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September 18, 2020

Classical Machine Learning

Week 0

Plan - Setting up your learning and programming environment

Getting started - [Setting up your ML environment](#) - [Choosing an ML environment](#) - [Quick intro to the tools](#)

1 Week 1

Plan - Motivate Machine Learning - Introduce notation used throughout course - Plan for initial lectures - *What*: Introduce, motivate a model - *How*: How to use a model: function signature, code (API) - *Why*: Mathematical basis – enhance understanding and ability to improve results

- [Course Overview](#)
- [Machine Learning: Overview](#)
- [Intro to Classical ML](#)

2 Week 2

Plan - Introduce a model for the Regression task: Linear Regression - Introduce the Recipe for Machine Learning: detailed steps to problem solving

- [Our first model: Linear Regression \(Overview\)](#)
- A *process* for Machine Learning
 - Go through the methodical, multi-step process
 - * Quick first pass, followed by Deeper Dives
 - This will be a code-heavy notebook !
 - Illustrate Pandas, Jupyter, etc
 - [Recipe for Machine Learning: Overview](#)
 - * [Linked notebook](#)

Deeper dives - Iterative improvement - [When to stop: Bias and Variance](#) - Regularization - [Fine tuning techniques](#)

3 Week 3

Plan - Regression wrap up - The Loss function for Linear Regression

- Recipe for ML focus: Introduction to Transformations (Prepare Data step)
 - Transforming data (featuring engineering) is a key step in the Recipe
 - We introduce transformations
 - * Focus on the *how*; subsequent lecture will cover the *why*
- Introduce a model for the Classification task: Logistic Regression
- How to deal with Categorical (non-numeric) variables
 - classification target
 - features

Regression wrap up - [Linear Regression: Loss Function](#)

Transformations - [Prepare Data: Intro to Transformations](#)

Classification intro - [Classification: Overview](#) - [Classification and Categorical Variables](#) - [linked notebook](#)

Classification, continued - [Multinomial Classification](#) - [Classification Loss Function](#)

Deeper dives - [Log odds](#)

4 Assignments

Your assignments should follow the [Assignment Guidelines](#)

- Regression
 - Assignment notebook: [Using Machine Learning for Hedging](#)
 - Data
 - * There is an archive file containing the data
 - * You can find it
 - Under the course page: NYU Classes -> Resources -> Data -> Regression Task
 - * You should unzip this archive into the *the same directory* as the assignment notebook
 - * The end result is that the directory should contain
 - The assignment notebook and a helper file
 - A directory named **Data**