Class 1 Review Notes

AI & Machine Learning
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1 Machine Learning I - Introduction

1.1 Explosion of Machine Learning

The factors are:

1. Sensors – small, cheap, low power consumption.
2. Connectivity (especially wireless) – can move the data for aggregation and analysis.
3. Human interaction with devices. The devices can collect data about human behavior.
4. Data storage. Vast quantities of data can now be stored and retrieved.
5. Computational power, distributed processing, and scalability (server farms).

Note 1. Neural network approaches have recently begun to really work ("deep learning"). Examples would include text recognition, facial recognition, large language models, and other generative AI models, etc. The success of neural networks has been enabled, in part, by massive parallel computation (GPUs).

1.2 What is Machine Learning

- Machine: Computers run software, so software and algorithms are the focus here.
- Learning: Focused on acquiring, refining, and/or updating skills.
- Examples: Classifying e-mails as spam or not spam./ Showing the best search results. / Showing the best ads. / Recommending products (physical or digital). / Detecting fraud. / Voice recognition (i.e. voice to text).

Note 2. Machine learning is NOT (logic) rule based. Machine Learning is data-driven.

1.3 Three Kinds of Machine Learning

1. Supervised learning: for each of the training cases, we have the correct answer.
2. Unsupervised learning: there is no correct answer available for the training cases.

3. Reinforcement learning: there is no correct answer given for the training cases, however, some sort of metric that provides information as to whether or not the outcome was good or bad or that provides a ranking of outcomes.

Note 3. Example of Supervised Learning: Problem: Predict sales price of a house. Answer: Actual sales price. Example of Unsupervised Learning: Discover customer segments or Detect unusual events. Example of Reinforcement Learning: Solving a maze. No correct sequence of movements is given. But feedback is provided by whether or not the reward was found.

1.4 Reference

Goizueta Business School-Emory University: Professor George S. Easton