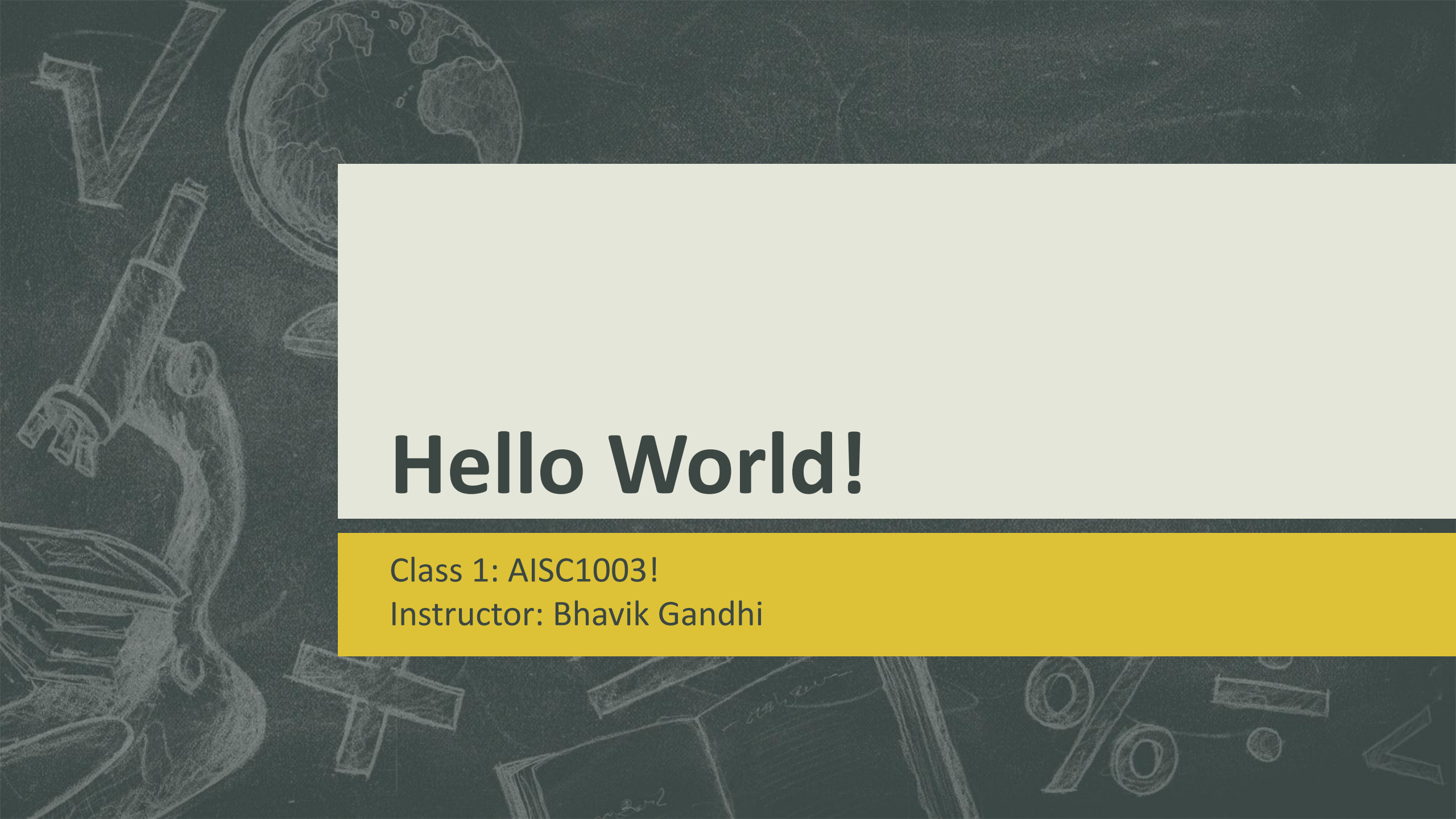


Hello World!

Class 1: AISC1003!

Instructor: Bhavik Gandhi

Introduction

Let’s say Hi!

About Me! Hello 👋

- Engg from NIT Kurukshetra, India in Mechanical and MS in Computer Engineering from University of Florida
- Started 12 years back at Microsoft building deep learning/nlp/reinforcement learning models to predict probability of click for Bing Ads
- Built and Led Data Science teams for Shopify, Haikujam, Pepperfry and Shaadi.com
- Love Swimming, Astronomy, Playing Piano, Reading and Teaching
- Have watched Big Bang Theory an unrealistic number of times :)

Tell me a bit about you!

Please take 15-20 seconds to tell me a bit about you!

Name

Background, Education, Experience

What interesting thing did you learn in the 1st semester?

Attendance

Hmm, I am present! 🙋

Course Logistics

Good question!!

Course Plan*

Week	Date	Topic	Activity
1	May 13, 2023	ML Intro, Types. Regression	Group Exercise (Risk and Applications)
2	May 20, 2023	Linear Regression, OLS	Practice Exercise, Group Activity (Excel OLS)
3	May 27, 2023	Gradient Descent	Indiv Assignment 1, Indiv Exercise (Compute GD)
4	Jun 3, 2023	Regularization	Group Exercise (Model building)
5	Jun 10, 2023	Logistic Regression	Group Assignment 2
6	Jun 17, 2023	Logistic Regression	Group Assignment 3
7	Jun 24, 2023	Goodness of Fit	Mid-Term

*Course Plan is tentative and subject to change. All assessments are in-class assessments. No extensions will be provided.

Course Plan*

Week	Date	Topic	Activity
9	Jul 8, 2023	Sensitivity Analysis, SVM	Group Exercise (GoF and Sensitivty Analysis)
10	Jul 15, 2023	SVM Kernels	Indiv Assignment 4, Group Exercise (SVM)
11	Jul 22, 2023	Decision Trees	Indiv Assignment 5, Group Exercise (DT)
12	Jul 29, 2023	Ensembling, Random Forests	Group Exercise (RF)
13	Aug 5, 2023	~~Boosting, Adaboost, XGBoost~~	Group Assignment 6
14	Aug 12, 2023	~~Naive Bayes, Nearest Neighbors~~	Final
15	Aug 19, 2023	~~Neural Networks~~	Group Presentation

*Course Plan is tentative and subject to change. All assessments are in-class assessments. No extensions will be provided.

Grading & Class Structure

Grades will be absolute

Any integrity violations will get you 0 on the assessment

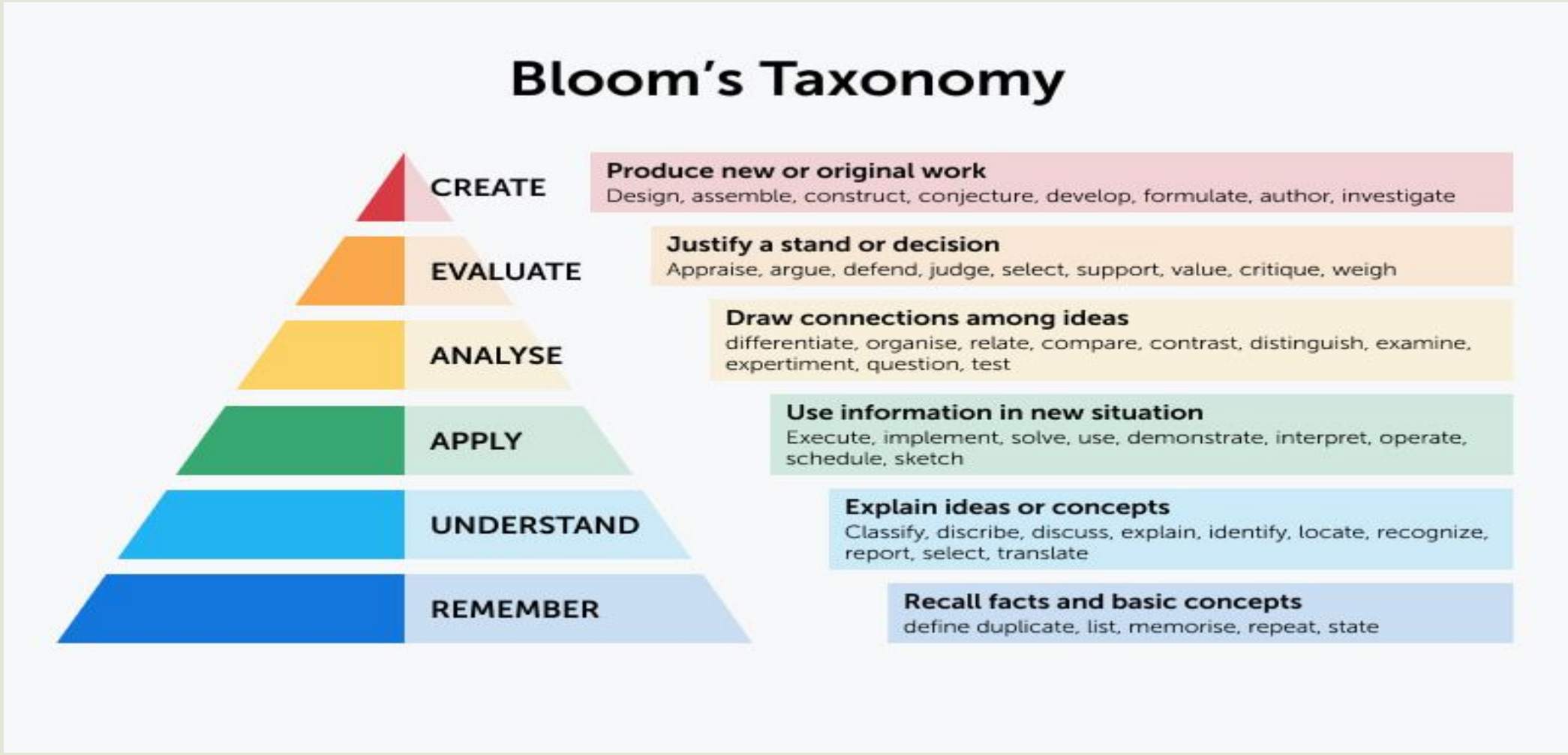
Bonus points can help you improve your grade

But you will still have to work! 😅

The class will usually be 1 - 1.5 hrs on instruction

The remaining 2-2.5 hrs will be on application and analysis of the material and in-class activities

Bloom’s Taxonomy



Slides, Learning Resources etc

Slides used here are only for reference, further asynchronous slides will be posted. However assessments will only be on the taught material (understanding, application, analysis, evaluation etc. - check's Bloom's taxonomy)

Various concepts will be explained using whiteboard, so feel free to take notes

Additional resources will be posted in Moodle.

Rubrics will be used to evaluate assignments. The assignments will not have bonus pts but upto 10% bonus pts may be awarded for extraordinary work as per the instructor's discretion.

Bonus pt assessments (usually a short quiz) may be held in the last weeks if a make-up test is needed for all the students

Class Decorum

No talking in the class even to yourself even if it is related to the subject matter except during breaks and group assignments/exercises.

Please step out for at least 15 minutes if you need to talk. If you are found talking you will be asked to step out and instruction to the class will be paused until you step out.

No language other than English in class even during breaks or group work. You need to get English and AI-ready. If found talking in another language you will be asked to leave the class until the next break and instruction to the class will be paused until you do.

No mobile phone ringing/vibrating in class. No recording in the class. If either of these happen you will be asked to leave the class until the next break and instruction will be paused until you do.

You can join in late in class, just come in and close the door. However attendance may be missed, you will miss on some content/instruction and you will not be allowed to join in late if an assessment has begun. Also, you will not get any make-up opportunities so be on time.

Academic Integrity

Academic Integrity is extremely important

- Cannot accept any submissions over email
- If you face any issues submitting the assignment, follow the below steps
  - Take screenshots
  - Send an email to bhavikg@quernscollege.ca with your complete assignment attached
  - Email itsupport@queenscollege.ca or moodlesupport@queenscollege.ca with these screenshots and get it resolved asap
  - Late submissions will incur a penalty so budget your time accordingly, genuine issues as verified by the it team or moodle team will be granted penalty-free extension
- Read the instructions and do not indulge in plagiarism. Anti-plagiarism softwares are very smart
- Please do not make me file ADRs 🙏 The risk is not worth the few extra pts you may get
- Not following instructions during test, even if you are not explicitly cheating, will still result in an ADR

Bonus Points!

- Total Bonus Points for the course will be capped at 20 (20%), total points capped at 100
- Attendance, Participation/Contribution: Upto 6 bonus points at the instructor's discretion (includes participation in class, exercises, forums etc.). Will call it out in forums, exercise feedback or by email etc.
- Slide Corrections/Suggestions: Upto 4 bonus points at the instructor's discretion, kindly email suggestions/corrections and save the response emails.
- Upto 10 bonus points distributed across assignments, exams and project.
- Bonus Point Assignment: Within 2 days of the last/W15 class each student will be required to submit how many bonus points they have and how they'd like their bonus points to be assigned. Failure to do so may lead to forfeiture of your bonus points. Set reminders now!

Group Exercises and Assignments!

- Points will be a combination of group performance and individual performance
- Individual responsibilities should be clearly outlined by the group in a MECE format in the assignment/exercise report
- The best submitted solutions at the instructor's discretion may be shared with the class. You may get some bonus pts for knowledge sharing is your submission in a graded assessment is selected for sharing. Please write to me if you have any concerns regarding this.

Success Factors

No one can teach you all of Machine Learning

There's just too much to teach, so the idea of this course is to give you a primer into these fields so that you can explore them correctly.

To succeed in this course, apart from following instructions and having a strong sense of integrity, you will need

1. Basic Mathematical Skills
2. Problem Solving
3. Time Management
4. Group Working Skills
5. Practice

Things to Do!

This Week

Discussion Group

May 16, 12-2 pm, Rec Room

Get Your SIN/Service Canada on Campus

May 18, 9:30 - 3:30, Book Appt

Devant Career Cafe

May 17, 7-8 pm

Tangerine Tuesdays

May 16, 2-4 pm

Next Week

Outdoor Meditation

May 23, 12-2 pm, Backyard

Immigration Consultation

May 24, 10:30-1:30 pm

Devant Immigration Q&A

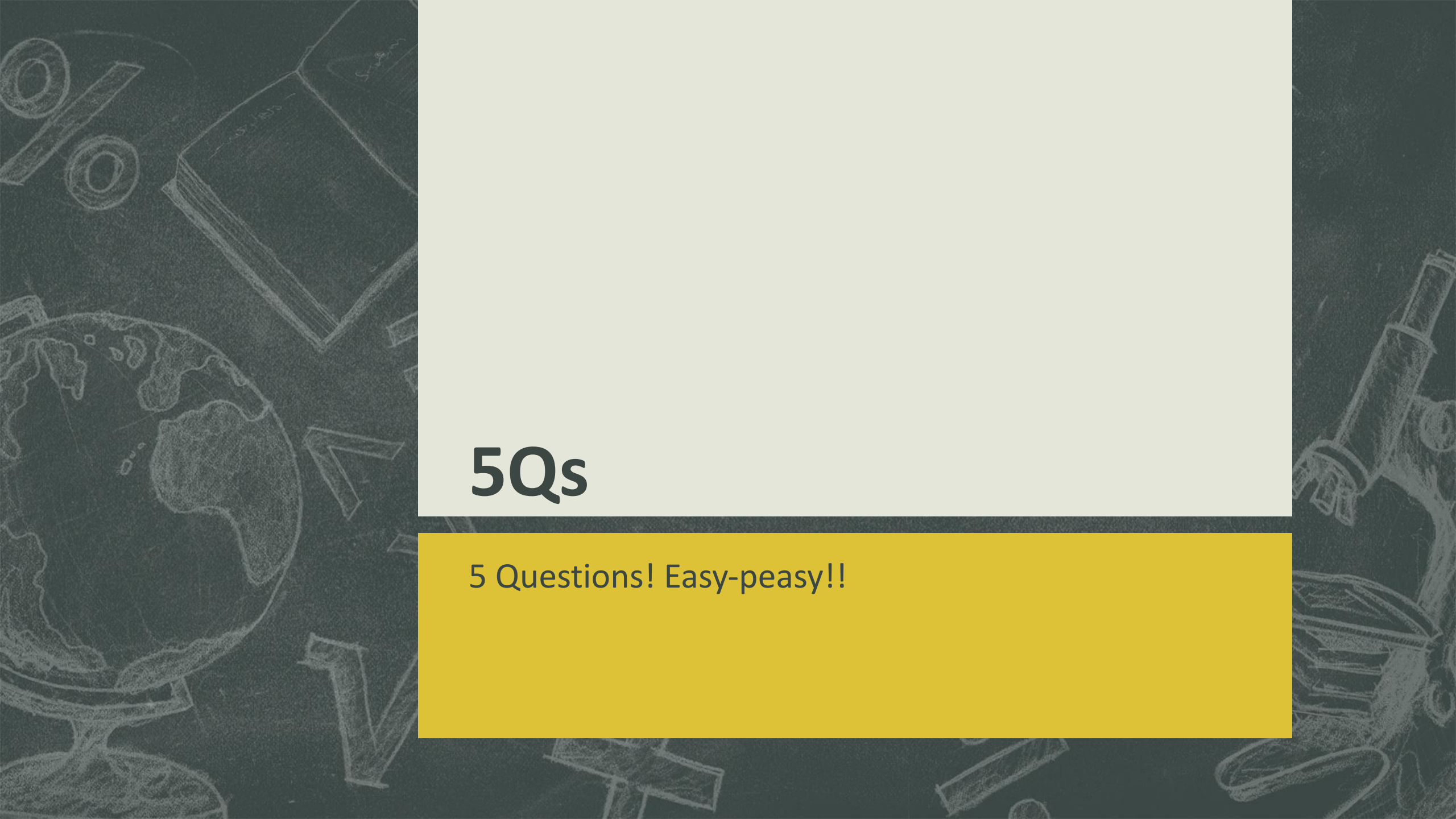
May 24, 7-8 pm

Tangerine Tuesdays

May 23, 2-4 pm

Course Outline

- AI
- Types of AI
- Turing Test
- History of AI
- Data Science
- ML
- NLP, Vision, DL



5Qs

5 Questions! Easy-peasy!!

Class Decorum

What is languages can you not use when you are in the classroom (including during breaks or class activities)?

Class Decorum

When is it not ok to sleep in the ML-1 class?

Canada

What is GTA? What is 6ix?

ADR

Can “not following instructions during a graded assessment” lead to an ADR?

AI vs ML

What are AI and ML? What do you think is the difference?

Answers

1. Any non-English languages
2. It is not ok to sleep in class if you snore, disturb others while sleeping ;)
3. GTA stands for Greater Toronto Area and includes Toronto (Scarborough, North York, Etobicoke), York (Vaughan, Richmond Hill etc), Durham, Peel (Mississauga, Brampton etc) and Halton regions. The 6ix is a nickname for Toronto from the 6 municipalities which were amalgamated to form Toronto
4. Yes
5. AI stands for Artificial Intelligence, ML stands for Machine Learning and is a type of AI where machines learn from data

Artificial Intelligence

Can I be artificially intelligent?

Alphabet Soup of Terms

There are many terms that are thrown around from

Artificial Intelligence

Data Science

Machine Learning

Natural Language Processing

Computer Vision

Deep Learning

Let's examine what they mean and how they relate to one another

What is AI?

Artificial intelligence (AI) is intelligence—perceiving, synthesizing, and inferring information—demonstrated by machines, as opposed to intelligence displayed by humans or by other animals.

Example tasks in which this is done include speech recognition, computer vision, translation between (natural) languages, as well as other mappings of inputs.

What does AI include?

AI consists of

Systems that think rationally (Structured thought, syllogisms, formal logic)

Systems that act rationally (Expected Utility Maximization, Rational Agents)

Systems that think like humans (Cognitive Information Processing, General Problem Solver, Systems that build internal models of their world)

Systems that act like humans (Robotics, NLP, ML, Computer Vision, Knowledge Representation, Automated Reasoning, Turing Test)

Types of AI

Reactive AI (Has no memory and predicts outputs based on the input that it receives)

eg. DeepBlue or Collaborative filtering

Limited Memory AI (comprised of supervised AI systems that derive knowledge from experimental data or real-life events) eg. Self-driving cars, ChatGPT

Theory of Mind AI (possess the understanding that people, creatures and objects in the world can have thoughts and emotions that affect their own behavior)

Self Aware AI (systems that can form representations about themselves, possess consciousness)

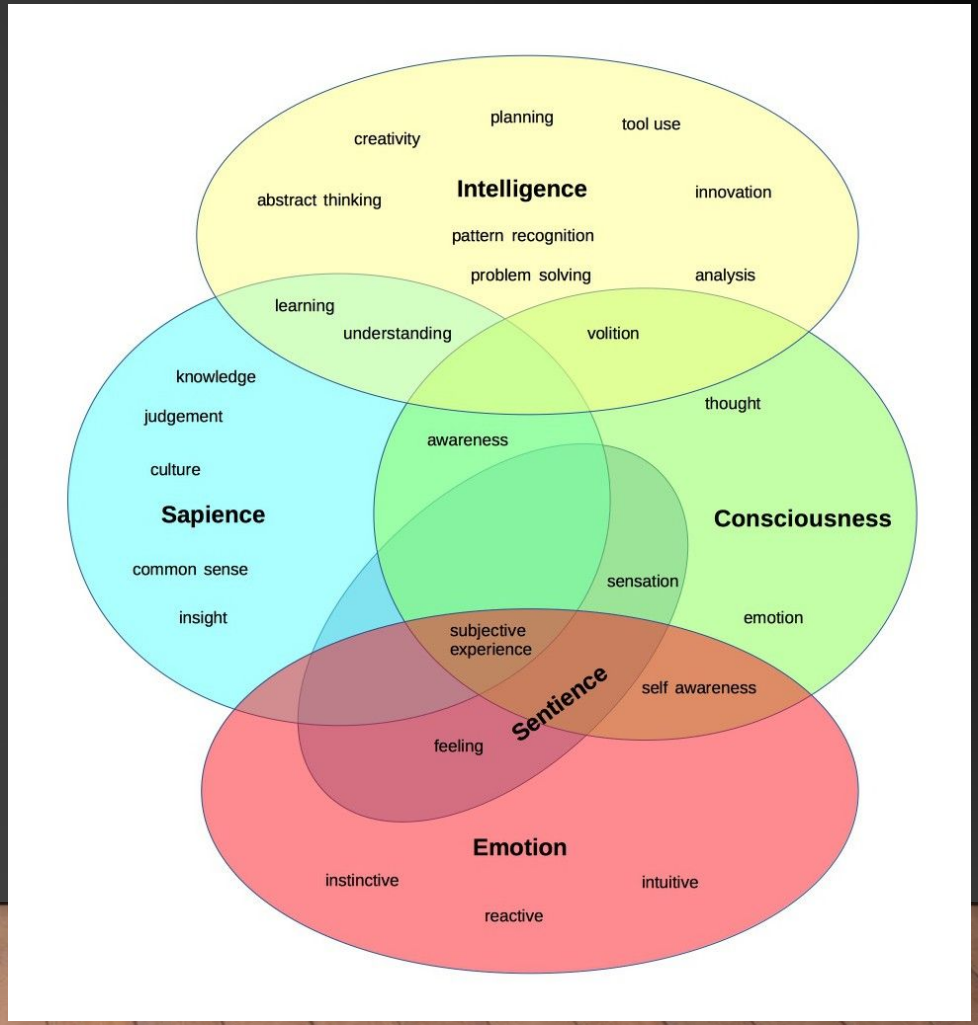
On a different spectrum

On similar lines there exist narrow/weak AI, general AI and super/strong AI

ANI or Artificial Narrow Intelligence is the ability to be intelligent in specific scenarios (eg. Image Classification, Sentiment Analysis)

AGI or Artificial General Intelligence is the ability of be intelligent in many different scenarios (eg. General Problem Solver)

ASI or Artificial Super Intelligence is the ability to be intelligent beyond humans



AI Agent Types

AI Agents can be specified using the PEAS (Performance Measure, Environment, Actuator and Sensor) framework

Task Environments can be fully or partially observable, episodic or sequential, static or dynamic, discrete or continuous, stochastic or deterministic and allowing for single or multi-agents

There are 4 categories in which agents can be classified. These are

Simple Reflex agents (Condition-Action Setup - If the car in front is braking, initiate braking)

Model based Reflex agent (Model based agent keeps track of the current complete state of a partially observable environment using a model and then applies condition-action setup)

Goal based agents (Goal helps defines a desirable situation, like getting closer to the destination)

Utility based agents (Utility allows for handling tradeoffs - for eg speed vs safety while driving)

Expert Systems

In artificial intelligence, an expert system is a computer system emulating the decision-making ability of a human expert.

Expert systems are designed to solve complex problems by reasoning through bodies of knowledge, represented mainly as if–then rules rather than through conventional procedural code.

The first expert systems were created in the 1970s and then proliferated in the 1980s. Expert systems were among the first truly successful forms of artificial intelligence (AI) software.

Applications include MYCIN, an early backward chaining expert system written in 1970s that used artificial intelligence to identify bacteria causing severe infections, such as bacteremia and meningitis, and to recommend antibiotics, with the dosage adjusted for patient's body weight

Conventional System vs Expert System

Conventional System	Expert System
Knowledge and processing are combined in one unit.	Knowledge database and the processing mechanism are two separate components.
The programme does not make errors (Unless error in programming).	The Expert System may make a mistake.
The system is operational only when fully developed.	The expert system is optimized on an ongoing basis and can be launched with a small number of rules.
Step by step execution according to fixed algorithms is required.	Execution is done logically & heuristically.
It needs full information.	It can be functional with sufficient or insufficient information.

From Guru99's expert systems with applications. Recommend checking it out

Turing Test

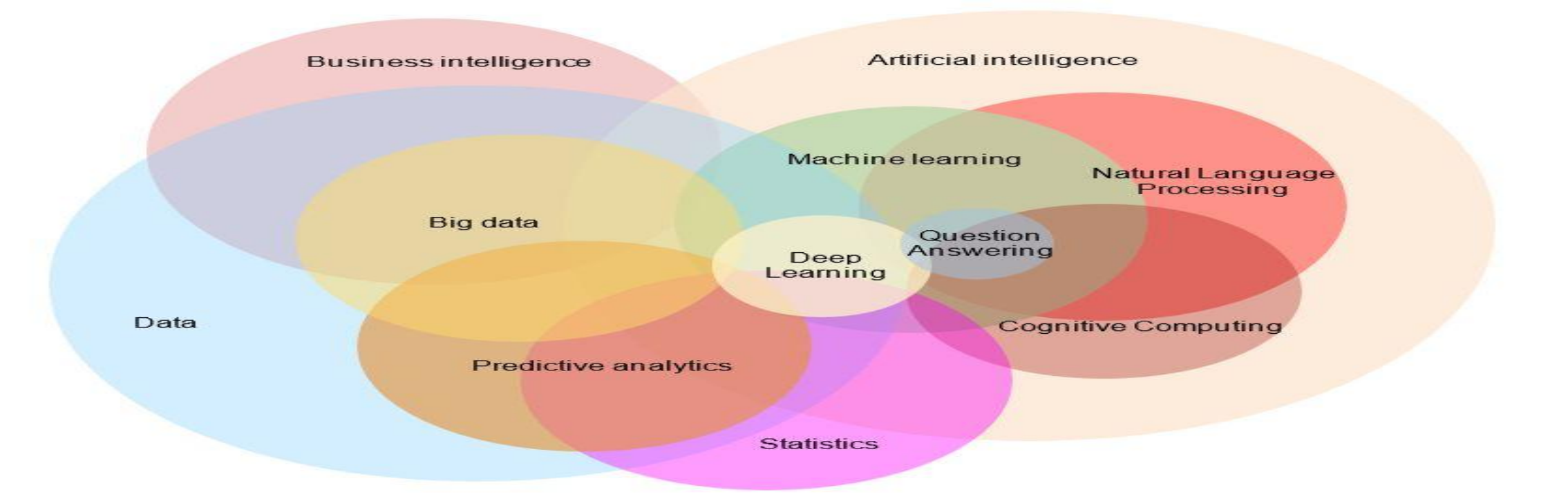
The Turing test, originally called the imitation game by Alan Turing in 1950,is a test of a machine's ability to exhibit intelligent behaviour equivalent to, or indistinguishable from, that of a human. Turing proposed that a human evaluator would judge natural language conversations between a human and a machine designed to generate human-like responses. The evaluator would be aware that one of the two partners in conversation is a machine, and all participants would be separated from one another.

History of AI - Timeline

Decade	Summary
<1950s	Statistical methods are discovered and refined.
1950s	Pioneering machine learning research is conducted using simple algorithms.
1960s	Ray Solomonoff lays the foundations of a mathematical theory of AI, introducing universal Bayesian methods for inductive inference and prediction.
1970s	Marvin Minsky and Seymour Papert publish Perceptrons, demonstrating previously unrecognized limits of this feed-forward two-layered structure. This book is considered by some to mark the beginning of the AI winter of the 1970s, a failure of confidence and funding for AI due to pessimism in the promise of AI
1980s	First expert system shells and commercial applications. Rediscovery of backpropagation causes a resurgence in ML research. Lack of generality in expert systems and expenses required to maintain them lead to a second AI Winter (88-93)
1990s	Work on AI shifts from a knowledge-driven approach to a data-driven approach. Scientists begin creating programs for computers to analyze large amounts of data and draw conclusions – or "learn" – from the results. Support vector machines (SVMs) and recurrent neural networks (RNNs) become popular.
2000s	Support Vector Clustering and other Kernel methods and unsupervised machine learning methods become widespread.
2010s	Deep learning becomes feasible, leading to AI becoming integral to many widely used software services and applications.
2020s	Large Language Models including ChatGPT, Bard and AutoGPT lead to massive shifts in how questions are answered

Based on Wikipedia

How does it work with the other terms?



Applications of AI

AI applications include advanced web search engines (e.g., Google Search), recommendation systems (used by YouTube, Amazon, and Netflix), understanding human speech (such as Siri and Alexa), self-driving cars (e.g., Waymo), generative or creative tools (ChatGPT and AI art), automated decision-making, and competing at the highest level in strategic game systems (such as chess and Go)

The AI Effect

As machines become increasingly capable, tasks considered to require "intelligence" are often removed from the definition of AI, a phenomenon known as the AI effect.

For instance, optical character recognition is frequently excluded from things considered to be AI, having become a routine technology.

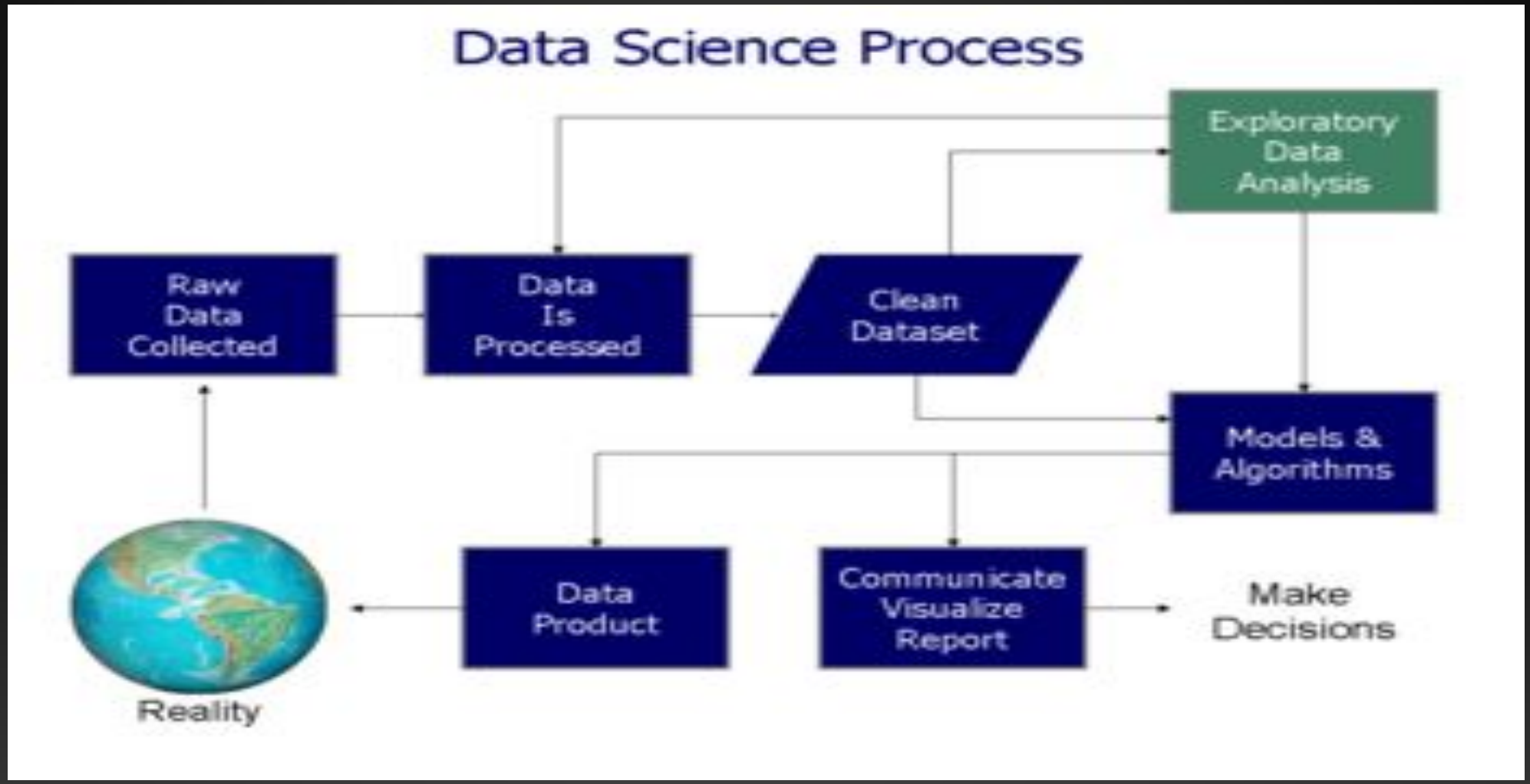
Data Science

I didn't think I'd be studying Science after School

WHAT IS DATA SCIENCE?

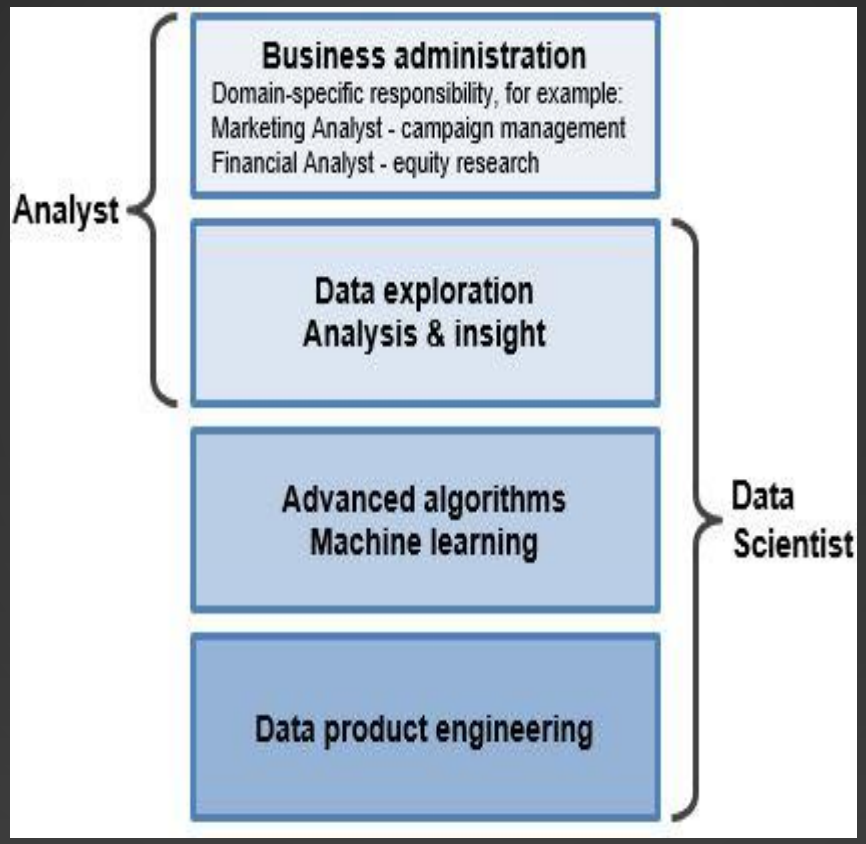
- Data science is all about uncovering findings from data. Diving in at a granular level to mine and understand complex behaviors, trends, and inferences. It's about surfacing hidden insight that can help enable companies to make smarter business decisions.
- Data science is a "concept to unify statistics, data analysis and their related methods" in order to "understand and analyze actual phenomena" with data. It employs techniques and theories drawn from many fields within the broad areas of mathematics, statistics, information science, and computer science, in particular from the subdomains of machine learning, classification, cluster analysis, data mining, databases, and visualization.

"Hiding within those mounds of data is knowledge that could change the life of a patient, or change the world."



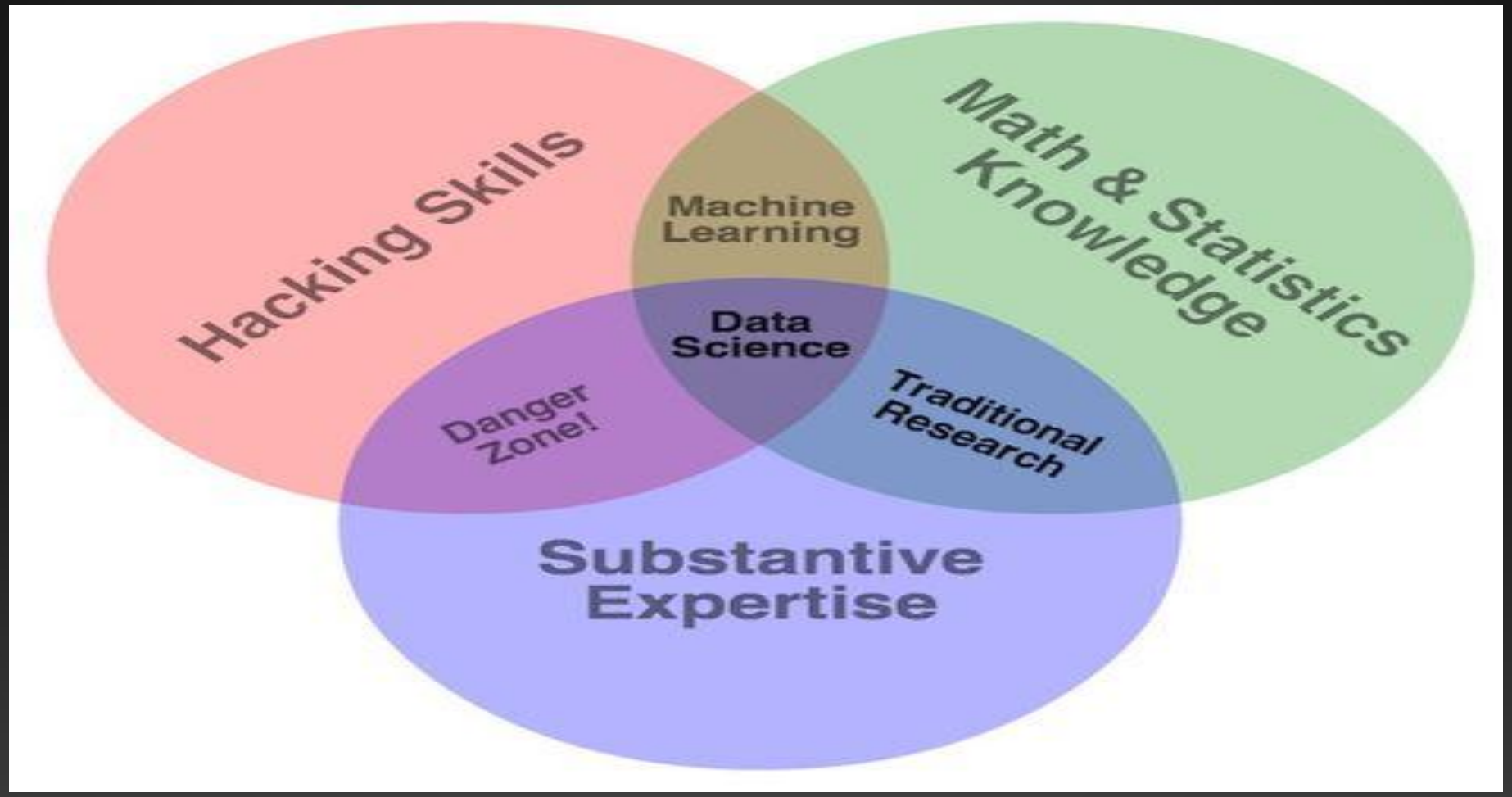
"If we have data, let's look at data. If all we have are opinions, let's go with mine." – Jim Barksdale, former Netscape CEO

DATA SCIENTIST VS DATA ANALYST

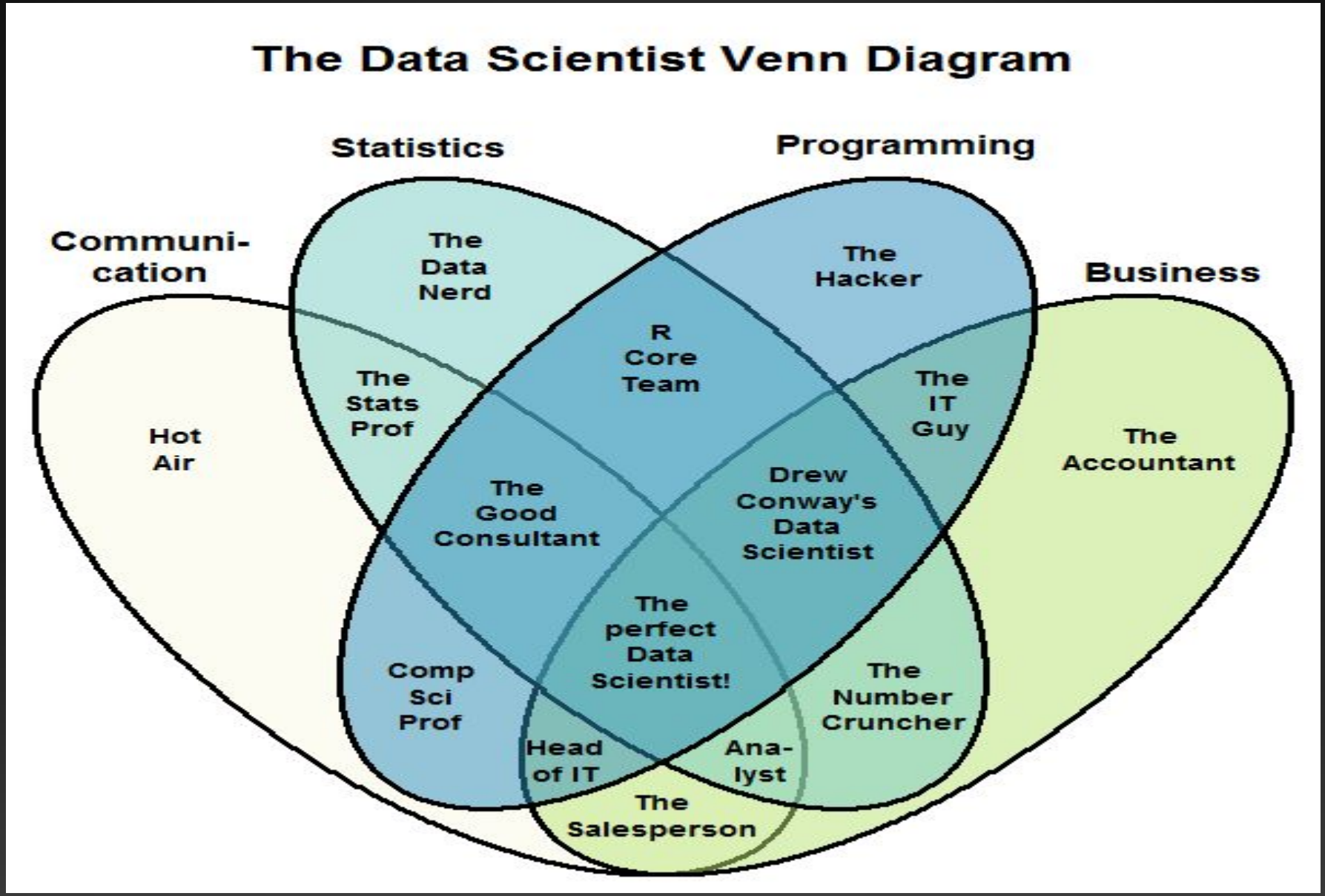


In God we trust. All others must bring data. ~ W. Edwards Deming, statistician

DREW CONWAY'S VENN DIAGRAM



"There were 5 exabytes of information created between the dawn of civilization through 2003, but that much information is now created every 2 days."



"War is 90% information." – Napolean Bonaparte

WHAT IT IS NOT?

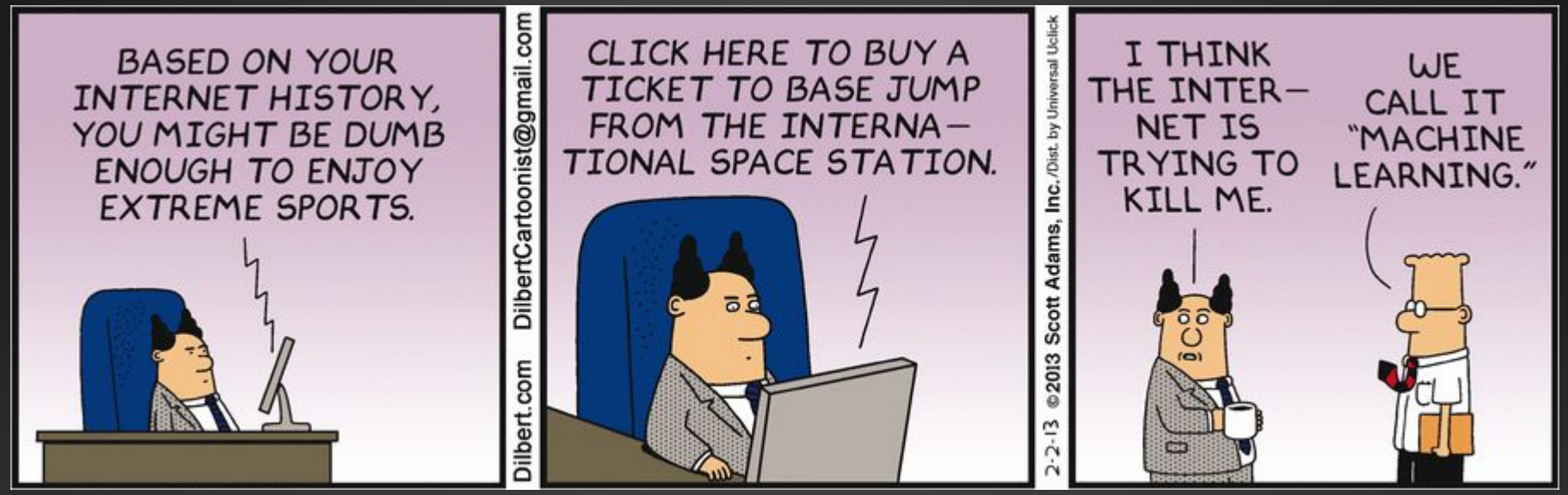
- Not only about large volumes of data
- Not about empirical methods without scientific foundations
- Not information science although often mis-referred
  - **Data** is a raw, unorganized set o things that need to be processed to have a meaning.
  - **Information** is when data was processed, organized, structured or presented in a given context so as to make it useful.

Data science is about automating data science

MACHINE LEARNING

- AN OVERVIEW

MACHINE LEARNING



Torture the data, and it will confess to anything. ~ Ronald Coase, Economics, Nobel Prize Laureate

WHAT IS MACHINE LEARNING?

- **Machine learning** is a type of artificial intelligence (AI) that provides computers with the ability to learn without being explicitly programmed. **Machine learning** focuses on the development of computer programs that can teach themselves to grow and change when exposed to new data.
- Writing software is the bottleneck, let the data do the work.
- E.g.: Intention Detection
- Scary Future?

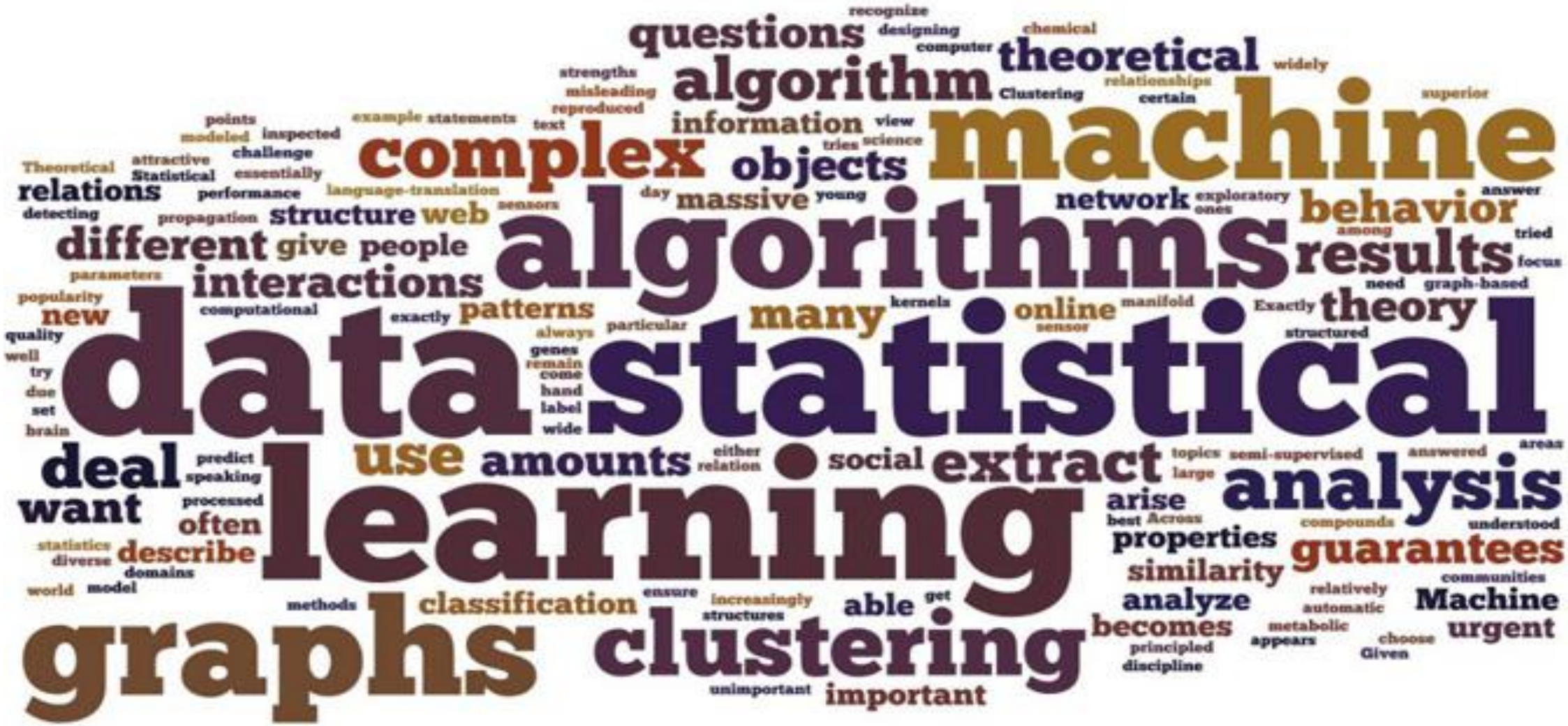
"Errors using inadequate data are much less than those using no data at all." – Charles Babbage

Traditional Programming

Machine Learning

Robotics

"A breakthrough in machine learning would be worth ten Microsofts" -- Bill Gates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MACHINE LEARNING VS ARTIFICIAL INTELLIGENCE

- AI consists of
  - Systems that think rationally (Structured thought, syllogisms, formal logic)
  - Systems that act rationally (Expected Utility Maximization, Rational Agents)
  - Systems that think like humans (Cognitive Information Processing, General Problem Solver, Systems that build internal models of their world)
  - Systems that act like humans (Robotics, NLP, ML, Vision, Knowledge Representation, Automated Reasoning, Turing Test)
  - Image Tagging
  - Climate Forecast

If there are up to 3 variables, it is statistics. If the problem is NP-complete, it is machine learning.
If the problem is PSPACE- complete, it is AI. If you don't know what is PSPACE-complete, it is data mining.

TYPES OF MACHINE LEARNING

- Supervised Learning
- Unsupervised Learning
- Reinforcement Learning (e.g. Robotic House Assistant)
- Semi-supervised Learning
- Active Learning, Developmental Learning (e.g. Pandora)
- Meta Learning, Learning to learn

"People worry that computers will get too smart and take over the world, but the real problem is that they're too stupid and they've already taken over the world." — Pedro Domingos

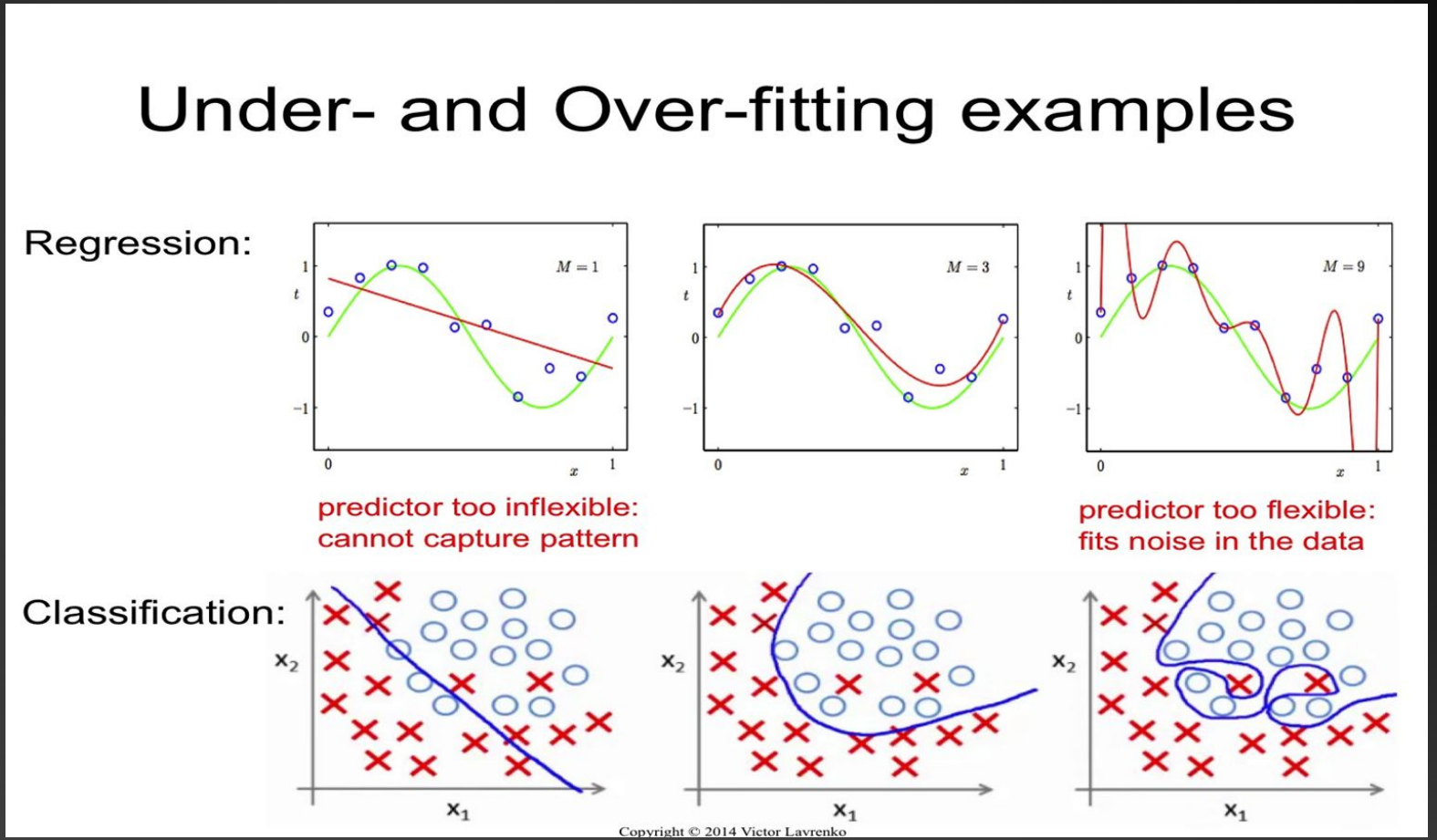
SOME INTERESTING MACHINE LEARNING TECHNIQUES

- Linear and Logistic Regression
- Decision Trees, Random Forests and Boosting
- Support Vector Machines
- K-means Clustering
- Principle Component Analysis/ Independent Component Analysis
- US Postal Service
- Image Similarity

"The question of whether a computer can think is no more interesting than the question of whether a submarine can swim." — Edsger W. Dijkstra

INTERESTING CHALLENGES

- Underfitting
- Overfitting
- Class Skew
- Missing Values
- Unlabeled Data
- Cold Start
- Electronic Tolling



"I'd much rather have a good ML system diagnose my disease than the median or average doctor – Vinod Khosla

Machine Learning

what society thinks I do

what my friends think I do

what my parents think I do

$$L_p = \frac{1}{2}\|w\|^2 - \sum_{i=1}^{l} \alpha_i y_i (x_i \cdot w + b) + \sum_{i=1}^{l} \alpha_i$$

$$\alpha_i \geq 0 \forall i$$

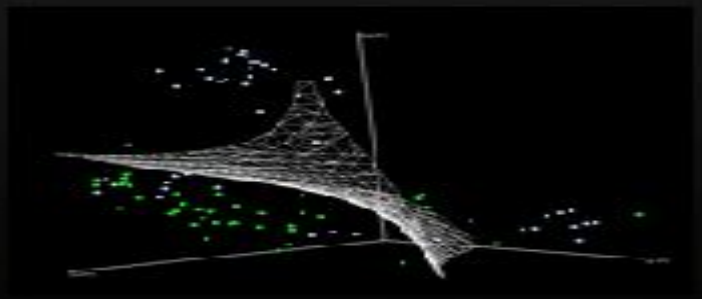
$$w = \sum_{i=1}^{l} \alpha_i y_i x_i \quad \sum_{i=1}^{l} \alpha_i y_i = 0$$

$$\nabla J(\theta_t) = \frac{1}{m} \sum_{i=1}^{m} \nabla \ell(x_i, y_i; \theta_t) + \nabla r(\theta_t)$$

$$\theta_{t+1} = \theta_t - \eta_t \nabla \ell(x_{\pi(t)}, y_{\pi(t)}; \theta_t) = \eta_t \cdot \nabla r(\theta_t)$$

$$\mathbb{E}_{\pi(t)}[\ell(x_{\pi(t)}, y_{\pi(t)}; \theta_t)] = \frac{1}{m} \sum_i \ell(x_i, y_i; \theta_t).$$

what other programmers think I do



what I think I do

```
>>> from scipy import SVM
```

what I really do

THE MACHINE LEARNING PROCESS

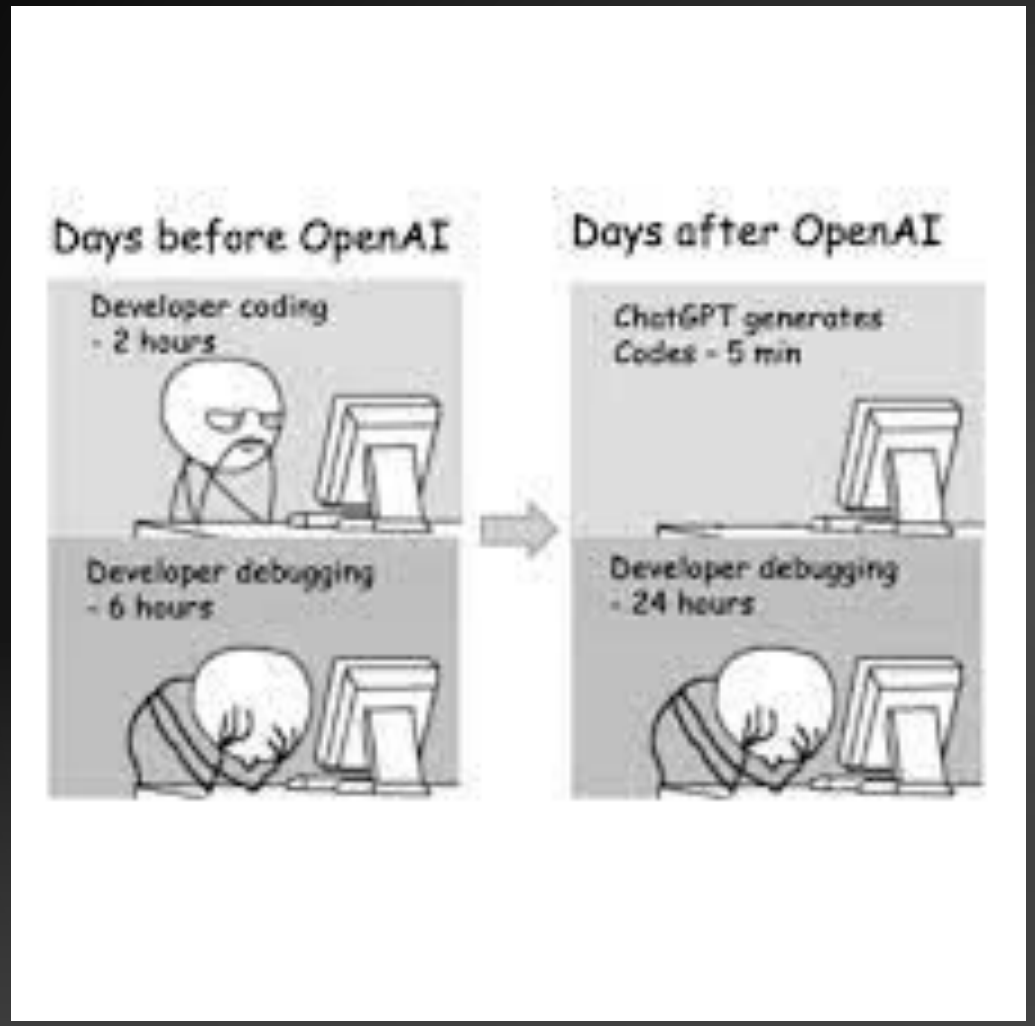
- Data Gathering and Cleansing
- Feature Recognition
- Model Identification
- Evaluation Parameters and Performance Metrics
- Feature Set Optimization
- Model Training
- Model Tuning
- Recommender System

"Whether we are based on carbon or on silicon makes no fundamental difference; we should each be treated with appropriate respect." — Arthur C. Clarke

WHEN TO USE ML?

-- Rule based systems will not always work or will require very frequent updates
-- Accuracy Guarantees are not a requirement or you can work around them
-- Reverse Engineering (whys?) are not expected or can be worked around
-- You have a large amount of labelled data (for supervised)
MogIA

"Machine learning is going to result in a real revolution" -- Greg Papadopoulos, former CTO, Sun

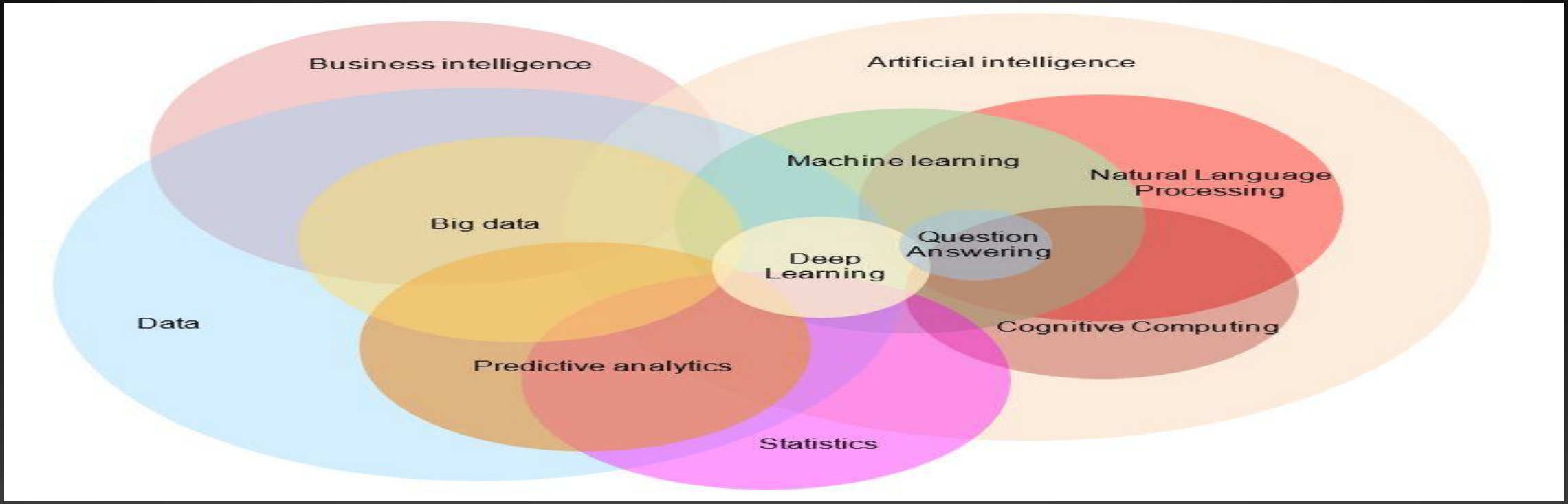


Natural Language Processing

GOAL OF NLP IS TO WRITE COMPUTER PROGRAMS THAT CAN INTERPRET NATURAL (HUMAN) LANGUAGES

NATURAL LANGUAGE PROCESSING

- **Natural language processing** (**NLP**) is an area of computer science and artificial intelligence concerned with the interactions between computers and human (natural) languages, in particular how to program computers to process and analyze large amounts of natural language data.



"There is no greater impediment to the advancement of knowledge than the ambiguity of words" — Thomas Reid

PROJECT DEBATER IN A DEBATE

https://www.youtube.com/watch?v=PkSzmnA1CQQ

MOSTLY SOLVED!! ☺

Spam detection

Let's go to Agra! ✓

Buy V1AGRA … ✗

Part-of-speech (POS) tagging

ADJ ADJ NOUN VERB ADV

Colorless green ideas sleep furiously.

Named entity recognition (NER)

PERSON ORG LOC

Einstein met with UN officials in Princeton

SOMEWHAT SOLVED!! ☺

Sentiment analysis

Best roast chicken in San Francisco!

The waiter ignored us for 20 minutes.

Word sense disambiguation

I need new batteries for my ***mouse***.

Machine translation (MT)

第13届上海国际电影节开幕…

The 13th Shanghai International Film Festival…

Coreference resolution

Carter told Mubarak he shouldn't run again.

Parsing

I can see Alcatraz from the window!

Information extraction (IE)

You're invited to our dinner party, Friday May 27 at 8:30

Party May 27 add

STILL VERY HARD! ☹

Question answering (QA)

Q. How effective is ibuprofen in reducing fever in patients with acute febrile illness?

Paraphrase

XYZ acquired ABC yesterday

ABC has been taken over by XYZ

Summarization

The Dow Jones is up

Housing prices rose

The S&P500 jumped

Economy is good

Dialog

Where is Citizen Kane playing in SF?

Castro Theatre at 7:30. Do you want a ticket?

"The knowledge products that can be generated of NLP are capable of being deployed to everyone's desk" — Steve Gardner

CHALLENGES WITH NLP

non-standard English

Great job @justinbieber! Were SOO PROUD of what youve accomplished! U taught us 2 #neversaynever & you yourself should never give up either❤️

ambiguity

Red tape holds up new bridges
Hospitals Are Sued by 7 Foot Doctors
Juvenile Court to Try Shooting Defendant
Local High School Dropouts Cut in Half

idioms

dark horse
get cold feet
lose face
throw in the towel

neologisms

unfriend
Retweet
bromance

world knowledge

Mary and Sue are sisters.
Mary and Sue are mothers.

tricky entity names

Where is *A Bug's Life* playing …
Let It Be was recorded …
… a mutation on the *for* gene …

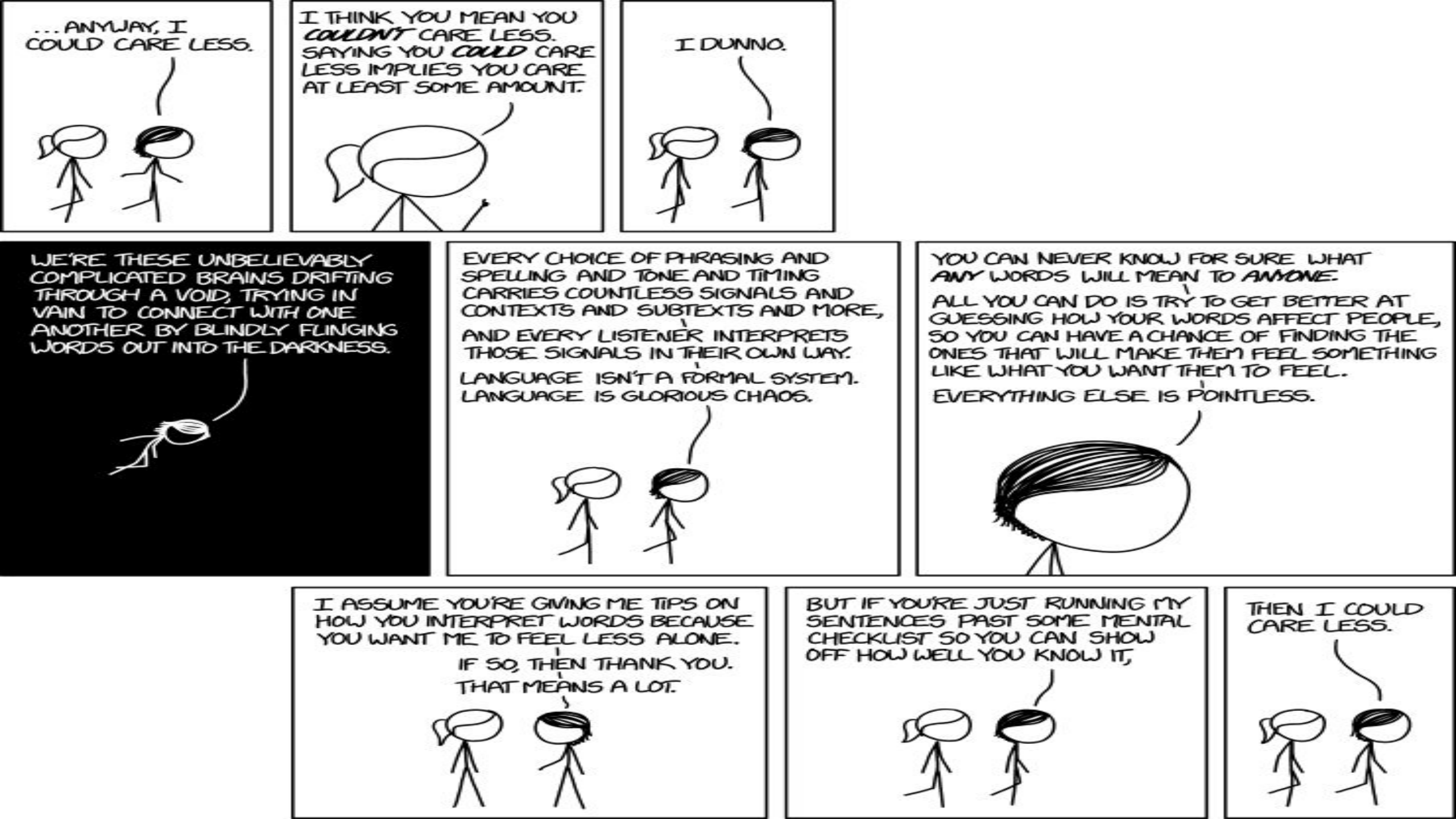
But that's what makes it fun!

"80% of the data in the enterprise is unstructured, a lot of it is text

AutoGPT and Duplex Innovations

https://www.youtube.com/watch?v=ixtAXlKhmSo

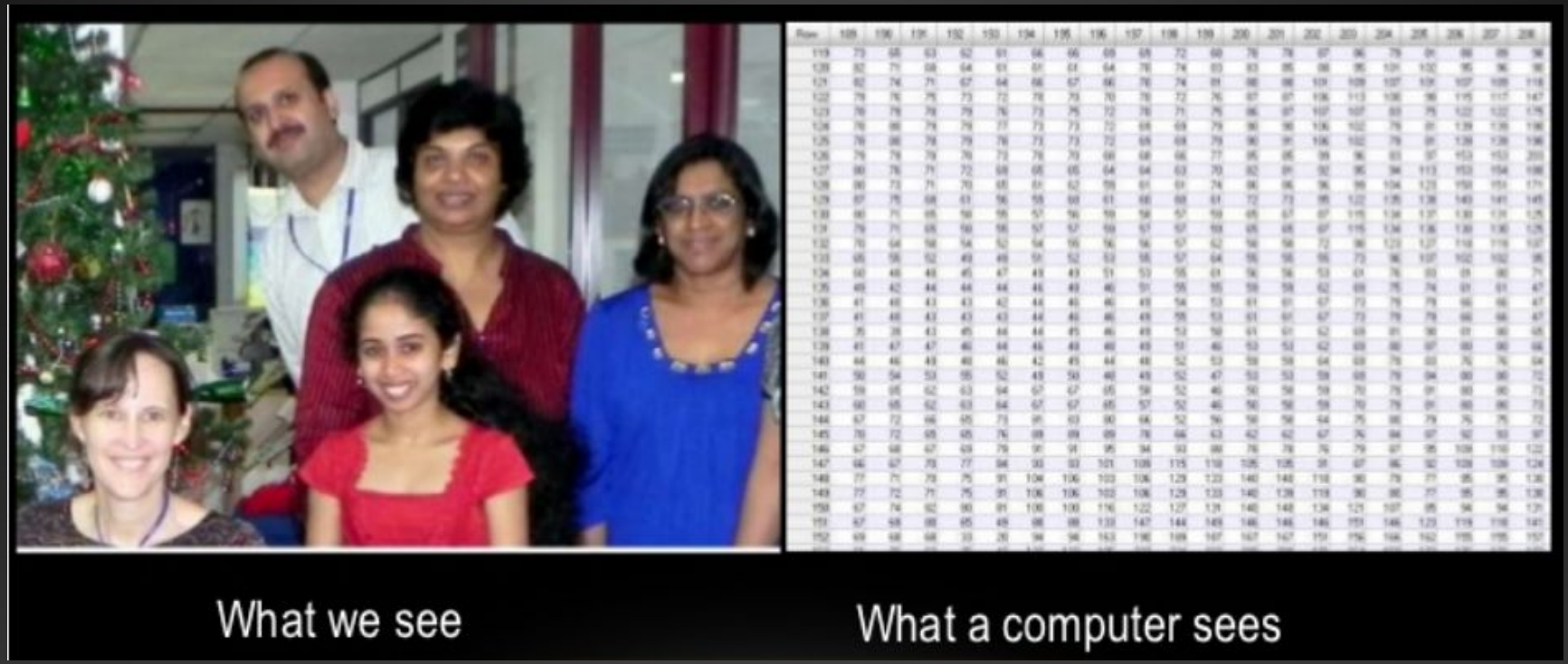
Google Video: https://www.youtube.com/watch?v=nTt8EEa53fA&t=488s


...ANYWAY, I COULD CARE LESS.
I THINK YOU MEAN YOU COULDN'T CARE LESS. SAYING YOU COULD CARE LESS IMPLIES YOU CARE AT LEAST SOME AMOUNT.
I DUNNO.
WE'RE THESE UNBELIEVABLY COMPLICATED BRAINS DRIFTING THROUGH A VOID, TRYING IN VAIN TO CONNECT WITH ONE ANOTHER BY BLINDLY FLINGING WORDS OUT INTO THE DARKNESS.
EVERY CHOICE OF PHRASING AND SPELLING AND TONE AND TIMING CARRIES COUNTLESS SIGNALS AND CONTEXTS AND SUBTEXTS AND MORE,
AND EVERY LISTENER INTERPRETS THOSE SIGNALS IN THEIR OWN WAY.
LANGUAGE ISN'T A FORMAL SYSTEM. LANGUAGE IS GLORIOUS CHAOS.
YOU CAN NEVER KNOW FOR SURE WHAT ANY WORDS WILL MEAN TO ANYONE.
ALL YOU CAN DO IS TRY TO GET BETTER AT GUESSING HOW YOUR WORDS AFFECT PEOPLE, SO YOU CAN HAVE A CHANCE OF FINDING THE ONES THAT WILL MAKE THEM FEEL SOMETHING LIKE WHAT YOU WANT THEM TO FEEL.
EVERYTHING ELSE IS POINTLESS.
I ASSUME YOU'RE GIVING ME TIPS ON HOW YOU INTERPRET WORDS BECAUSE YOU WANT ME TO FEEL LESS ALONE.
IF SO, THEN THANK YOU.
THAT MEANS A LOT.
BUT IF YOU'RE JUST RUNNING MY SENTENCES PAST SOME MENTAL CHECKLIST SO YOU CAN SHOW OFF HOW WELL YOU KNOW IT,
THEN I COULD CARE LESS.

COMPUTER VISION

GOAL OF COMPUTER VISION IS TO WRITE COMPUTER PROGRAMS THAT CAN INTERPRET IMAGES

CHALLENGES WITH COMPUTER VISION



A picture is worth a thousand words (rather numbers ☺)

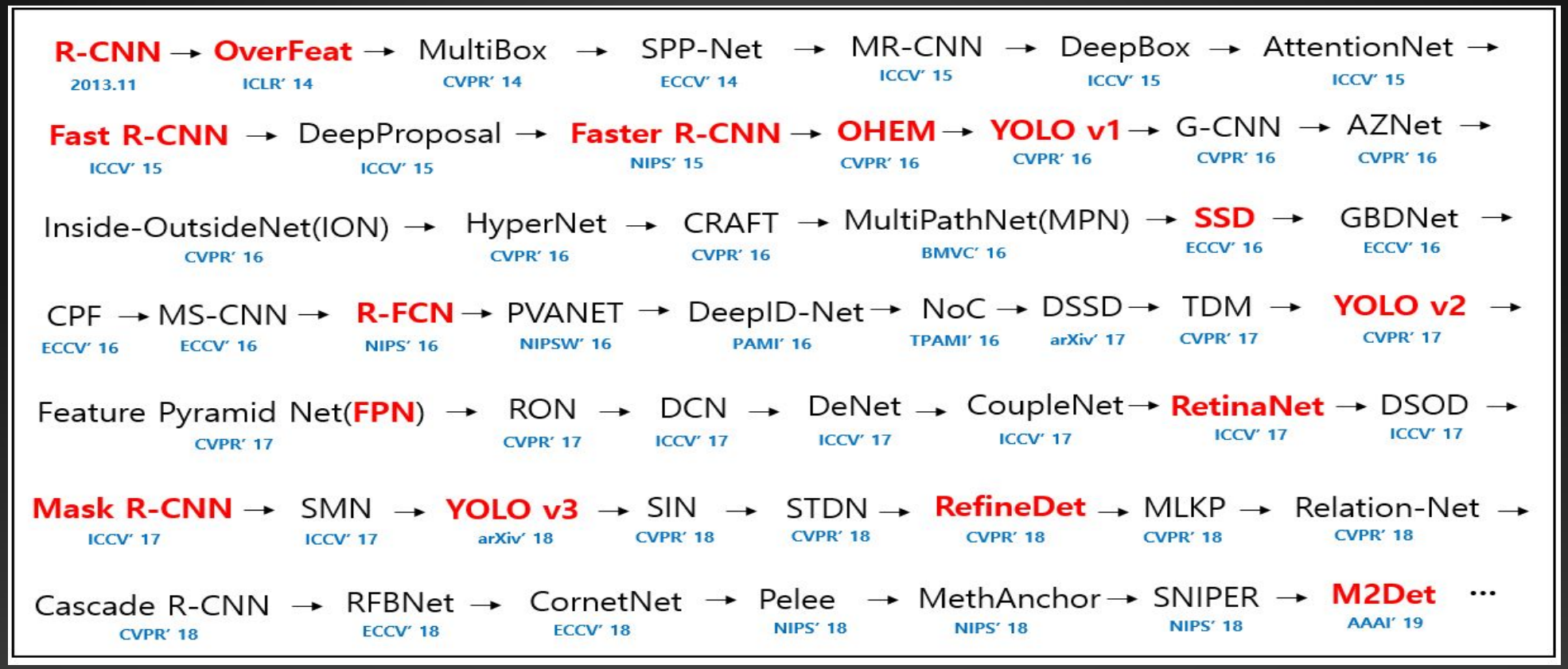
HUMAN VISION

- Vision is an amazing feat of natural intelligence
  - Visual cortex occupies about 50% of Macaque brain
  - More human brain devoted to vision than anything else
  - About 30,000 visual categories, learnt by 6 years (~13.5/day)
- Machines can't replicate Human Image Recognition yet, they do not possess our ability to recognize distorted images
- Drawing to Images

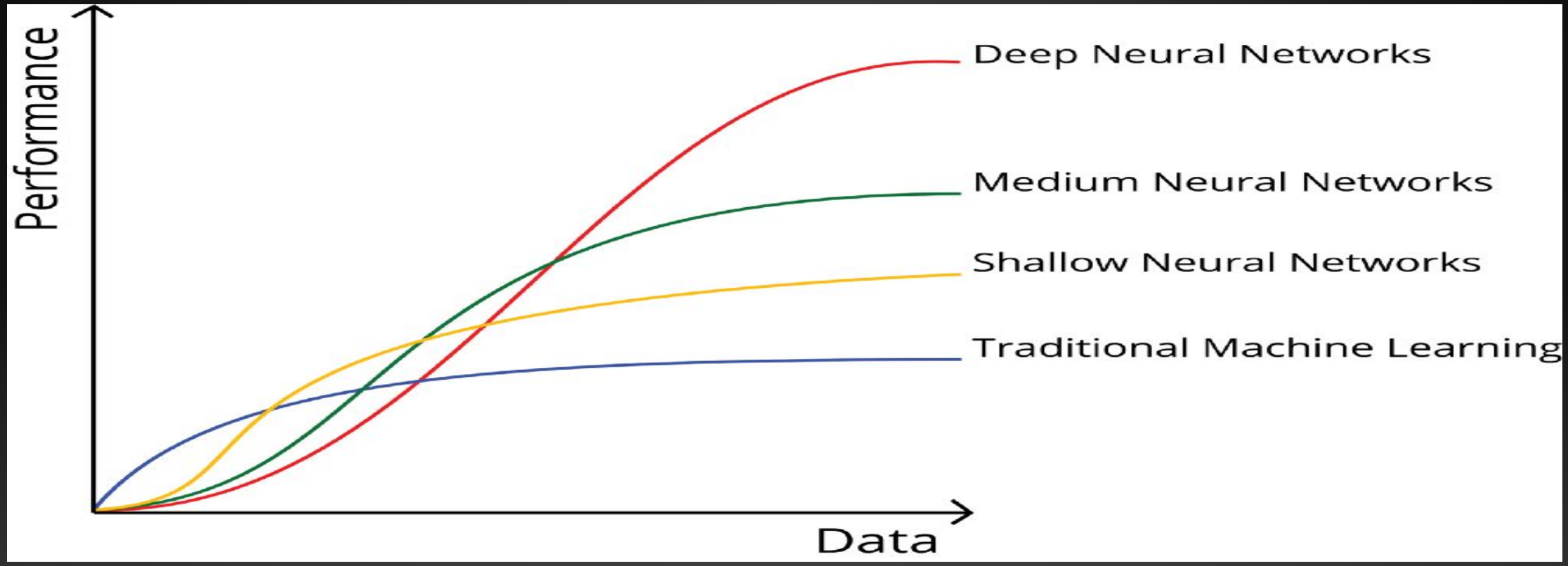
APPLICATIONS

- OCR
- Face Detection
- Smile Detection
- Face Recognition
- Medical Imaging
- Self-driving cars
- Sports Technologies
- Gaming Technologies

ADVANCES IN OBJECT DETECTION



DEEP LEARNING



Neural Networks and Deep Learning

HUMAN WINS IBM DEBATER

RECENT HEADLINES IN BLOOMBERG

INTERESTING DEMOS

- Language Translation
- Self driving Car
- Retail Store
- Duplex

You can't tell if a machine has gotten smarter or if you've just lowered your own standards of intelligence to such a degree that the machine seems smart.

And so it begins!!

I am exciiiiitttteeeddd!!