# Grokking Artificial intelligence Algorithms
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## Section 1 Intuition of Artificial Intelligence

Intelligence is a mystery. Intelligence is a concept that has no agreed upon definition. Philosophers, psychologists, scientists and engineers all have different opinions about what it is and how it emerges. We see intelligence in nature around us such as groups of living creatures working together, and we see intelligence in the way that we think and behave. In general, things that are autonomous yet adaptive are considered to be intelligent.

This directory has no source code, but rather is a collection of summaries and figures seen in chapter 1

### Defining Ai

Intelligence is a very tricky subject with many definitions coming to light from great minds

"*Salvador Dalí believed that ambition is an attribute of intelligence; he said, "Intelligence without ambition is a bird without wings." Albert Einstein believed that imagination is a big factor in intelligence; he said, "The true sign of intelligence is not knowledge, but imagination." And Stephen Hawking said, "Intelligence is the ability to adapt*"

This textbook decides to define or at least tries to define what an intelligent system would be/do. The textbook goes into details about behaviors that are at the very least Ai like. Citing examples such as solving hard problems, providing value and utility, and autonomous learning with new data/environments. With more specific examples such as, "A system that succeeds at playing many types of complex games, A cancer tumor detection system, A system that generates artwork based on little input, A self-driving car. "

### More Specific definitions

The data input into Ai systems may be qualitative or quantitative, with quantitative being known facts that are not subject to bias, such as the temperature at a specific location at a specific time. Meanwhile, qualitative refers more to values or observations that may be subject to bias i.e someone's perceived truth; such as the level of one's agreement to government policies. Data, information, and knowledge can be interpreted differently by different people,
based on their level of understanding of that domain and their outlook on the world

With the loose definition of what Ai is we can now go into algorithms which are essentially sets of rules that may accomplish a certain goal. Usually the algorithm

accepts an input, iterates through the rules a finite amount of times, finally producing a desired output. They allow us to accomplish things such as “enable live video chat across the world through compression algorithms, and we can navigate cities through map applications that use real-time routing algorithms”. When it comes to the history of Ai we see that it is not a new concept and has been seen in ideas and concepts in ancient times.

**Types of Problems**

With Ai there are several types of problems that can arise, such as search problems where the goal is to find a path between 2 points from many different options; usually involving finding the shortest solution. There are also optimization problems which involve deciding amongst an enormous set of possibilities and finding the best solution such as the knapsack problem. With optimization problems there are 2 types of solutions, “A local best solution is the best solution within a specific area in the search space, and a global best is the best solution in the entire search space.” There are also prediction and classification problems which mainly involve finding patterns within sets of data and finding what the next step would be or separating them into their own categories. There are also Clustering problems which takes data and tries to uncover hidden relationships, such as uncovering if younger people frequent cheaper restaurants. Deterministic models are used for problems where with the given input a consistent output can be expected, such as there always being daylight at noon, and darkness at midnight. When it comes to probabilistic models, a given input will return an outcome from a set of possible outcomes.

**Old Ai vs. New Ai**

Old Ai is generally understood as a system where people encoded the rules that allows Ai to exhibit intelligent behavior, such as manually creating decision tree with its set of options and rules. Meanwhile New Ai aims to create systems that are able to create their own rules from given data.

**Algorithms**

Search algorithms are used to achieve goals such as the shortest path, or the next best move. They work by evaluating future states and trying to determine the path with the best outcome, and are the best way to evaluate search spaces.

We also have biological algorithms which are developed from studying the behavioral patterns in nature such as the cooperation seen in ants, or migrational patterns found in birds. These can be implemented into *Evolutionary Algorithms* where the system produces new individuals from ancestors that are able to better perform tasks. It can also be seen in swarm intelligence where a group on non-intelligent individuals inhibit intelligent behavioral patterns much like how ant colonies operate.

Machine learning algorithms utilize training models from given data and can understand relationships, make decisions, as well as make intelligent predictions from the training models. Supervised learning is one way in which machine learning

operates. Supervised learning involves data whose outcomes are known such as the type of fruit given weight, color, texture, and label. On the other hand Unsupervised learning involves uncovering hidden relationships so that one may pose more specific questions. Reinforcement learning involves rewarding the subject when a favorable act is committed and punishing them for an unfavorable action. Reinforcement learning is best used to see how programs or robots interact with a dynamic environment.

***Important Figures:***

## The Evolution of Ai

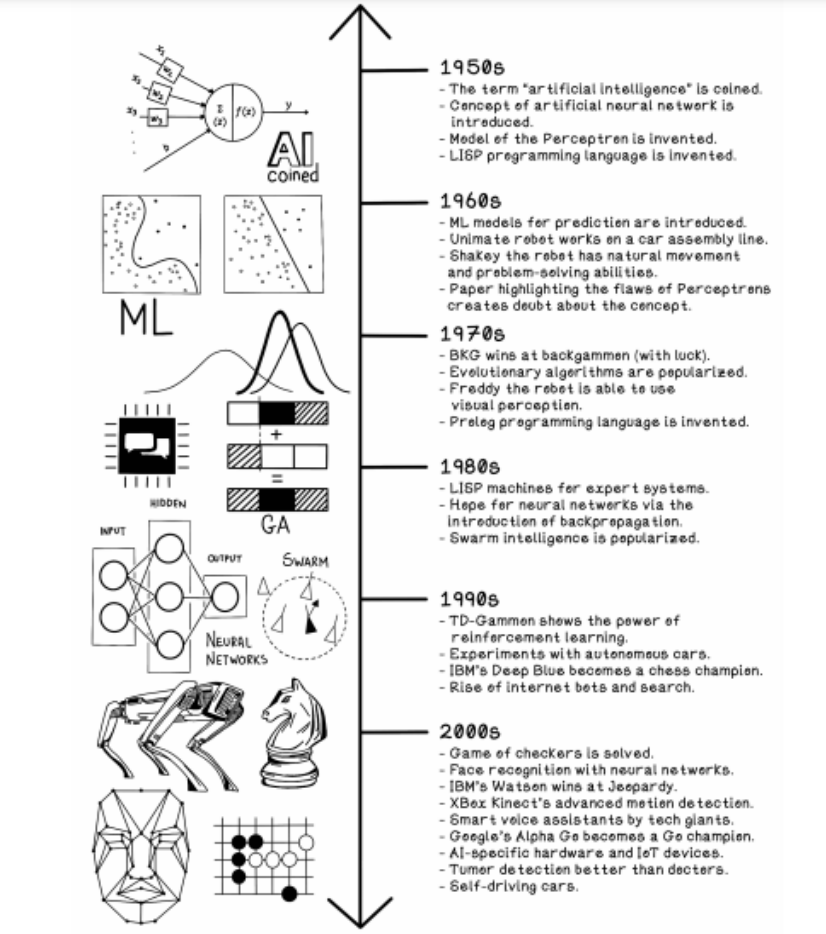


Figure 1.5 The evolution of AI

## Concepts of Ai

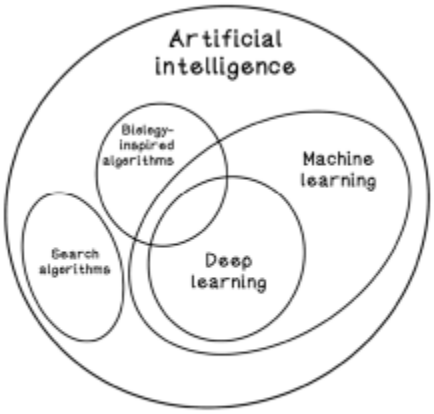


Figure 1.7 Categorization of concepts within AI

## Ai Applied

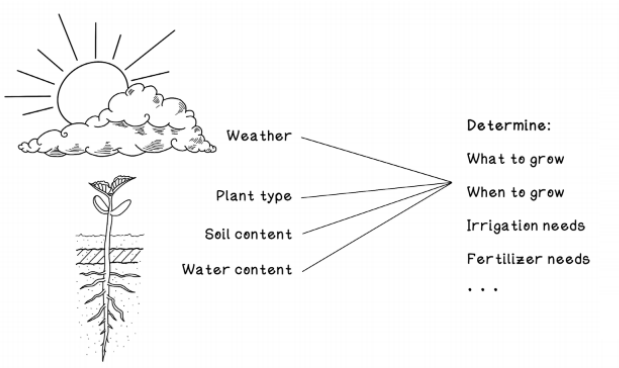


Figure 1.8 Using data to optimize crop farming

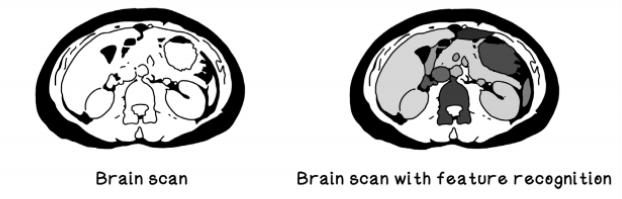


Figure 1.9 Using machine learning for feature recognition in brain scans