

# General Learning Algorithms

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## 0.1 Context

This is a summary of the notes I've taken while listening to the presentation by Demis Hassabis available at <https://www.youtube.com/watch?v=08Cl7ii6viY>. It builds on the presentation [Systems Neuroscience and AGI](#) but can be watched on its own. This presentation covers most of the content in the presentation [The Theory of Everything](#) and [How Deep Learning Can Give Birth to General Artificial Intelligence](#) as well.

## 0.2 Learned in this study

## 0.3 Things to explore

# 1 Overview

- DeepMind was founded in 2010
- Acquired by Google in 2014
- An Apollo Programme for AI (>100 scientists)
- A new way to organize science

## 1.1 General-Purpose Learning Machines

- Learn automatically from raw inputs - not pre-programmed
- General - same system can operate across a wide range of tasks

## 1.2 Reinforcement Learning Framework

- Build the best approximate model of the world
- Update the model every time a new observation comes in
- Use the model to make plans (simulations) toward a goal
- Reinforcement learning in the brain through the dopamine system called TD (temporal difference) learning

## 1.3 Atari Agents

- Agents just get the raw pixels as inputs (~30K)
- Goal is simply to maximize score
- Everything learnt from scratch
- One system to play all the different games

## 1.4 Transfer Learning

- The key to flexible general intelligence
  - Apply previously learnt knowledge to a new situation
- Identify the salient features in an environment

- Re-represent those features as an abstract concept
- Select and appropriately apply prior knowledge

## 1.5 Adding Memory to Neural Networks

- Classical Computer (leads to)
- Recurrent Neural Network + Memory Store (leads to)
- Neural Turing Machine

## 1.6 Why work on AGI and spend life/career on it

- Information overload and system complexity
- Solving AI is potentially the meta-solution to all these problems
- Empowering people through knowledge

## 2 See also

- [Systems Neuroscience and AGI](#)
- [https://en.wikipedia.org/wiki/Temporal\\_difference\\_learning](https://en.wikipedia.org/wiki/Temporal_difference_learning)

## 3 References

- [General Learning Algorithms](#)
- [The Theory of Everything](#) (covered by this presentation)
- [How Deep Learning Can Give Birth to General Artificial Intelligence](#) (covered by this presentation)