Types of Learning

- Supervised
  - *Structured data*
  - Ex: picture → image type
  - Ex: picture → digit number
- Unsupervised
  - *Unstructured data* #### Train/Dev/Test Sets
- For small datasets, you have to allocate a larger % of examples for testing and validation.
  - Ex: 70/30 train/test split
- For larger datasets, a much larger % of examples are used for testing.
  - Ex: 99/1/1 train/dev/test split
- Always make sure the dev and test sets come from the same distribution.

Bias/Variance

- High **Bias** means *underfitting*.
  - Ex: 15% training error and 16% dev error
- High **Variance** means *overfitting*.
  - Ex: 1% training error and 11% dev error.
- High bias and high variance can both be present.
  - Ex: 15% training error and 30 % dev error.
- In between high bias and high variance is **Just right**
  - Ex: 0.5% training error and 1% dev error.

Basic Recipe for Machine Learning

- Issues with high bias?
  - Increase the size of your network
  - Train longer
- High variance?
  - Try to get more data
  - Regularization
  - More appropriate architecture

Regularization

- **L2 Regularization**
  - *Sum of all the weights squared*

$$\|w\|_2^2 = \sum_{j=1}^{N_x} w_j^2$$