ML is the ROX

Definition of ML

Machine learning theory about how well data can be statistically modeled. Machine learning is practically about building machines which can learn from data.

There are three types of ML: supervised learning, unsupervised learning, and reinforcement learning.

Supervised learning

Supervised learning gleans "information" from labeled data to label new unlabeled data. This is simply discrete function approximation. Supervised learning/function approximation must make assumptions about the given data to *generalize* to new data.

[Note on] Induction and deduction

- *Induction* takes specific examples to create a general rule.
- *Inductive bias* is necessary to come up with "useful" generalizations. (set of assumptions that the learner uses to predict outputs given inputs that it has not encountered)
- *Deduction* takes a general rule and applies it in specific cases.

Unsupervised learning

Given inputs with no labels, derive some structure using the relationships between the inputs. Often a summarization of data into clusters. In practice, unsupervised learning is useful even in supervised contexts to gain insight into the data.

Reinforcement learning

Learning from delayed supervision. For example: playing a [turn-based] game [with potentially non-deterministic environmental factors] where you find out whether you have won or lost near the end. Somewhat difficult.

Comparison of these parts of ML

All learning is "optimization." SL wants to label data well. RL wants to score well. UL has scientist-imposed criteria for correctness.