- https://www.youtube.com/watch?v=lpJIBVU_WJE
- https://www.youtube.com/watch?v=gy5g33S0Gzo
- https://www.youtube.com/watch?v=Snf2D1v3y9s
- https://slate.com/technology/2021/04/american-crossword-puzzle-tournament-dr-fill-artificial-intelligence.html
- https://www.youtube.com/watch?v=PTpBEYxQPUQ
- https://www.youtube.com/watch?v=Wn13KnHYJ_A
- https://blog.applus.com/cavride-project-an-l4-automated-taxi-designed-to-navigate-driverless-within-idiadas-headquarters/

- https://youtu.be/Q_8jt355PvM
- https://youtu.be/ET9SHYzMz_4
- https://youtu.be/2l3bZTyuh5g

2.3.2 Properties of task environments

- Fully observable vs partially observable

Fully: agent's sensors give access to the complete state of environment at each point in time

Effectively fully if sensors detect all aspects relevant to choice of action (as determined by performance measure)

Fully: agent doesn't need internal state to keep track of the world

partially observable because of noisy and inaccurate sensors

Unobservable: If the agent has no sensors at all then the environment

- **Single agent** vs. **multiagent**
- Is it an agent or just a stochastically behaving object (ex: wave on a beach)?
- Key question: can its behavior be described as maximizing performance depending on the actions of ‘our’ agent?
- Classify multiagent env. As (partially) competitive and/or (partially) cooperativeEx: Taxis partially comptitive and partially coooperative

- **competitive** multiagent environment: in chess, the opponent entity B is trying to maximize its performance measure, which, by the rules of chess, minimizes agent A's performance measure partially **cooperative** multiagent environment: In the taxi-driving environment, avoiding collisions maximizes the performance
- It is also partially competitive :because, for example, only one car can occupy a parking space.

- **Deterministic** vs. **stochastic:** the next state of the environment is completely determined by the current state and the action executed by the agent is then the environment deterministic;
- otherwise, it is stochastic.
- Partially observable environment could appear to be stochastic

- **Deterministic** vs. **nondeterministic.**
- If the next state of the environment is completely determined by the current state and the actions selected by the agents, then we say the environment is deterministic.
- In principle, an agent need not worry about uncertainty in an accessible, deterministic environment.
- If the environment is inaccessible or partially observable, then it may *appear to* be nondeterministic.

- **Episodic** vs. **nonepisodic.**
- Episodic environment: agent's experience is divided into 'atomic episode';
- each episode consists of agent perceiving then performing a single actionEpisodes are independent:
- next episode doesn't depend on actions taken in previous episodes
- Ex: classification tasks: spotting defective parts on an assembly line
- Sequential: current decision could affect all future decisions (ex: chess playing)

- **Static** vs. **dynamic.**
- If the environment can change while an agent is deliberating, then we say the environment is dynamic for that agent;
- otherwise it is static.
- Static environments are easy to deal with because the agent need not keep looking at the world while it is deciding on an action, nor need it worry about the passage of time.
- If the environment does not change with the passage of time but the agent's performance score does, then we say the environment is **semidynamic.**

- **Discrete** vs. **continuous.**
- If there are a limited number of distinct, clearly defined percepts and actions we say that the environment is discrete.
- Chess is discrete—there are a fixed number of possible moves on each turn. Taxi driving is continuous

Task Environment	Observable	Agents	Deterministic	Episodic	Static	Discrete
Crossword puzzle	Fully	Single	Deterministic	Sequential	Static	Discrete
Chess with a clock	Fully	Multi	Deterministic	Sequential	Semi	Discrete
Taxi driving	Partially	Multi	Stochastic	Sequential	Dynamic	Continuous
Medical diagnosis	Partially	Single	Stochastic	Sequential	Dynamic	Continuous
Image analysis	Fully	Single	Deterministic	Episodic	Semi	Continuous
Part-picking robot	Partially	Single	Stochastic	Episodic	Dynamic	Continuous
Refinery controller	Partially	Single	Stochastic	Sequential	Dynamic	Continuous
Interactive English tutor	Partially	Multi	Stochastic	Sequential	Dynamic	Discrete

Figure 2.6 Examples of task environments and their characteristics.