Morgan Lewis

Ice Breaker:

Discuss the hypothetical below with your neighbors:

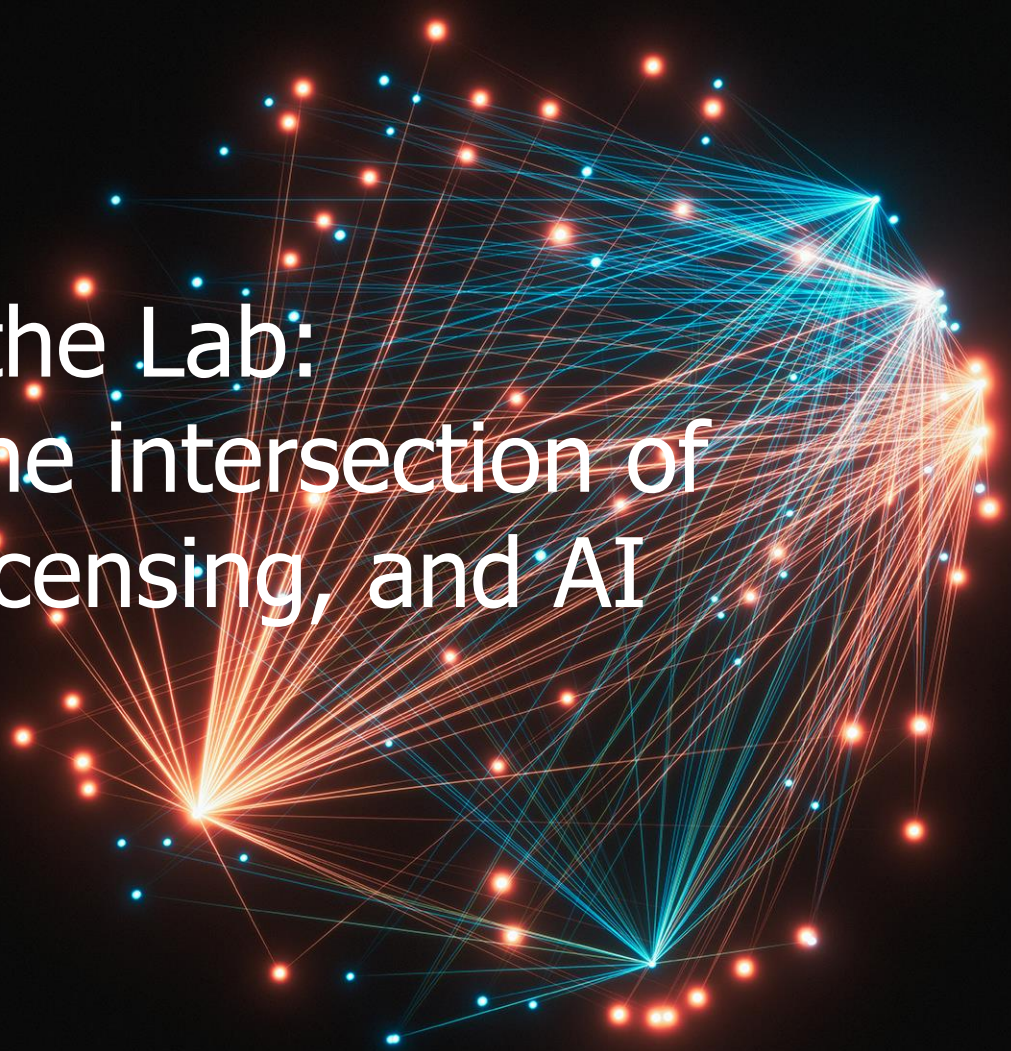
Your company owns a large amount of clinical trial data collected from a diverse patient population. This data is highly desirable to researchers.

What would you like to do with that data?

Morgan Lewis

Thinking Outside the Lab: Opportunities at the intersection of healthcare data, licensing, and AI

Jianbai “Jenn” Wang – Morgan Lewis

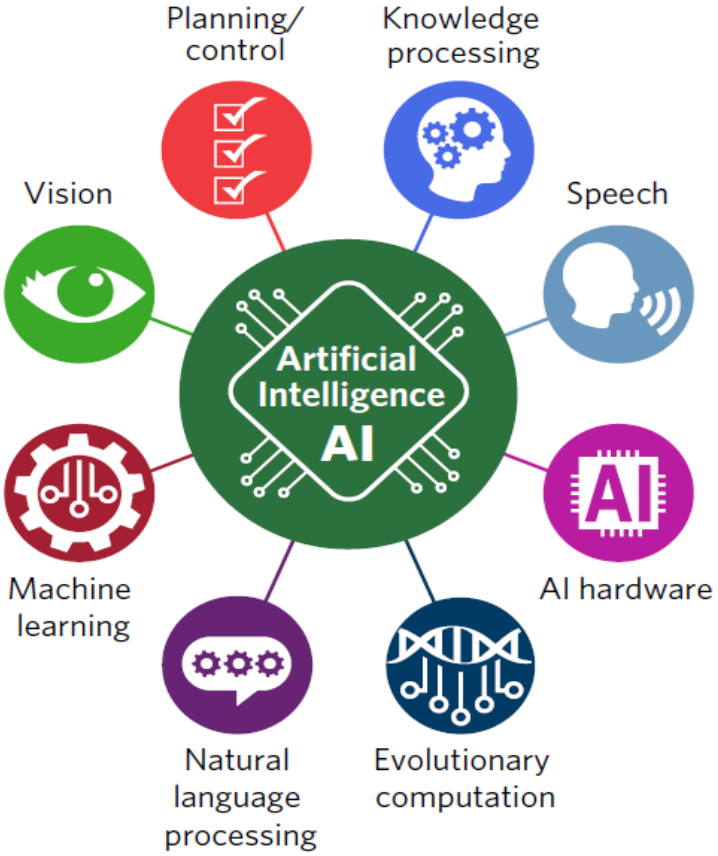


Background in Artificial Intelligence

The term “Artificial Intelligence” is very broad.

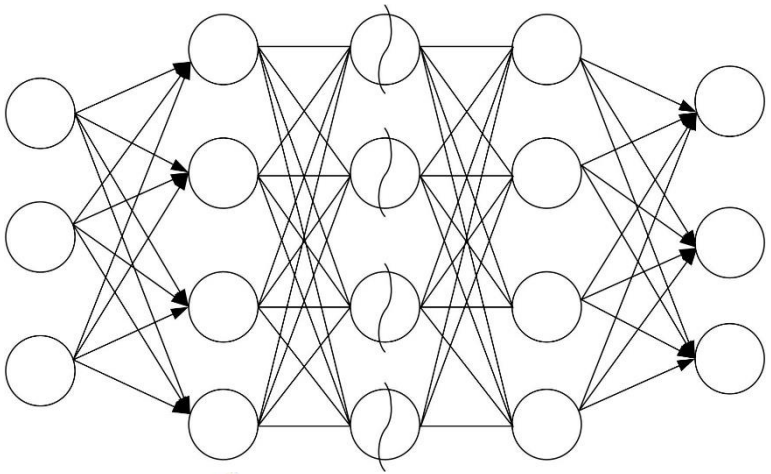
Table 1: The three components of learning algorithms.

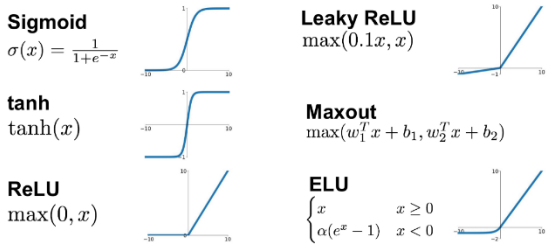
Representation	Evaluation	Optimization
Instances	Accuracy/Error rate	Combinatorial optimization
K-nearest neighbor	Precision and recall	Greedy search
Support vector machines	Squared error	Beam search
Hyperplanes	Likelihood	Branch-and-bound
Naive Bayes	Posterior probability	Continuous optimization
Logistic regression	Information gain	Unconstrained
Decision trees	K-L divergence	Gradient descent
Sets of rules	Cost/Utility	Conjugate gradient
Propositional rules	Margin	Quasi-Newton methods
Logic programs		Constrained
Neural networks		Linear programming
Graphical models		Quadratic programming
Bayesian networks		
Conditional random fields		

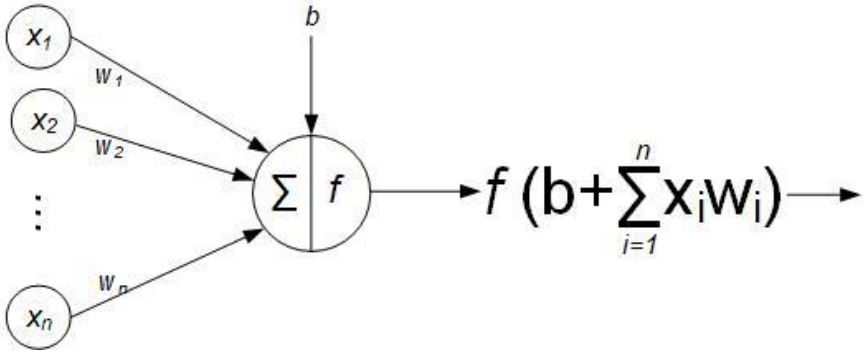


Background in Artificial Intelligence – Neural Network (NN)

- Applications: (non-abstract idea)
  - ❑ Image, Audio, Video, Text Processing
    - — Autonomous Driving
    - — Extended reality (augmented reality)
    - — Real time translation
  - ❑ Prediction and forecasting (weather, stock market)







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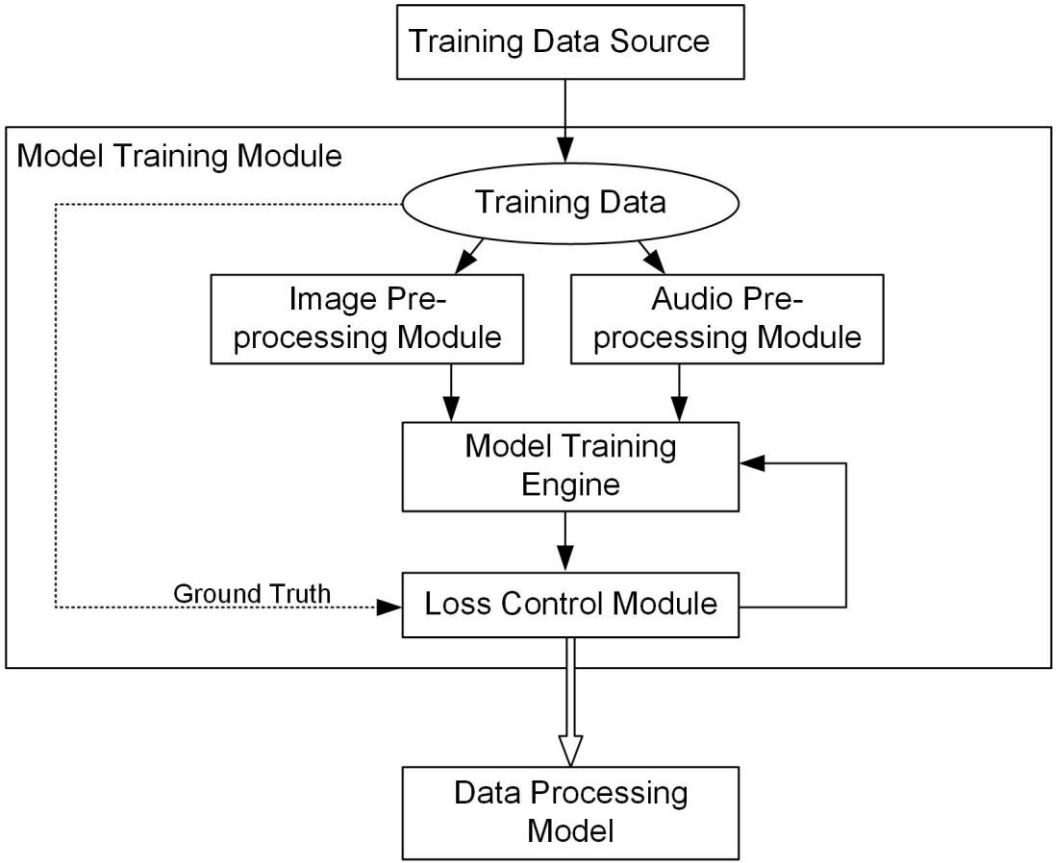
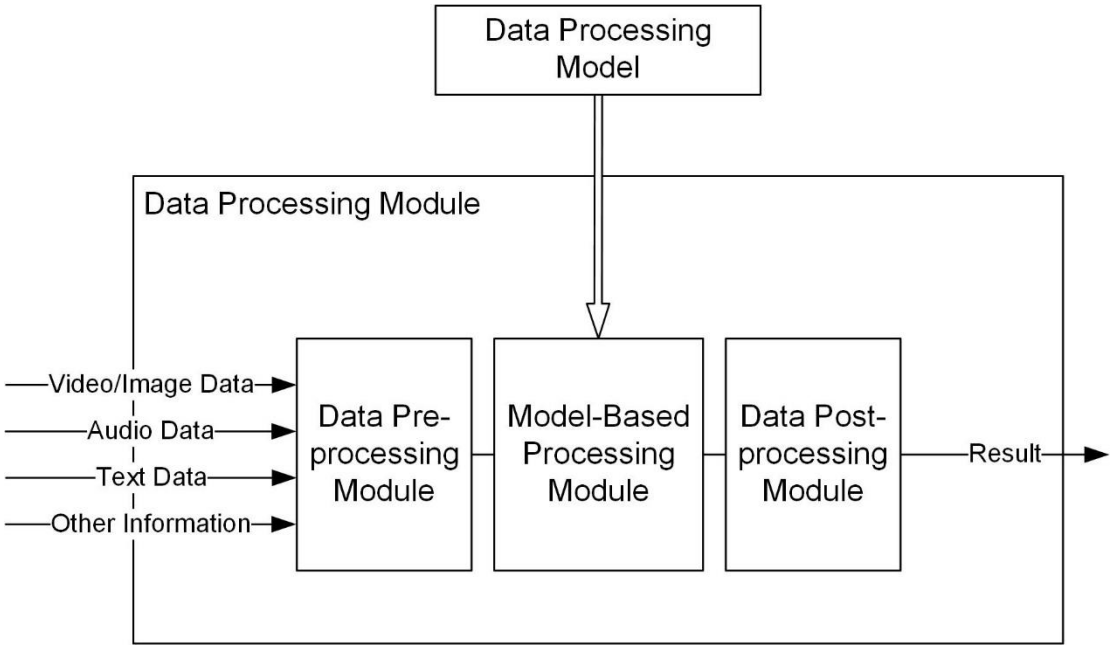
Background in Artificial Intelligence - Training

- Takes place on (1) a server, (2) electronic device, or (3) both
- Supervised, semi-supervised, or unsupervised training
- Examples of inventive ideas that achieve efficient training and accurate NN model:
  - **Training data augmentation**
  - Special loss function
  - Ground truth management
  - Model pruning and quantization



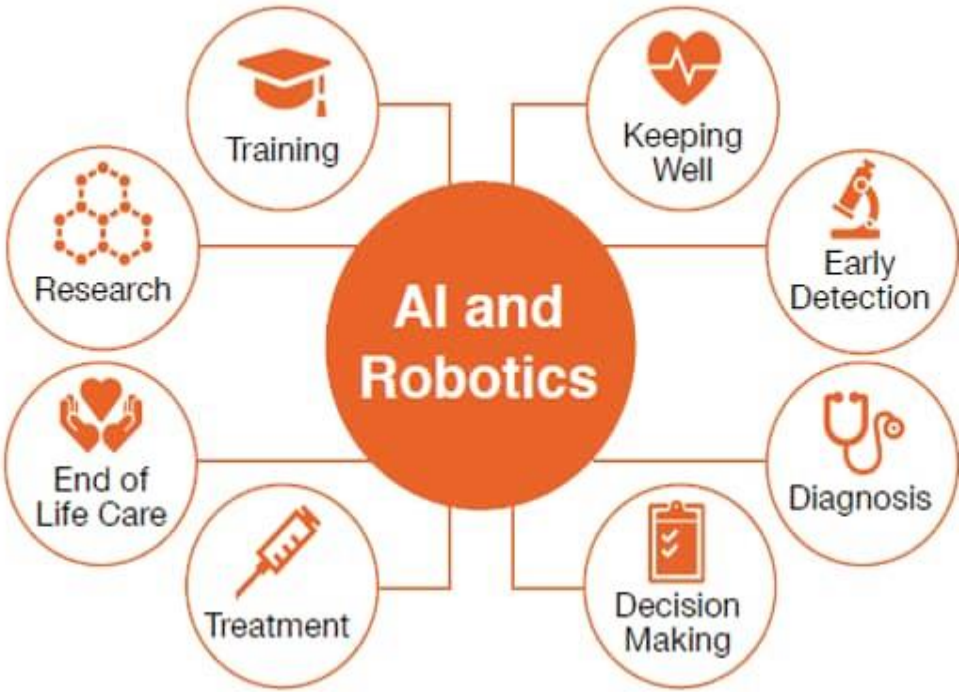
Background in Artificial Intelligence - Inference

- Takes place on (1) an electronic device, (2) a server, or (3) both
- Examples of inventive ideas:
  - Input data structure (e.g., 3 successive images or a sequence of images, or an image + keywords extracted from a prior audio item)
  - Data pre-processing (e.g., divide an input into tiles)
  - Novel application of a type of NN model in a specific context
  - Modification of NN for a context (e.g., skip connection redefined for U-Net)
  - Pull out intermediate data of NN to add additional cross-channel processing
  - Data post-processing (e.g., combine with the input image before processing with an output layer, or organize translated text adaptively)



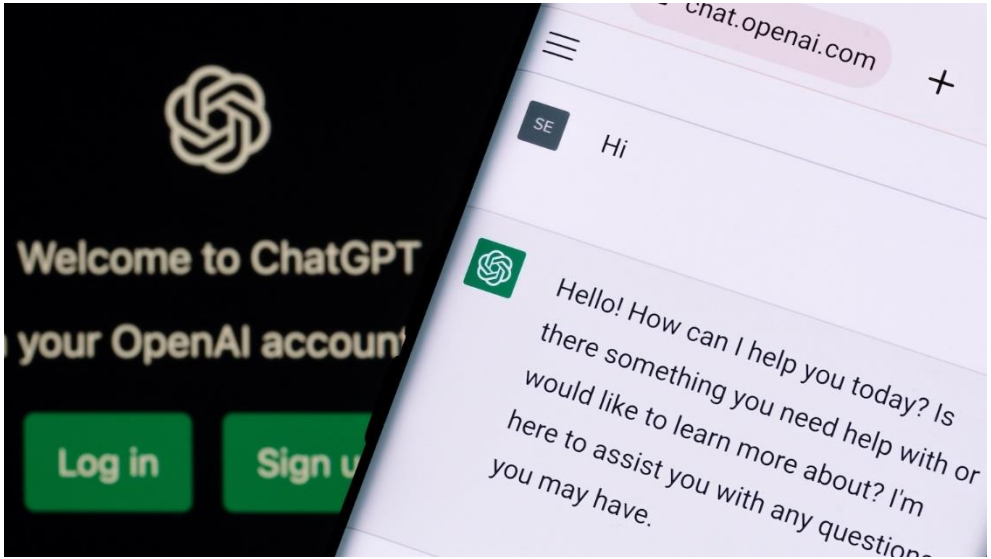
Trends in Adoption of AI in Healthcare

- 90% of U.S. Hospitals and Insurance companies will implement some type of AI System by 2025
  - **Examples of AI Systems**: Medical image analysis, digital image processing, pattern recognition solutions, machine learning platforms, automated patient guidance and engagement solutions



ChatGPT and Related Issues

- Generative Pre-trained Transformer (GPT) has two parts: (1) Understanding the context of the input chat by human and (2) Generating reactionary answer back to the human
- Training: (1) 1-year unsupervised learning using huge amounts of text data from the Internet up to 2021 and (2) 6-month supervised learning guided by human judges
- Between version releases, no update on neural network.
- Massive amounts of GPU and electrical power to train.



Types of IP Protection Relevant to Data Models

- Patent
  - Novelty may exist in any of the multiple phases of the model-making process
  - Typically, model weights/parameters are not suited to patent protection
- Trade Secret
  - Must take measures "reasonable under the circumstances" to maintain the information's secrecy
- Protection of Data
  - Copyright
  - Contract
  - Privacy

Relevant Legislation on AI Governance / Privacy

- EU
  - EU Artificial Intelligence (AI) Act
  - European Data Act
  - General Data Protection Regulation (GDPR)

- US
  - Proposed federal and state legislation
  - Blueprint for an AI Bill of Rights (https://www.whitehouse.gov/ostp/ai-bill-of-rights/)
  - Health Insurance Portability and Accountability Act of 1996 (HIPAA)
  - California Privacy Rights Act (CPRA) and similar state AI-related laws and proposed laws

Morgan Lewis

Panel Discussion:
Thinking Outside the Lab: Opportunities at the intersection of healthcare data, licensing, and AI

September 19, 2023

Doug Crisman – Morgan Lewis
Eric Lin – Genentech
Duane Valz – Former Insitro
Chitra Kalyanaraman – Moderator, Johnson & Johnson

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