Chapter 1 : Introduction

29/07/19

1.1 Reinforcement Learning

- map situations to actions
- maximize numerical reward signal
- trial and error search
- delayed reward

RL is
- a problem
- a class of solution methods
- a field that studies the problem and its solution methods

key idea : learning agent senses state (to some extent) and acts to affect it
↳ has goal/s wrt. the state

supervised learning is not applicable to interactive problems as it is infeasible to obtain examples of desired behaviour that are correct and representative of all the situations in which an agent has to act

key challenge in RL : exploration v/s exploitation tradeoff

RL's applicability: (in addition to AI + ML)

- overcoming "curse of dimensionality" in operations research and control theory
- psychology, neuroscience

1.2 Examples

- chess player
- refinery operation
- gazelle calf learning to walk
- a smarter roomba
- preparing a breakfast (lot of subgoals involved)

all of these involve →
- interaction b/w active, decision making agent and its environment
- agent seeks to achieve goal despite uncertainty in environment
- actions affect the future state of the env.

1.3 Elements of Reinforcement Learning

- policy (mapping from $S \rightarrow A$)
- reward signal (numeric signal obtained at each state)
- value function (estimate of how good a state or action is)
- model (optional)

1.4 Limitations and Scope

- concept of a state
- evolutionary methods don't use value functions
  - ↳ they ignore the fact that policy maps from $S \rightarrow A$
  - ↳ they ignore which states an agent passes through or which actions the agent takes