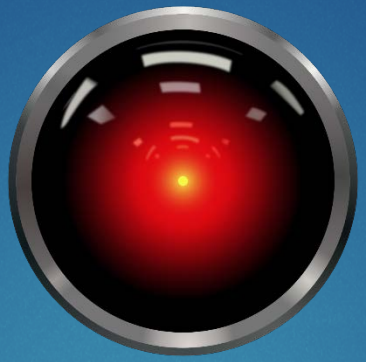
ECE3340
Numerical Methods for Electrical and Computer Engineering

PROF. HAN Q. LE

A further outlook

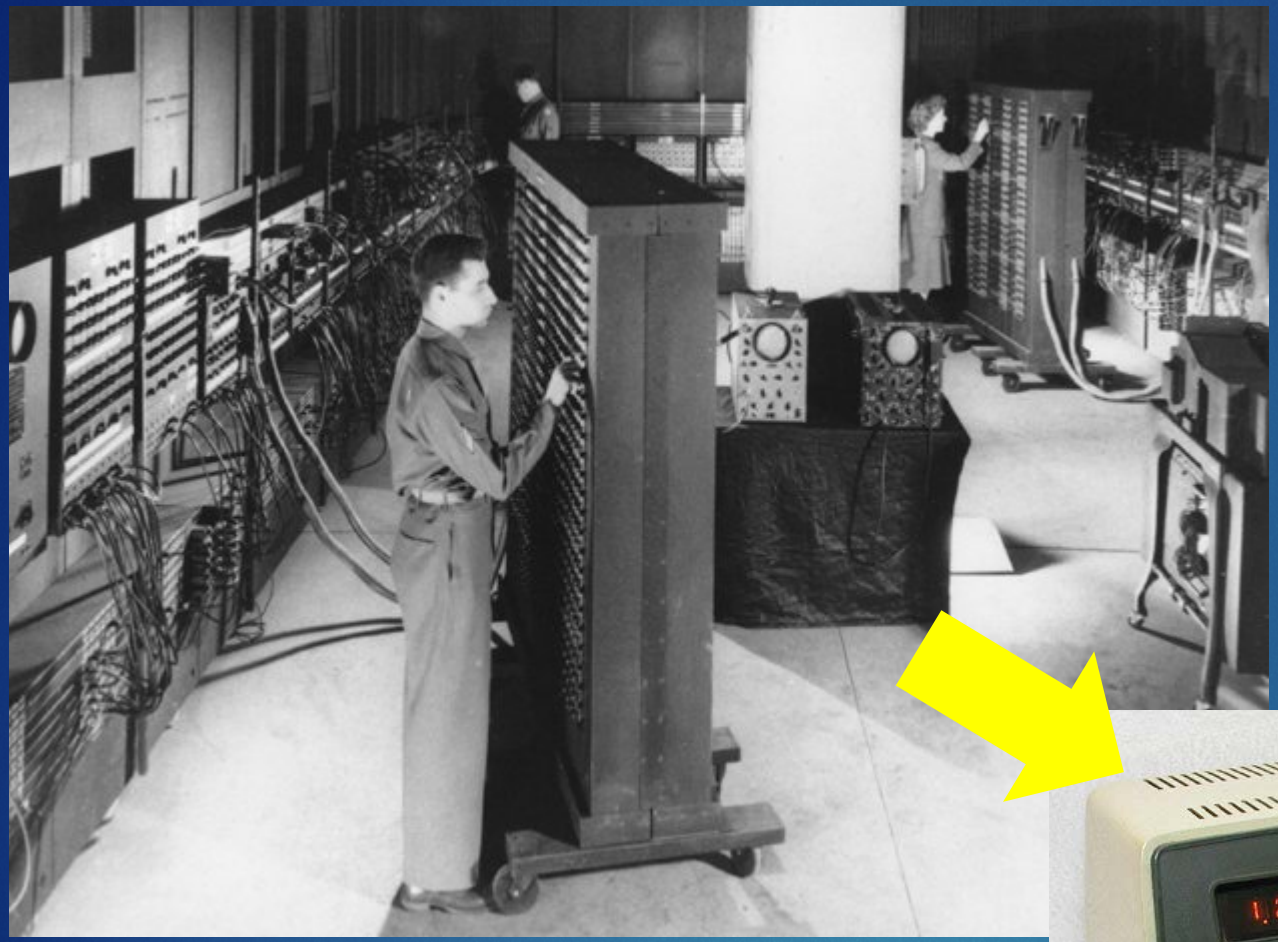
From imagination



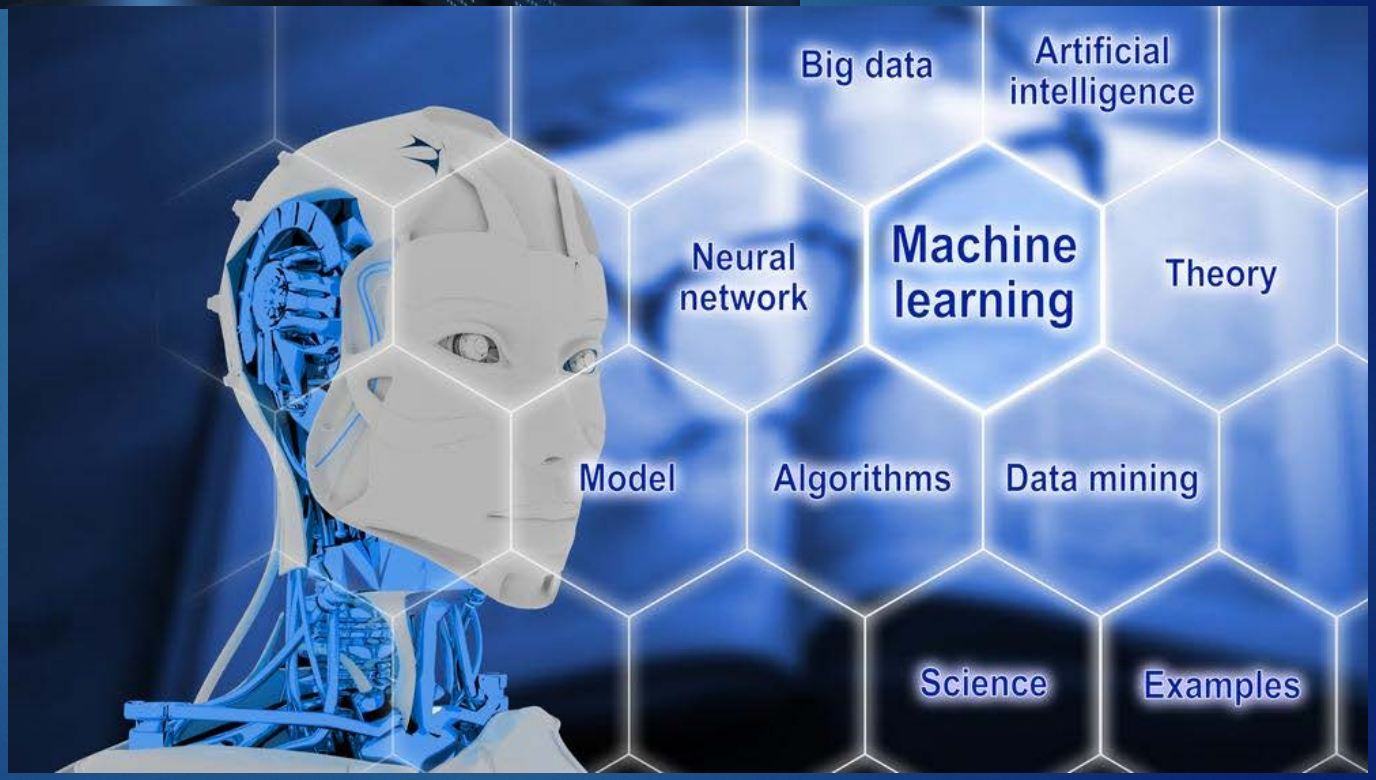
To reality

What can I help
you with?

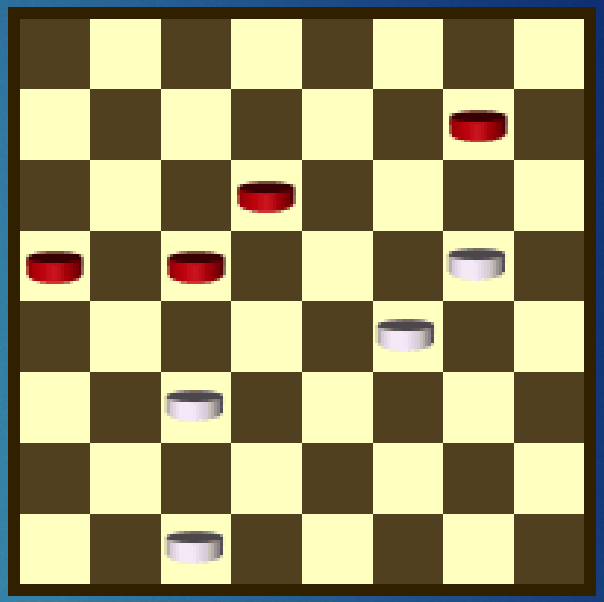
Hi. I'm Cortana.
Ask me a question!



1.2345678901234
Casio AL-1000
© 2003 Nigel Tout


Big data
Artificial intelligence
Neural network
Machine learning
Theory
Model
Algorithms
Data mining
Science
Examples

1995



Chinook vs. Don Lafferty

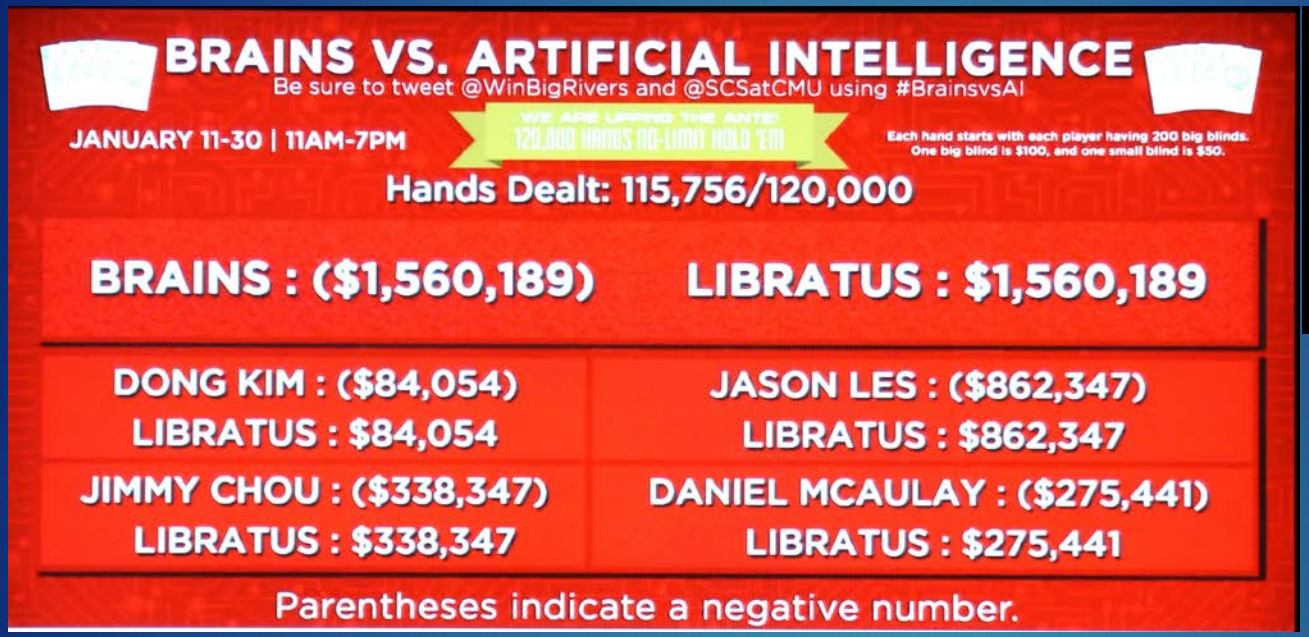
1997

Deep Blue vs. Garry Kasparov

… *20 years later,* 2017

AlphaGo versus Ke Jie

2017



Libratus versus 4 best human poker players

Top 10 AI tech trends for 2018

- Deep learning theory
- Capsule networks
- Deep reinforcement learning
- Generative adversarial networks
- Lean and augmented data learning
- Probabilistic programming
- Hybrid learning models
- Automated machine learning
- Digital twin
- Explainable artificial intelligence

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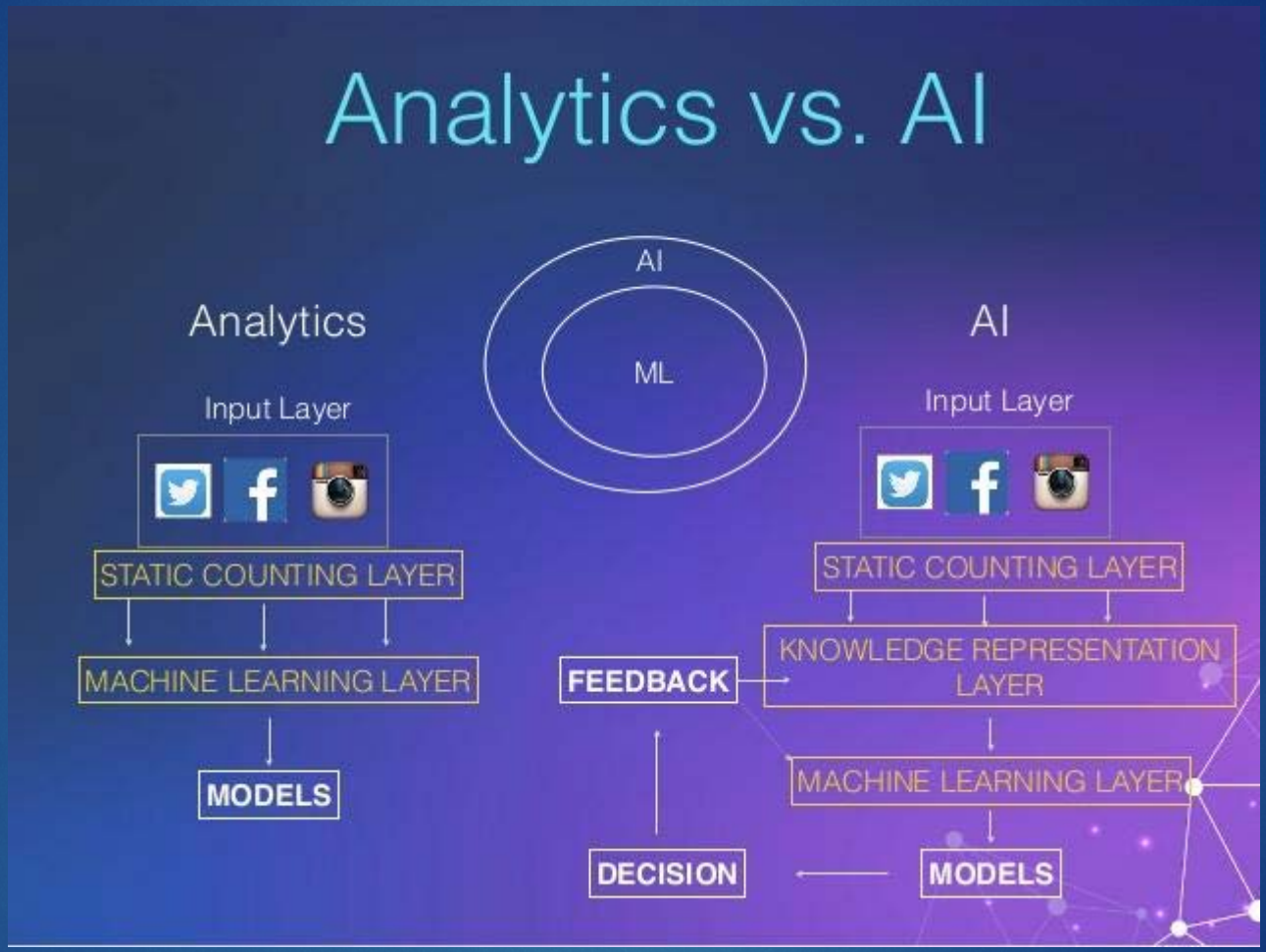
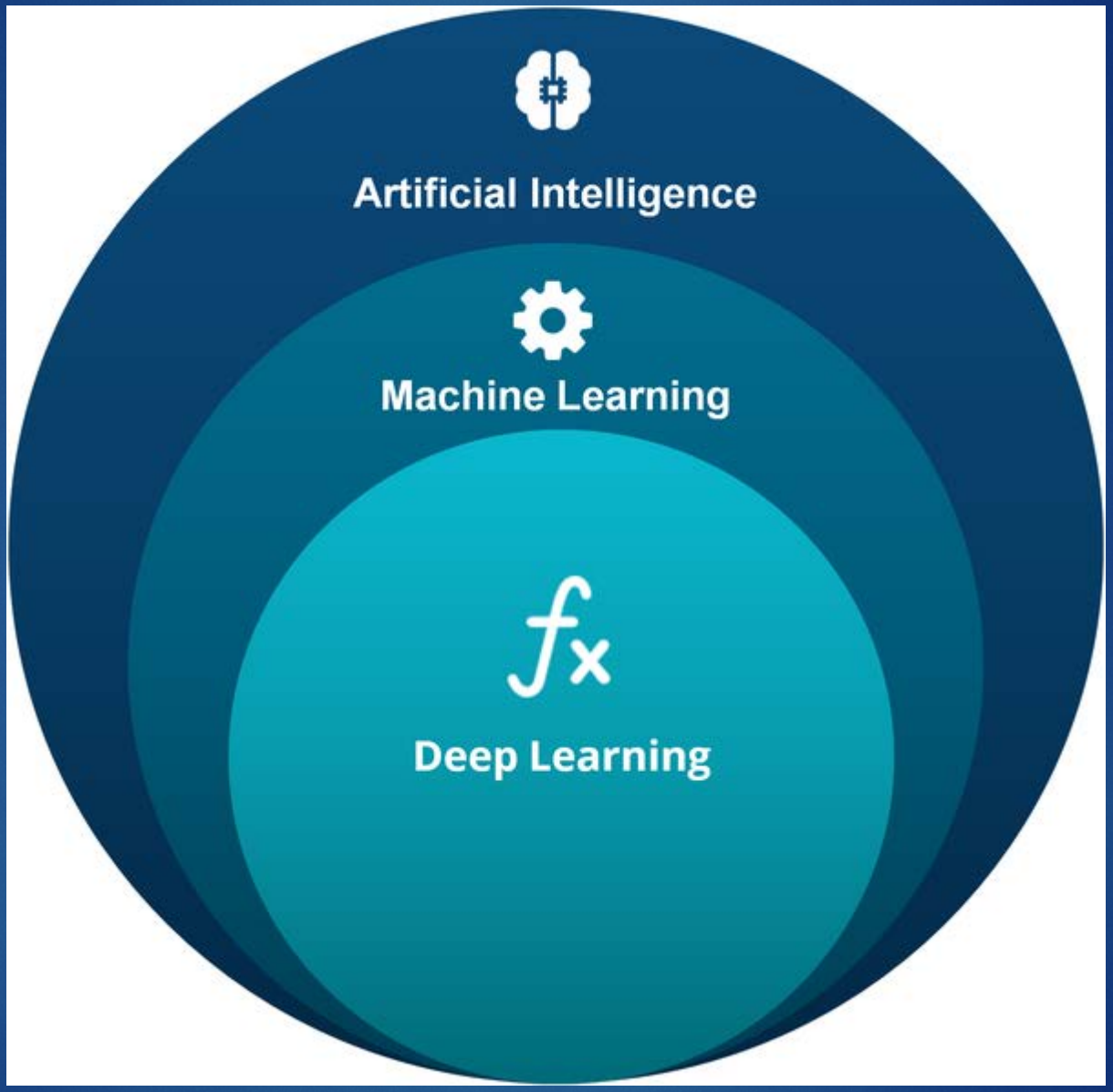
Analytics vs. AI




Artificial Intelligence
Machine Learning
Deep Learning

Levels of Big Data Maturity

LEVEL 5
Data & Analytics as a Service

Operating as a "data service provider"

Self-serve data

Collaboration and sharing analytics across the enterprise

LEVEL 4
Enterprise Adoption

Leveraging use cases for multiple LOBs

Integrated metadata, quality, and governance across Big Data

Predictive insights integrated into business operations

LEVEL 3
Business Adoption

Leveraging discrete LOB use cases

Structured and unstructured analysis

Predictive analytics applied to Big Data

LEVEL 2
Technical Adoption

Using Big Data mostly for storage/transform

Usage primarily by IT

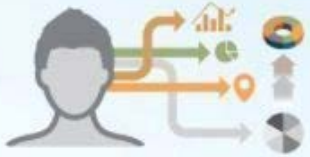
Some Big Data exploratory analytics

LEVEL 1
Infancy

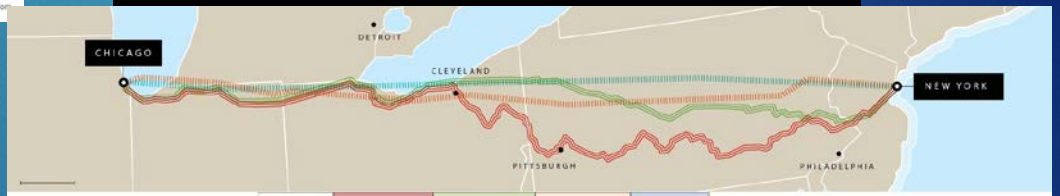
Thinking about it

Initial Big Data environment in place

Proof-Of-Concept / Pilot

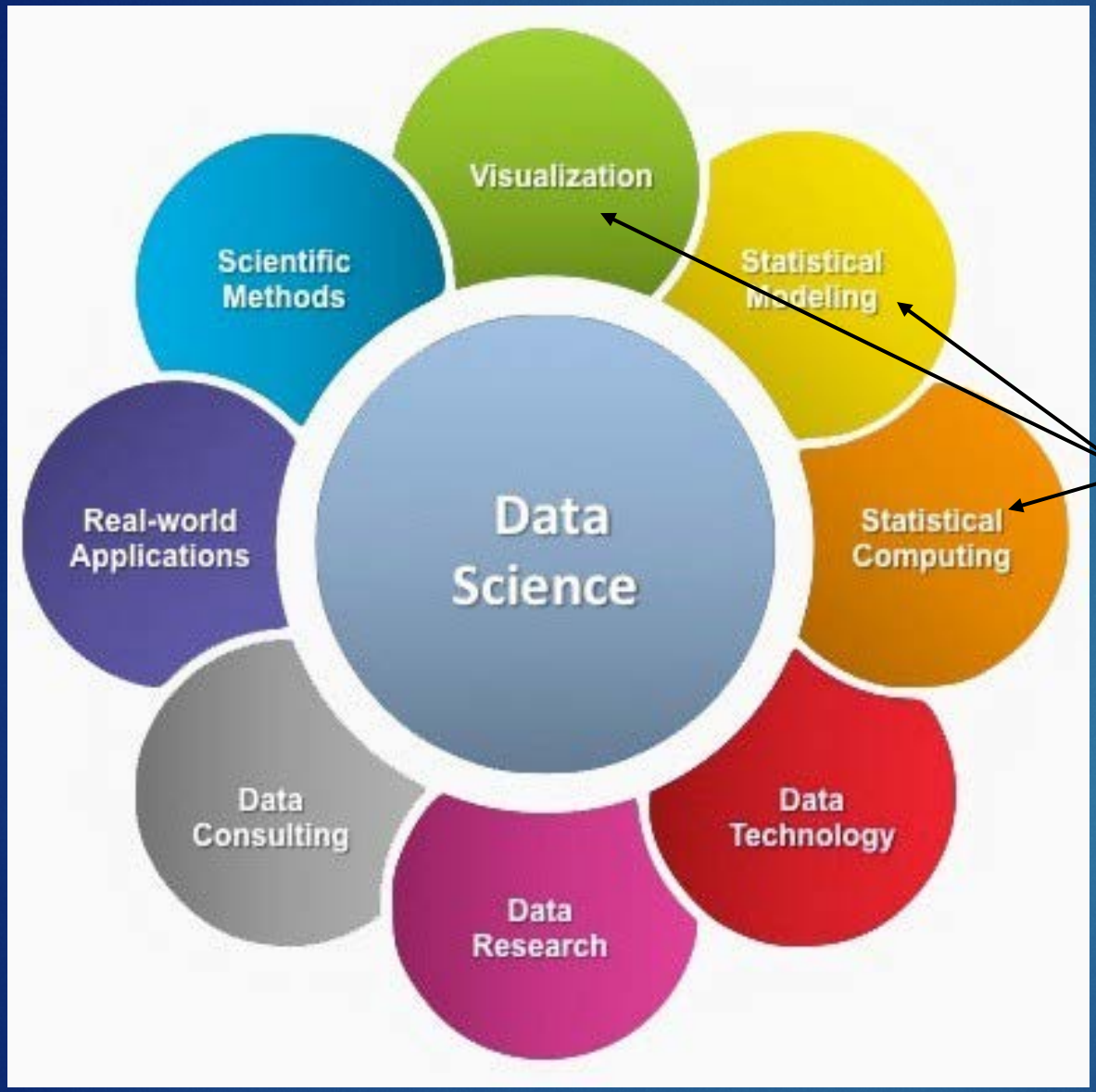


Impact on Capital Markets



	Red	Green	Orange	Blue
Provider	Original cable	Spread Networks	McKay Brothers	Tradeworx
Technology	Fiber-optic cable	Fiber-optic cable	Microwave	Microwave
Completion	mid 1980s	August 2010	July 2012	Winter 2012
Path length	ca 1000 miles	825 miles	744 miles	ca 731 miles
RT latency	14.5 ms	13.1 ms	9 ms	8.5 ms

Source: wired.com



You can learn some of these stuffs in this course

COURSE SYLLABUS

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YEAR COURSE OFFERED: 2019

SEMESTER COURSE OFFERED: Spring

DEPARTMENT: Electrical and Computer Engineering

COURSE NUMBER/ID: 8700

NAME OF COURSE: ECE 3340 - Numerical Methods for Elec. & Comp. Engineers

NAME OF INSTRUCTOR: Han Le

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We will learn some very elementary concepts of data analytics as a part of sci./eng. data analysis

List of discussion/lecture topics

- Introduction and review of selected topics in electrical and computer engineering that serve as learning materials for the application of computational numerical methods.
- Binary system and numerical representation in digital computer.
- Numerical precisions and errors in computation.
- Polynomials, roots, zeros, and poles.
- Numerical Fourier transform techniques and applications. Laplace transform applications.
- Multivariate linear system and review of linear algebra: matrix and computation techniques.
- Stochastic processes, introduction to statistical analysis and data analytics.
- Differentiation and integration. Differential equations.

Think if this course ECE3340 as a very small (baby) first step toward advanced computing for the future.

- you don't have to have a PhD in comp. sci. to use the power of machine learning (not anymore than one has to be an aeronautics engineer to fly an airplane).
- all you have to be is an educated, intelligent user to make the most of it.