Intro to Machine Learning with Pytorch Syllabus

Contact Info

While going through the program, if you have questions about anything, you can reach us at support@udacity.com. For help from Udacity Mentors and your peers visit the Udacity Classroom.

Nanodegree Program Info

Learn foundational machine learning algorithms, starting with data cleaning and supervised models. Then, move on to exploring deep and unsupervised learning. At each step, get practical experience by applying your skills to code exercises and projects.

Prerequisite Skills

A well-prepared learner is able to:

- This program is intended for students with experience in Python

Required Software

- Python 3.6
- Anaconda 4.7 or latest
- Jupyter notebook 6.0.1 or latest
- GIT bash 2.23 or latest
- Python Libraries Optional

Version: 2.0.0

Length of Program: 76 Days*

** This is a self-paced program and the length is an estimation of total hours the average student may take to complete all required coursework, including lecture and project time. Actual hours may vary.*

Part 1: Introduction to Machine Learning

Part 2: Supervised Learning

Project: Finding Donors for CharityML

You've covered a wide variety of methods for performing supervised learning -- now it's time to put those into action!

Supporting Lessons

Lesson	Summary
Machine Learning Bird's Eye View	Before diving into the many algorithms of machine learning, it is important to take a step back and understand the big picture associated with the entire field.
Linear Regression	Linear regression is one of the most fundamental algorithms in machine learning. In this lesson, learn how linear regression works!
Perceptron Algorithm	The perceptron algorithm is an algorithm for classifying data. It is the building block of neural networks.
Decision Trees	Decision trees are a structure for decision-making where each decision leads to a set of consequences or additional decisions.
Naive Bayes	Naive Bayesian Algorithms are powerful tools for creating classifiers for incoming labeled data. Specifically Naive Bayes is frequently used with text data and classification problems.
Support Vector Machines	Support vector machines are a common method used for classification problems. They have been proven effective using what is known as the 'kernel' trick!
Ensemble Methods	Bagging and boosting are two common ensemble methods for combining simple algorithms to make more advanced models that work better than the simple algorithms would on their own.
Model Evaluation Metrics	Learn the main metrics to evaluate models, such as accuracy, precision, recall, and more!
Training and Tuning	Learn the main types of errors that can occur during training, and several methods to deal with them and optimize your machine learning models.

Project: Optimize Your GitHub Profile

Other professionals are collaborating on GitHub and growing their network. Submit your profile to ensure your profile is on par with leaders in your field.

Part 3: Deep Learning

Project: Create Your Own Image Classifier

In this project, you'll build a Python application that can train an image classifier on a dataset, then predict new images using the trained model.

Supporting Lessons

Lesson	Summary
Introduction to Neural Networks	In this lesson, Luis will give you solid foundations on deep learning and neural networks. You'll also implement gradient descent and backpropagation in python right here in the classroom.
Implementing Gradient Descent	Mat will introduce you to a different error function and guide you through implementing gradient descent using numpy matrix multiplication.
Training Neural Networks	Now that you know what neural networks are, in this lesson you will learn several techniques to improve their training.
Deep Learning with PyTorch	Learn how to use PyTorch for building deep learning models.

Project: Improve Your LinkedIn Profile

Find your next job or connect with industry peers on LinkedIn. Ensure your profile attracts relevant leads that will grow your professional network.

Supporting Lessons

Lesson	Summary
Industry Research	You're building your online presence. Now learn how to share your story, understand the tech landscape better, and meet industry professionals.

Part 4: Unsupervised Learning

Project: Creating Customer Segments with Arvato

In this project, you'll apply your unsupervised learning skills to two demographics datasets, to identify segments and clusters in the population, and see how customers of a company map to them.

Supporting Lessons

Lesson	Summary
Clustering	Clustering is one of the most common methods of unsupervised learning. Here, we'll discuss the K-means clustering algorithm.
Hierarchical and Density Based Clustering	We continue to look at clustering methods. Here, we'll discuss hierarchical clustering and density-based clustering (DBSCAN).
Gaussian Mixture Models and Cluster Validation	In this lesson, we discuss Gaussian mixture model clustering. We then talk about the cluster analysis process and how to validate clustering results.
Dimensionality Reduction and PCA	Often we need to reduce a large number of features in our data to a smaller, more relevant set. Principal Component Analysis, or PCA, is a method of feature extraction and dimensionality reduction.
Random Projection and ICA	In this lesson, we will look at two other methods for feature extraction and dimensionality reduction: Random Projection and Independent Component Analysis (ICA).

Part 5: Congratulations!

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