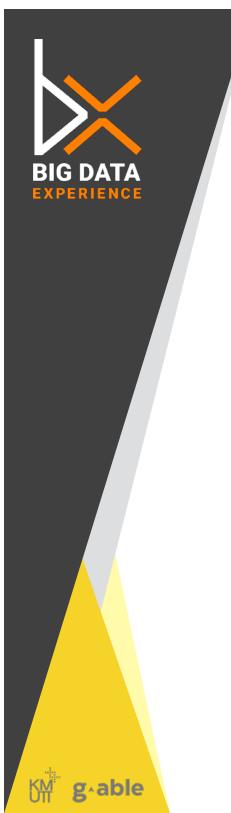
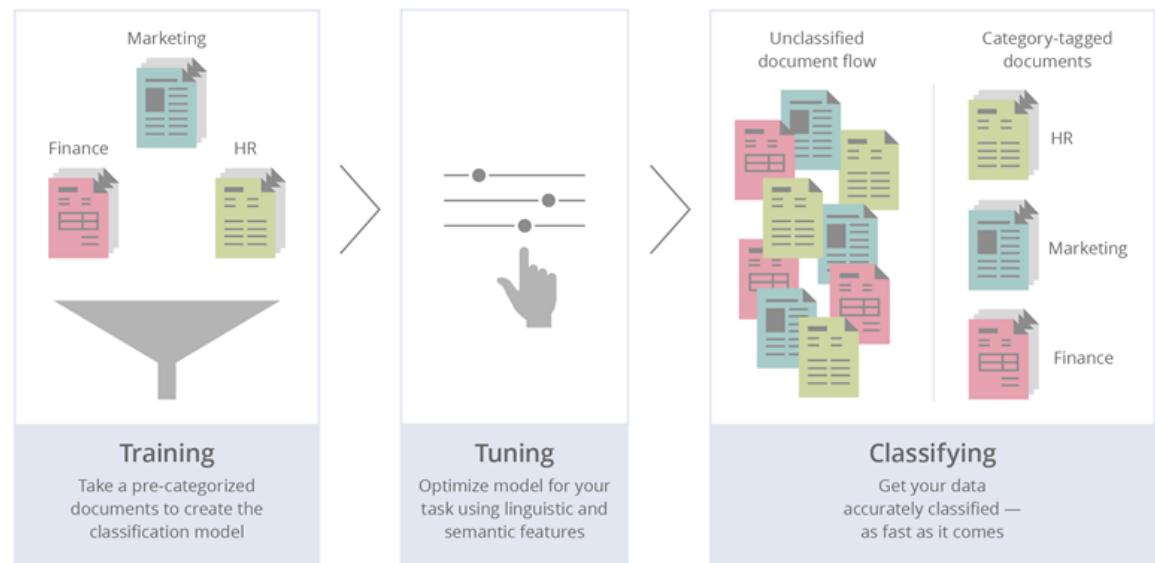
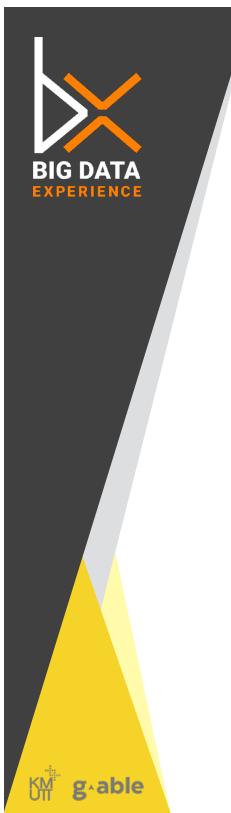
Case studies AI area of use



Case studies JPMorgan Chase

JPMorganChase 

- JPMorgan Chase has introduced a Contract Intelligence (COiN) platform designed to “analyze legal documents and extract important data points and clauses.”
- Manual review of 12,000 annual commercial credit agreements normally requires approximately 360,000 hours.
- Results from an initial implementation of this machine learning technology showed that the same amount of agreements could be reviewed in seconds.



Case studies Wells Fargo



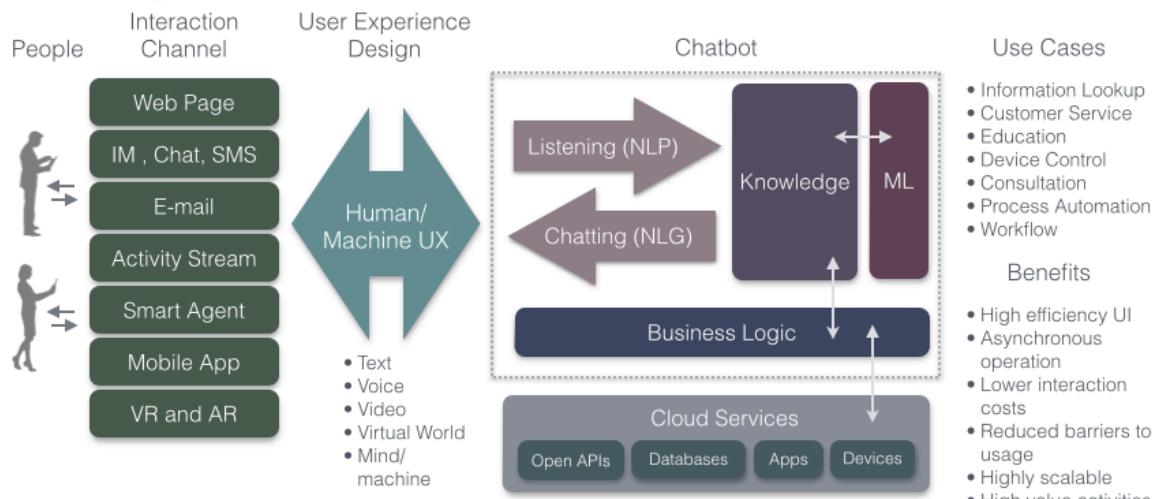
- In April 2017, the company began piloting an AI-driven Chatbot.
- This virtual assistant communicates with users to provide account information and helps customers reset their passwords.
- The company reported that it planned to expand its testing phase later in the spring to a few thousand customers.

Case studies Bank of America



- Bank of America Corporation recently made a bold push into AI technology with the debut of an intelligent virtual assistant named Erica.
- Erica is a Chatbot leveraging “predictive analytics and cognitive messaging” to provide financial guidance to the company’s over 45 million customers.

Anatomy of a ChatBot: How Conversational UXs Provide Value

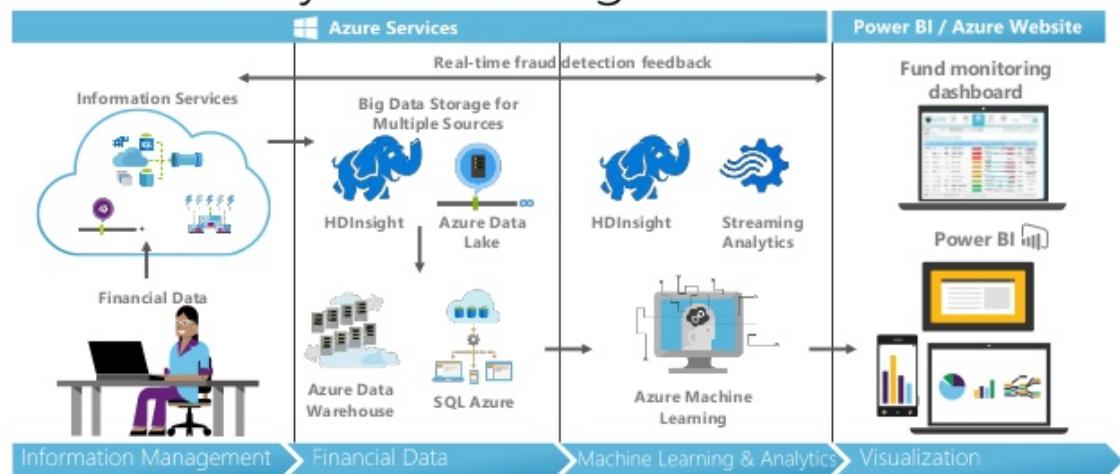


Case studies OCBC Bank (Singapore)



- OCBC bank's transaction monitoring team and its Fintech unit has enrolled the project to use machine learning in helping the anti-money laundering (AML) task.
- The software is dynamic and is able to "learn" from or adjust to changes in transaction patterns over time, allowing it to flag suspicious transactions with better precision, as well as discovering new patterns for smarter future detection.

Anti-Money Laundering





Case studies Bank of America Merrill Lynch



- Bank of America Merrill Lynch has been using the algorithm trading to swiftly and accurately manage portfolios.
- The company also recently released a new service that relies on artificial intelligence (AI) to improve companies reconciliation of incoming payments.
- The new solution is ideally suited for companies that manage a large volume of payments and eInvoices, where the remittance information is either missing or received separately from the payment



Case studies American Express (Amex)



- AMEX use machine learning techniques to
 - Attract new customers send mail to prospective customers
 - Drive up turnover: identify association between buyers and sellers and use them to drive up transaction
 - Offer personalized recommendations to users: algorithms compile information on consumer habits, income and spending, and predict expenditure that suit them
 - Identify fraudulent operations: ML is use for near real-time fraud detection instead of traditional delays.





Case studies EU Banks

McKinsey
&Company

- A 2015 report from McKinsey & Company claimed a dozen European banks had made the shift from traditional statistical analysis modelling to machine learning.
- The results have been impressive, with some organisations increasing new product sales by ten per cent, while churn and capital expenditure have both declined by 20 per cent.
- Common applications include microtargeted models that can predict churn or default.
- Importantly, these systems can both predict behaviour and learn to understand how people react in certain situations.



Workshop: ML in Business *Description*

- This workshop aims to reinforce the general idea in machine learning of machine learning.
- Participants should divide into team of 5-7 peoples
- (30 minutes) Each team will discuss the potential ML solution at KTC, necessary data, and expected outcome. Prepare the powerpoint if necessary.
- (5-10 minutes / team) Each team will present the idea to the class.





Thank you
Question?

KM g·able