**Reinforcement Learning**

**Difference between DL and RL.**

DL classifies, clusters and makes predictions about data. Deep artificial neural networks learn from training set correlating data with labels, to create a model that can classify.

RL learns how to maximize a reward function by exploring that actions available from certain states. An RL agent tests an action to see what reward will be returned by the environment in which it acts.

Deep learning is very very complex function approximation, for image recognition, speech (supervised) as well as for dimension reduction and deep network pretraining (unsupervised).

Reinforcement learning is actually more in line with optimal control, where an agent learns to develop an optimal policy of sequential actions to take by interacting with an environment. There are various branches within RL, such as temporal difference, Monte Carlo and dynamic programming.

Deep learning and reinforcement learning combine (deep Q learning, Google deepmind Atari) is when a deep neural network is used to approximiate the Q function in Q-learning, one popular algorithm that falls under temporal difference learning.

In the Atari game playing example, because the state space is so large, using a neural network to approximate Q function beats traditional methods of using a look-up table or linear equations.