

Machine learning tasks:

- Classification; output is one of a number of classes ex. 'A'
- Regression; output is a real value ex. \$35/share

Machine learning types:

- Supervised; Provide training with correct answers
- Unsupervised; No feedback. Clustering based on similarity.
- Semi-supervised; some feedback is provided, but not detailed.

Instance; Individual example of a particular class.

- trainPokemon(perceptron,instance)

Feature; Collection of attributes of a single instance

Feature Vector; N-dimensional vector describing a single instance

Data:

- Training; Used to train the model
- Validation; Used to select model complexity, to determine further training time, method
- Test; Used to evaluate trained model

## # PERCEPTRONS

Input is  $(x_1, x_2, \dots, x_n)$

Weights are  $(w_1, w_2, \dots, w_n)$

Output =  $y(x) = \text{sgn}(w_0 x_0 + w_1 x_1 + w_2 x_2 + \dots + w_n x_n)$

Classification Methods:

- One vs. All;
- All-pairs

Stochastic gradient descent:

$$\blacktriangleright \Delta w_i = -\eta \left( \frac{\partial J}{\partial w_i} \right) = \eta x[i]^k t^k$$

-----

$$\blacktriangleright w_i \leftarrow w_i + \Delta w_i$$

$$\blacktriangleright \Delta w[i] = \eta (x[i]^k (t^k) - \eta (\text{input})(\text{target}))$$

How to interpret / fill in a confusion matrix:

- Identity are the accurate values
- accuracy =  $(\# \text{ of right} / \text{Total})$