Michael DiGregorio

CPE695 Homework 1

1. [18 points] Explain the following concepts:
1) supervised learning,
2) unsupervised learning,
3) online learning,
4) batch learning,
5) model-based learning,
6) instance-based learning.

1. Supervised learning is the process of training a model with a dataset made up of input features and their associated labels. The model has full knowledge of the true labels of the input dataset when evaluating its performance and calculating loss. Popular examples are linear regressions, logistic regressions, and multi-class classification problems
2. Unsupervised learning is the process of using a model to make groupings or predictions based off of unlabeled data. Unlike with supervised learning, unsupervised models do not have a set of labels to refer back to for performance evaluation and must thus use other metrics. Popular examples include k-means clustering and other clustering techniques.
3. Online learning is the process of continually training a model on successive pieces of data. Instead of giving it a large batch of data to train on and then viewing the output, the model is trained on a sequence of smaller chunks of data over time. This is primarily used when the data varies tremendously over time or when training over the whole dataset in a batch is infeasible
4. Batch learning is the process of training a machine learning model on one large dataset one time. This is the traditional (more commonly imagined) implementation of machine learning models. You train your model on your whole dataset at once.
5. Model-based learning seeks to create a bespoke solution tailored to each new problem. It is a meta-modeling approach where the model is used to represent the problem and techniques for working with the data rather than the data itself. It focuses on creating the best model for the problem.
6. Instance-based learning is when the machine learning model is configured to construct hypotheses and predictions directly from the training instances themselves instead of performing explicit generalization as many other modelling techniques do. Examples include knn and RBF networks.