Introduction to Machine Learning Using Python

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Definition:

A computer program is said to 'learn' from experience $E$ with respect to some class of tasks $T$ and performance measure $P$, if its performance at tasks in $T$, as measured by $P$, improves with experience $E$. 
Example:
Classification: Digit Recognition

Input ($X_i$): Image Features

Output ($Y$): Class Labels \{ $y^0$, $y^1$, ..., $y^9$ \}

Features($X_i$):
Proportion of pixels in Each of the 12 cells $X_i$, where $i = 1, 2, ..., 12$

\[
x_i^0 = 0 - 10\% \\
x_i^1 = 10 - 20\% \\
....
\]

$Val(X_i) = 10$

No of parameters = $10^{12} - 1$
Handcrafted Rules will result in a large number of rules and exceptions

- We need ML in cases where we cannot directly write a program to handle every case

So it's better to have a machine that learns from a large training set

So, according to the definition earlier:

Task (T): recognizing and classifying handwritten words within images
Performance measure (P): percent of words correctly classified
Training experience (E): a database of handwritten words with given classifications
Speech Recognition
When humans are unable to explain their expertise
Where ML is used...
Major Classes of Learning Algorithms:

- Supervised Learning
- Unsupervised Learning
- Reinforcement Learning
Supervised Learning:
Reinforcement Learning:
Good Robot Bad Robot