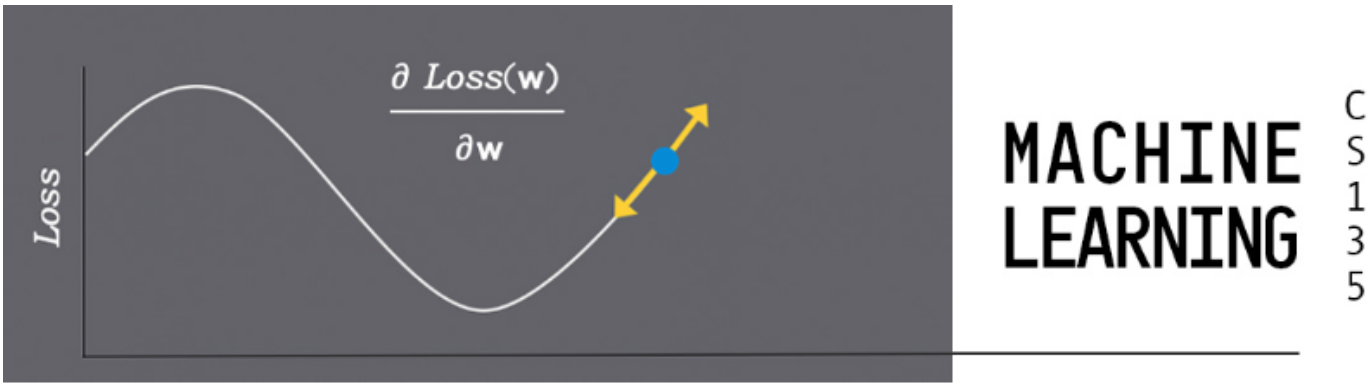
Introduction to Machine Learning



Machine learning (ML) is a sub-field of artificial intelligence (AI). As a serious academic and engineering discipline, AI has roots that go back at least 70 years. In this course, we will start with an operational and functional definition of what it means for a program—or a machine running a program—to learn. Then, we will examine several techniques for doing such learning, improving the ability of a program to identify and respond to patterns in data. Finally, we will cover several methods and ideas:

- Linear regression models for predicting numerical outputs based upon given inputs.
- Linear classification models for labeling data and separating it into categories.
- Non-linear methods for dealing with data that aren't handled well by linear techniques.
- Supervised methods, where we start with some known and well-understood examples of our data and learn to identify patterns that all us to understand new measures.
- Unsupervised methods, where we start with data that is not already understood but has patterns that can be analyzed and used to identify essential differences and similarities between examples.
- Ethical and social implications of machine learning and AI technologies, including seemingly benign choices in how algorithms are designed or data sets are selected, can have serious ramifications when the resulting techniques and models are deployed in the real world.
- Explainable AI, where the task is to interrupt the decision of the model, such as to provide evidence and insights into why the output(s) were inferred.

Learning Outcomes

Students will:

- Review the syllabus and course schedule to understand overall content, expectations, due dates, and the like.
- Install Python and associated libraries for machine learning (instructions and a script for installing these libraries will be provided).
- Identify any known conflicts with due dates (due to conference travel, athletics, and the like), and discuss them with the instructor to outline how necessary arrangements can be made to deal with these.

- Secure any necessary documentation of accommodations that need to be made, and provide those to the instructor so that necessary steps can be taken or at least prepared.