Guided Tour of Machine Learning in Finance

Week 4: Reinforcement Learning

4-2-1-Reinforcement Learning in Finance

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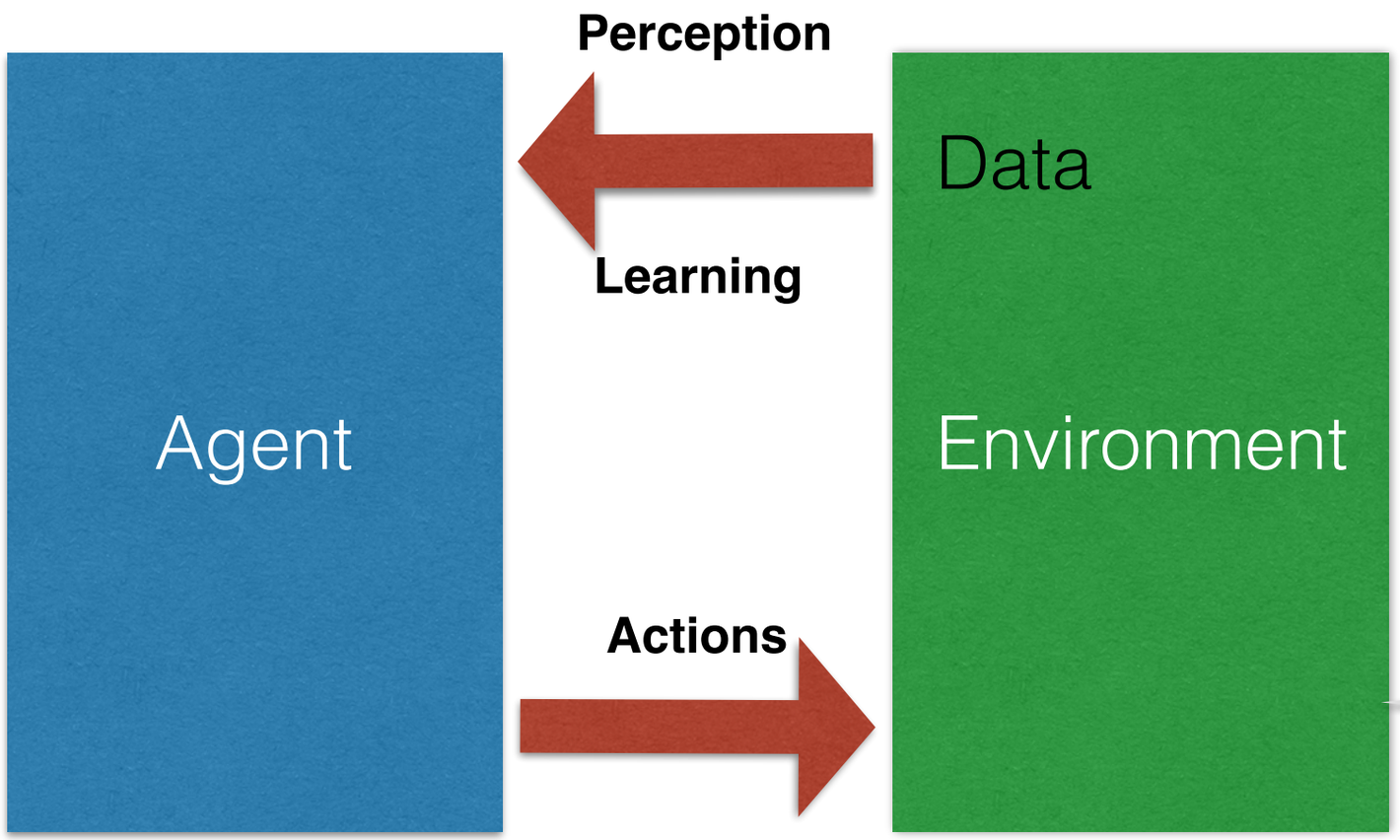
Types of ML tasks

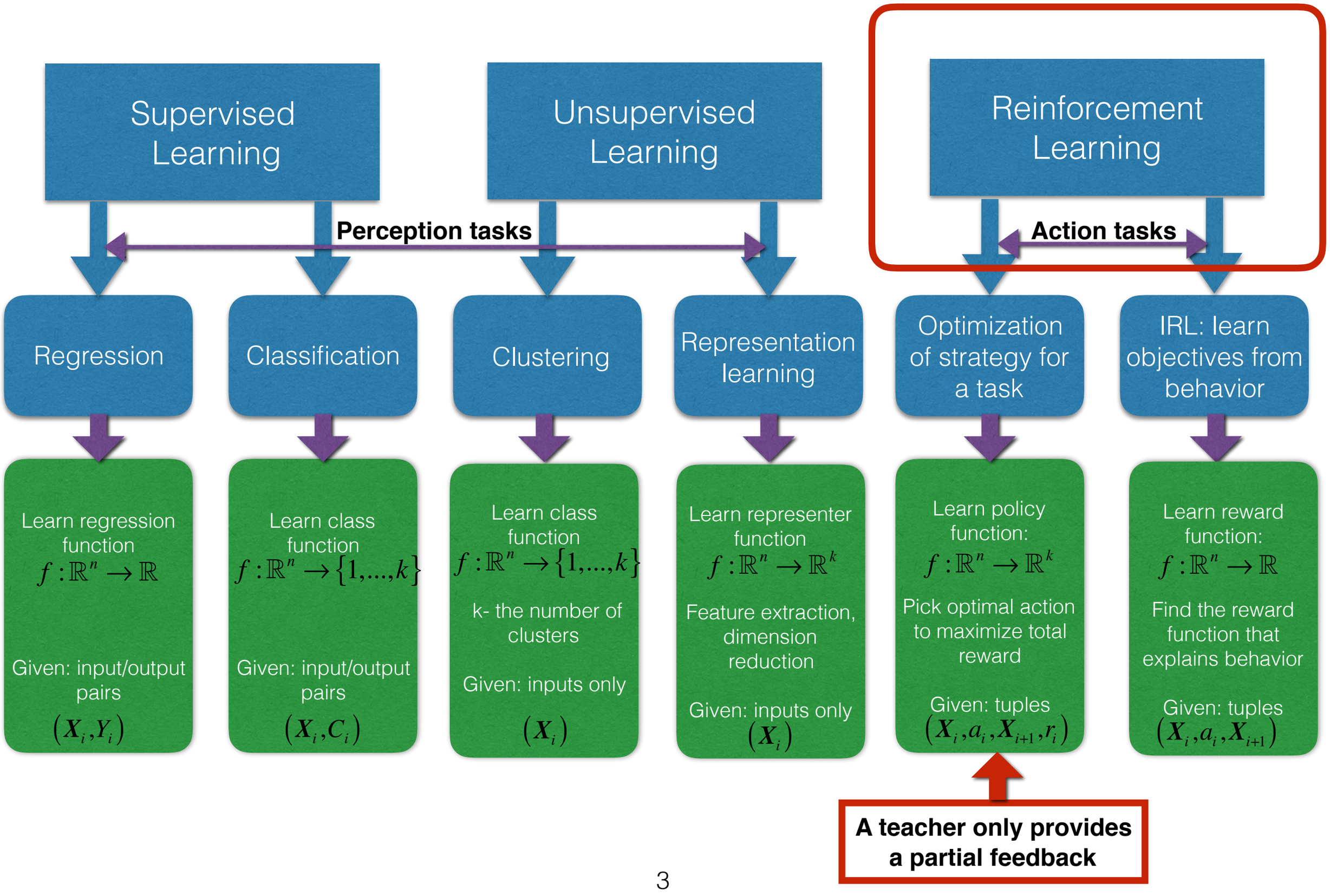


The agent may not have access to streaming data from the environment (on-line learning) and learn instead in a batch mode (off-line) from data obtained from this environment.

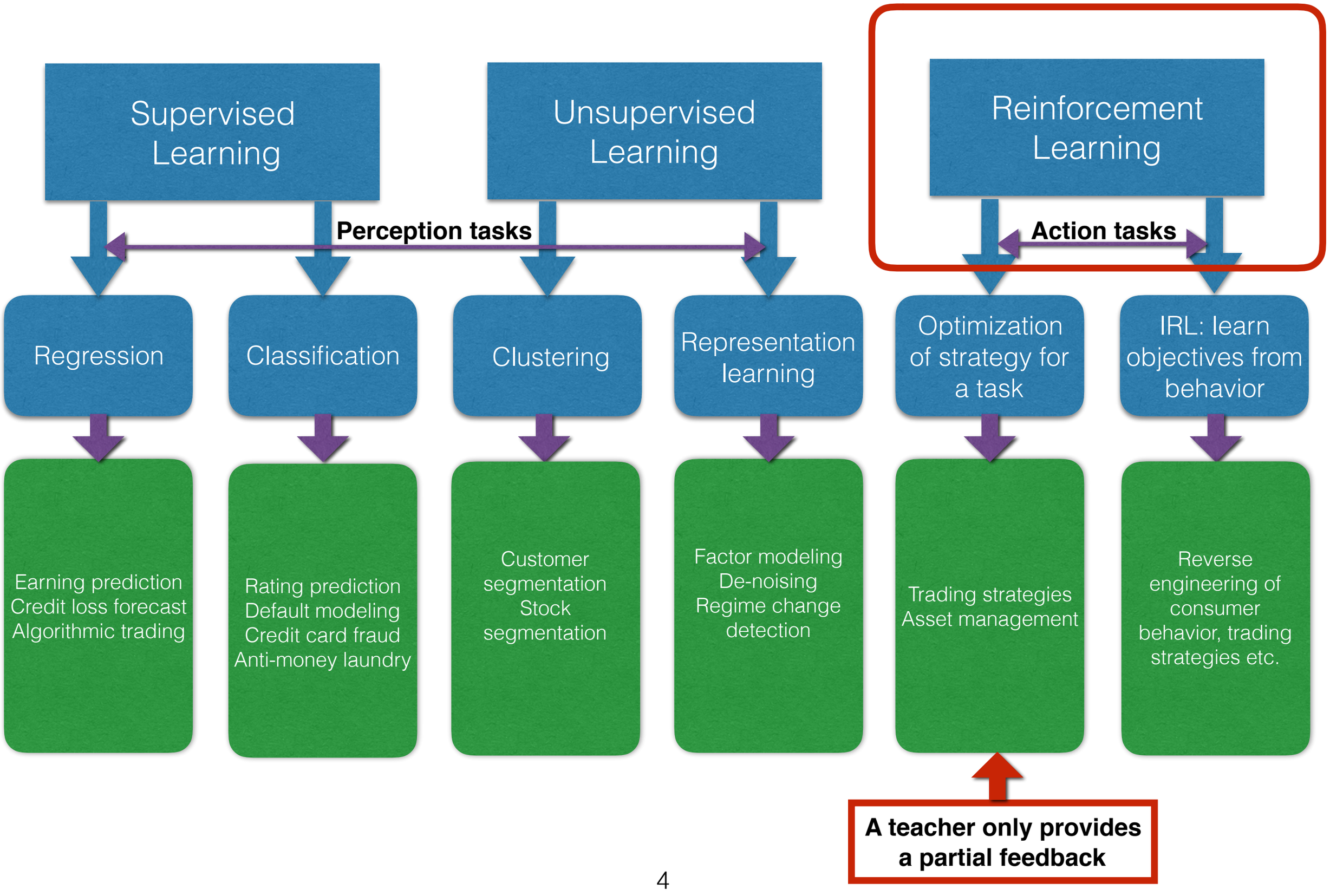
"**Perception tasks":** perception and learning from data. There is a fixed action, e.g. predict a loan default, classify an image, or translate a text. Regression and classifications are perception tasks. The output is a learned function of data $f(\mathbf{X})$

"**Action tasks**": the same as perception tasks, but there are multiple possible actions. For sequential (multi-step) problems, action tasks involve planning and forecasting the future.

Machine Learning landscape



Machine Learning in Finance



Control question

Select all correct answers

1. Inverse Reinforcement Learning is Reinforcement Learning performed backward in time.
2. While Direct Reinforcement Learning seeks the best possible action, Inverse Reinforcement Learning seeks the worst possible action. This has multiple applications in the industry, for example for contrarian trading.
3. Direct Reinforcement Learning observes the state of the world, and chooses its optimal action. Inverse Reinforcement Learning observes its action, and chooses the optimal state of the world.
4. On-line, or real-time Reinforcement Learning is achieved when batch-mode Reinforcement Learning algorithms are uploaded on Github.
5. In Reinforcement Learning, the learning data comes in tuples $(\boldsymbol{X}_i, a_i, \boldsymbol{X}_{i+1}, r_i)$ that include the state, action, next state, and reward. For Inverse Reinforcement Learning, the information about the reward is missing, so that data comes in tuples $(\boldsymbol{X}_i, a_i, \boldsymbol{X}_{i+1})$

Correct answers: 5