CS 574 Machine Learning
HW1

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Warm up

- Newton's first law of motion:
    - An object in motion will remain in motion unless acted upon by an outside force. An object at rest will remain at rest unless acted upon by an outside force.
    - $\sum F = 0 \iff \frac{dv}{dt} = 0$
- Einstein's mass-energy equation:
    - $E = mc^2$
- Time complexity of Quicksort on average in Big-O notation:
    - $\Theta(nlog(n))$

- ▶ Supervised Learning:
  - ▶ The general idea of Supervised Learning is that a labeled dataset full of examples is utilized to learn a function that can take inputs map them to a certain output. For example, if we wanted to predict the price of a house in Ames given a dataset that contains many houses with their features and prices.
- ▶ Unsupervised Learning:
  - ▶ This differs from Supervised Learning in that the dataset is not labeled and the specified algorithm will attempt to make sense of it on its own. For example, if a grocery store wanted to put together customer 'profiles' by looking at combinations of items that are often purchased together.
- ▶ Reinforcement Learning:
  - ▶ Reinforcement Learning is fairly different from either of the other types of learning that we have talked about above. The main idea is that we let a computer sort out different ideas to optimize the solution to a certain problem. For example, if we wanted to train a computer to play a video game, we could program all of the possible moves that could be taken at any point and then kick off a simulation. Over time, the computer will 'learn' the optimal strategy by optimizing the target (which would be winning the game).

▶ If there are 5 categories of kiosks, the minimal dimensionality of the dataset would be six. There are five categories for the one-hot encoding and I am assuming that our measure of profitability adds only a single dimension.

- tannerdboyle.github.io/hw1.pdf