Note: Machine Learning Introduction

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1 Definition of Machine Learning

I've heard of lots of famous machine learning algorithm like SVM, collaborate recommending, LSH and applications like google machine translation. Those algorithms and applications make me believe that machine learning is powerful and useful. So, what is machine learning? Arthur Samuel said that Machine learning was a field of study that gave computer the ability to learn without being explicitly programmed. He wrote a checker's playing program watching tens of thousands games to learn what tends to be good positions and what tends to be bad positions. And finally, the program was much better at playing games than Arthur Samuel himself. Wow, this is really a remarkable point showing the learning ability of machine. Tom Mitchell(1998) defined machine learning problem as: A computer program is said to learn from experience E with respect to some task T and some performance measure P, if its performance on T, as measured by P, improves with experience E. For example, we have a email program watching which emails are marked as spam or non-spam, and the program bases on that to learn how to better filter spam. In the case, Classifying emails as spam or not spam is the task of T, watching emails' labels is the experience of E, and the number of emails correctly classified as spam or not spam is the performance measure of P. I think this definition is much more format than previous one, however, and one sided. Because in the case of unsupervised learning, no "right answers" are provided, so the experience of E and performance measure P are obscure. In my opinion, Arthur Samuel's definition reveals the intrinsic of machine learning.

2 Supervised Learning

Example 1: Look at Figure1, it shows the relationship between price and area of a house. The read cross points are the so called "right answers" also the given data set. The machine learning problem is if we have another new size of house area.