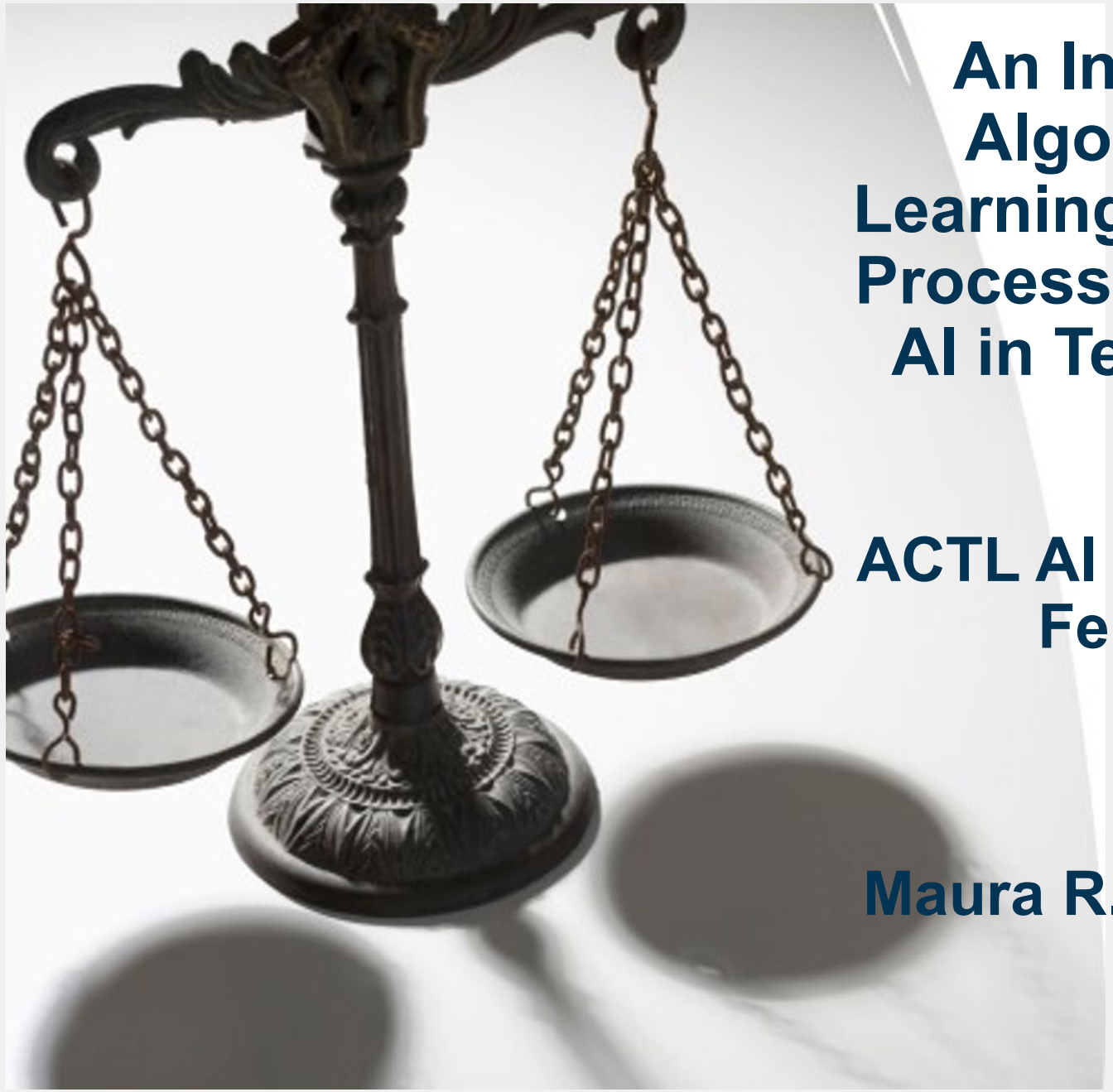

An Introduction to AI, Algorithms, Machine Learning, Natural Language Processing, and Generative AI in Ten Minutes or Less

ACTL AI in Trial CLE Program
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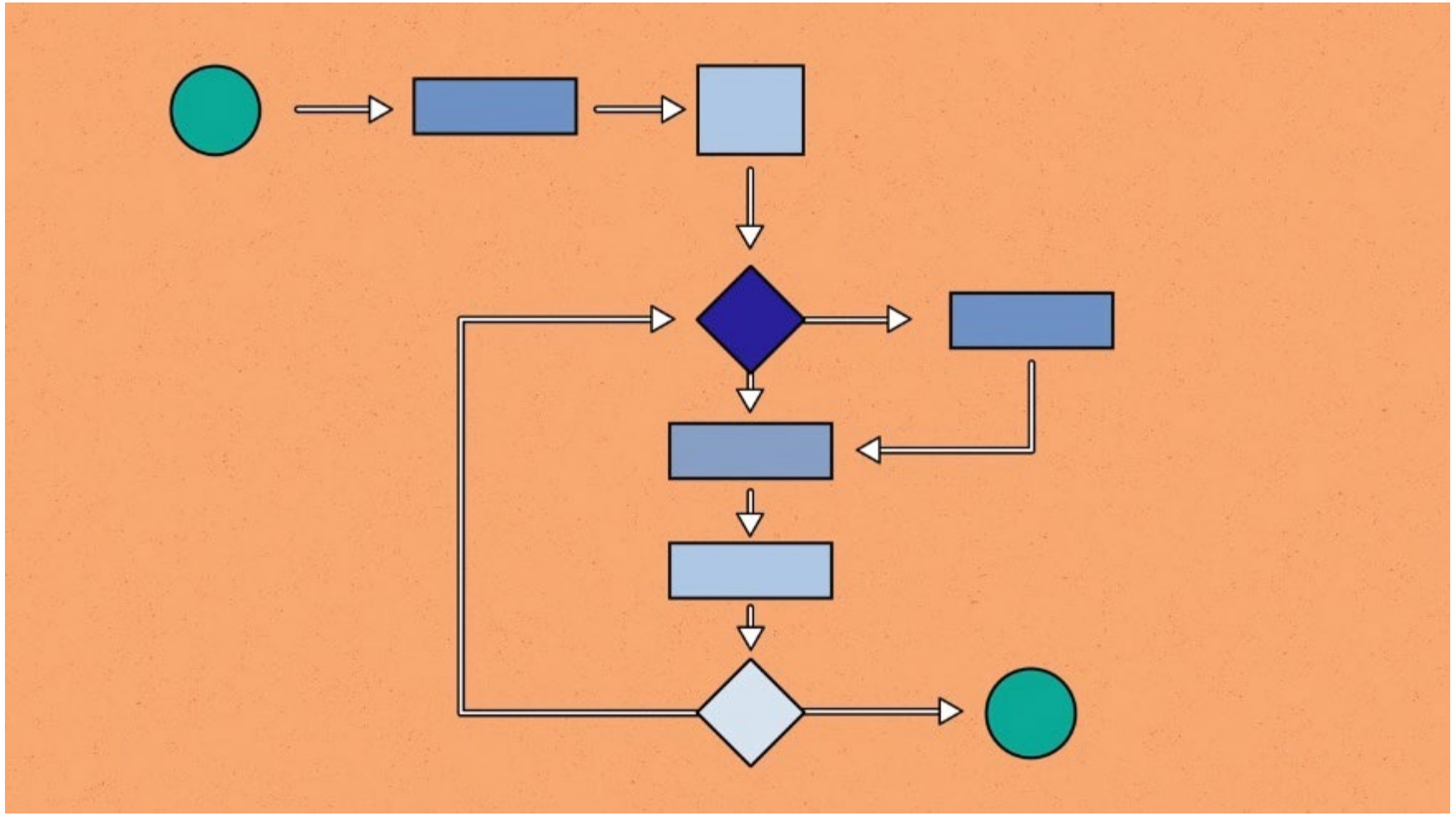
AI, Algorithms, Machine Learning, and Natural Language Processing

WHAT IS "ARTIFICIAL INTELLIGENCE"?

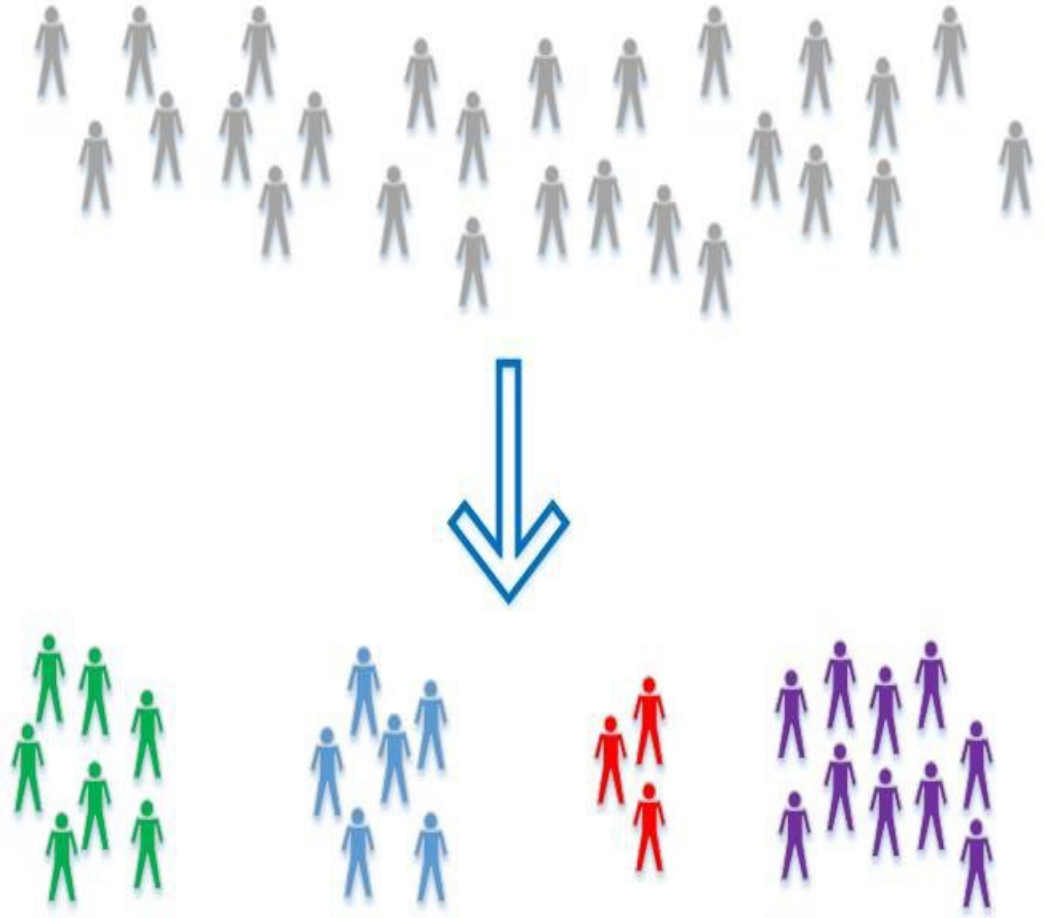
- Umbrella term first used at a conference in Dartmouth, NH, in 1956
- Computers doing intelligent things (*i.e.*, performing cognitive tasks) once thought to be the sole province of humans
- Not a single technology or function
- Whatever computers can't do … until they can
- Called "software" once we get used to it
- Slightly different than "automation" and "robotics"
- Generally involves algorithms, machine learning, and/or natural language processing ("NLP")

WHAT'S AN "ALGORITHM"?



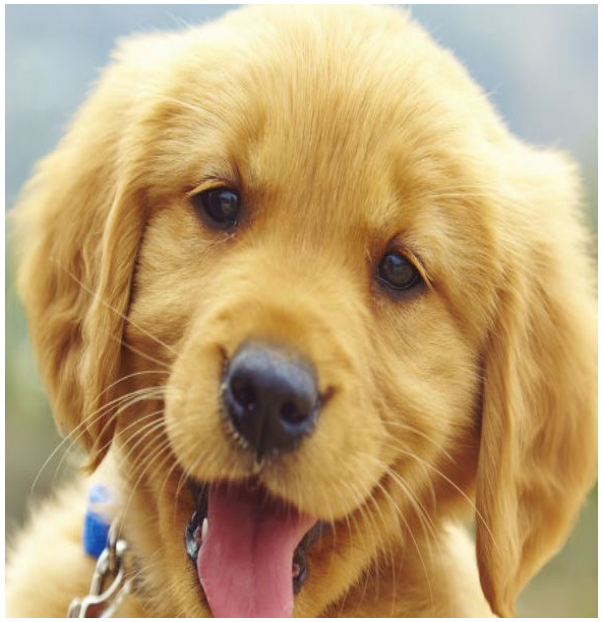
A set of instructions to complete a task. A recipe to bake a cake is an algorithm.

UNSUPERVISED MACHINE LEARNING



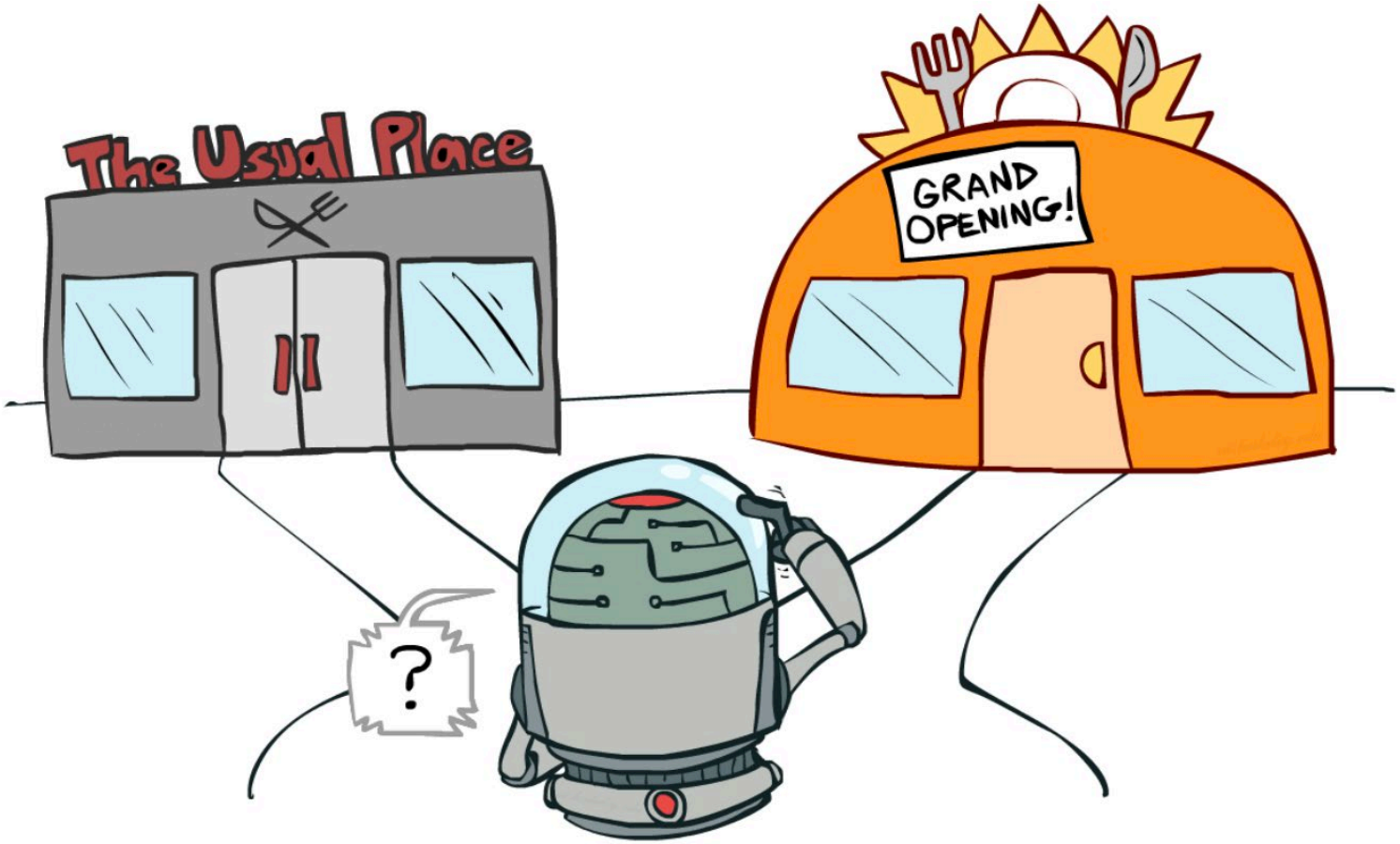
System automatically identifies naturally occurring patterns, clusters, groupings, or anomalies

SUPERVISED MACHINE LEARNING



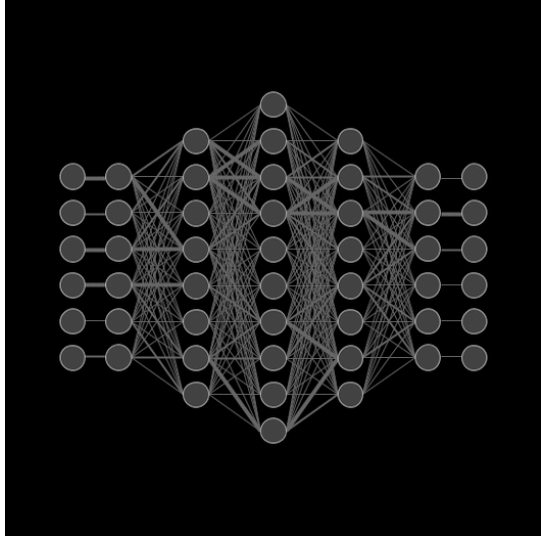
Human trains system to distinguish between two or more categories by providing the system with labeled examples from which it infers or learns the rules to distinguish them

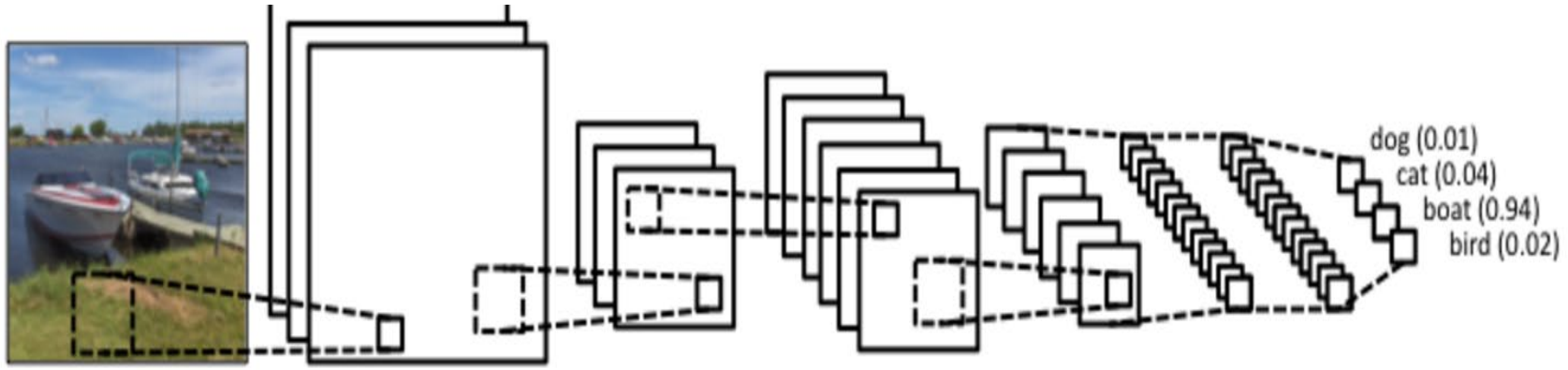
REINFORCEMENT LEARNING



Combines Exploration and Exploitation;
System begins at random but quickly learns goal from reinforcement provided by human feedback

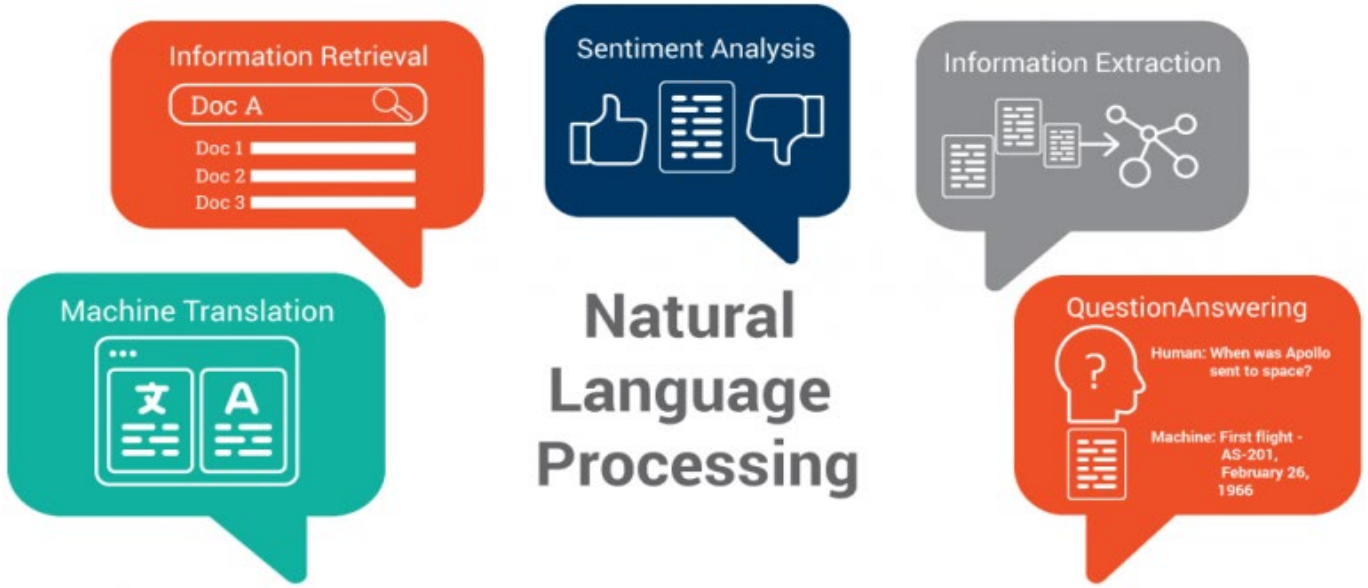
DEEP LEARNING





- Uses multiple layers of neural networks to transform complex input into mathematical representations and predictions
- Information from each layer is combined at the next layer (but creates a black-box problem!)
- Requires massive amounts of labeled training data to work

NATURAL LANGUAGE PROCESSING



Uses a computer to "understand" human language as it is written or spoken, or to create a computer representation of language (including both syntax and semantics)

- **Tokenization** → Splits longer strings into smaller pieces; determines word boundaries
- **Stemming** → Eliminates prefixes and suffixes from words
- **Bag of words** → Looks for co-occurrences of words in a document
- **Stop words** → Removes words that are noise and don't add meaning
- **Tf-idf** → Determines how important a word is to a document according to its frequency
- **Disambiguation of content** → Polisemy (*i.e.*, lead vs. lead)
- **Topic modeling** → Statistical models to discover abstract concepts

Generative AI

WHAT IS "GENERATIVE AI" ("GEN AI" OR "GAI")?

- A subset of AI that uses training on massive data sources — primarily from the Internet — to generate new content in response to a user prompt. It can converse, replicate specific styles, and excels at creative tasks and synthesizing or summarizing content.

- Gen AI falls under the broad categories of machine learning and natural language processing.

- It leverages neural networks (*i.e.*, deep learning) to analyze the underlying patterns and structures of data, enabling it to predict what should come next, or to generate fresh and unique content. (This explains why it "hallucinates!")

BRIEF HISTORY OF GEN AI: PRECURSORS TO LARGE LANGUAGE MODELS ("LLMS")

- **New or Not?**
  - **Claude Shannon (one of the founders of AI) wrote *Prediction and Entropy of Printed English* in 1951.**
  - **He would erase fragments of text and have humans guess what was erased.**
  - **Language models are statistical models applied to Shannon's prediction task. Historically used for things like data compression, information retrieval, author and spam detection.**
  - **In comes massive computing power + massive data + neural nets, convolutional neural nets, deep learning . . .**

A BRIEF HISTORY OF GEN AI: BREAKTHROUGHS FROM 2010 – 2022

- In 2014, Generative Adversarial Networks ("GANs") took a huge leap forward in their ability to create authentic-looking content.

- GANs introduce a new way for algorithms to learn: One algorithm (the generative network) creates content, and the other algorithm (the discriminative network) evaluates it against real data in an effort to distinguish them. This approach creates more and more realistic-looking content (and also explains why detection of Gen AI content is so difficult).

- GANs revolutionized image, audio, and video generation.

A BRIEF HISTORY OF GEN AI: BREAKTHROUGHS FROM 2010 – 2022 (CONT'D)

- In 2017, Google introduced the transformer architecture, a significant breakthrough in processing natural language which no longer required pre-labelled training data and allowed processing to occur in parallel (which is much faster).

- Another major change introduced with GPT-3 was the use of reinforcement learning, in which external (*i.e.*, human) feedback is used to modify and improve the output of the model.

APPLICATIONS OF GEN AI IN LEGAL

- **Gen AI will:**
  - **Enhance delivery of legal services by providing lawyers with tools to increase their productivity.**
  - **Enhance access to justice by providing tools to litigants unable to afford legal services or navigate the legal system.**

- **Gen AI will not:**
  - **Replace a lawyer's or judge's reasoning, critical thinking, compassion, empathy, etc.**

- **Gen AI can:**
  - **Analyze, translate, and summarize lengthy documents, *e.g.*, complex statutes or regulatory codes; witness transcripts to identify key people, events, or inconsistencies**
  - **Brainstorm ideas or (counter)arguments**
  - **Help with marketing and creative copy**
  - **Create outlines and draft or edit documents and presentations**
  - **Conduct research???**
  - **Respond to emails???**

RISKS OF GEN AI IN LEGAL

- Gen AI does not respect confidentiality or privacy; anything you enter may be used for training or other purposes unless you contract otherwise

- Gen AI does not guarantee the accuracy of its output
  - It sounds very confident and compelling
  - But, . . . it hallucinates
  - It reinforces stereotypes (as you saw!)
  - It is predicting things based on Internet content; your mileage may vary
  - It can be biased, toxic, and defamatory

- Gen AI is not secure and is subject to jailbreaking and other adversarial attacks (e.g., prompt injections)

- Gen AI content is likely not subject to copyright protection and may infringe on others' IP

QUESTIONS? THANK YOU!

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