# Getting to know Machine Learning

The projects this semester will revolve around machine learning. The following items will become important throughout the semester for the various aspects of this analysis. Working in pairs, you will research and prepare a 10-minute presentation to become an expert in a particular topic about machine learning. Your presentation should be in the form of slides written in LaTeX, PowerPoint, Keynote, etc. and it should contain information such as:

- General information that will provide an overview of your topic;
- Factors that directly affect the specifics of your topic;
- Best practices or most commonly used architectures/functions/methods–if this is data-dependent, note that and give examples;
- Intuition/reasoning behind the most commonly used architectures/functions/methods;
- Any other specific information you can find on your topic
- Pictures and graphs – these are always extremely helpful in conveying information fast. Make sure you specify the source for them.

Please include all references you consulted, including websites, newspaper articles, blogs, podcasts, other collaborators etc. Make sure you support your statements with facts and/or a mathematical/statistical analysis.

List of topics (choose one; first come, first serve):

(1) Activation Functions (must cover sigmoid, ReLU, and softmax);
(2) Loss Functions (must include squared-error and cross-entropy);
(3) Optimizers (must cover gradient descent with momentum and Adam optimization method);
(4) Lasso and Ridge Regularization;
(5) Validation Dataset and tuning hyperparameters (be sure to define the word hyperparameter);
(6) Support Vector Machines (SVMs);
(7) k-nearest neighbor (kNN);
(8) Convolutional Neural Networks (CNNs);
(9) Recurrent neural networks (RNNs);
(10) Autoencoders and Bottlenecks;