Machine Learning Engineer Syllabus

Contact Info

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

Nanodegree Program Info

This program will teach you how to become a Machine Learning Engineer, build Machine Learning models and apply them to data sets in fields like finance, healthcare, education, and more.

Prerequisite Skills

Having familiarity with these skills will help you to be successful in this program.

- Proficient in python programming
- Knowledge of inferential statistics, probability, linear algebra, and calculus

Required Hardware

- Webcam
- Microphone

Required Software

- Python 2.7/3.6
- Jupyter Notebooks
- Anaconda 5.0.1

Version: 2.0.0

Length of Program: 181 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: Introductions

Welcome to the Machine Learning Engineer Nanodegree program! In this first part, you'll meet the instructors and the career services team. You'll also learn about the program structure and get your first lesson on the basics of machine learning. Join the ML community! --> mlnd.slack.com

Part 2: Model Evaluation and Validation

Project: Predicting Boston Housing Prices

Put all you've learned into practice by building and optimizing a model to predict housing prices!

Part 3: Supervised Learning

Learn how Supervised Learning models such as Decision Trees, SVMs, etc. are trained to model and predict labeled data.

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
Linear Regression	Linear regression is a very effective algorithm to predict numerical data.
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.
Support Vector Machines	Support vector machines are very effective models used for classification.
Ensemble Methods	Bagging and boosting are two common ensemble methods for improving the accuracy of supervised learning approaches.
Supervised Learning Assessment	Test your Supervised Learning concepts with a quick assessment.

Part 4: Deep Learning

In this section, we will learn about TensorFlow, Neural Networks and Convolutional Neural Networks.

Project: Dog Breed Classifier

CNN project to recognize dog breeds.

Supporting Lessons

Lesson	Summary
Neural Networks	Luis will give you an overview of logistic regression, gradient descent, and the building blocks of neural networks.
Cloud Computing	Take advantage of Amazon's GPUs to train your neural network faster. In this lesson, you'll setup an instance on AWS and train a neural network on a GPU.
Deep Neural Networks	A deeper dive into backpropagation and the training process of neural networks, including techniques to improve the training.
Convolutional Neural Networks	Alexis explains the theory behind Convolutional Neural Networks and how they help us dramatically improve performance in image classification.
Deep Learning for Cancer Detection with Sebastian Thrun	In this lesson, Sebastian Thrun teaches us about his groundbreaking work detecting skin cancer with convolutional neural networks.
Deep Learning Assessment	Test your Deep Learning concepts with a quick assessment.

Part 5: Unsupervised Learning

Learn how to find patterns and structures in unlabeled data, perform feature transformations and improve the predictive performance of your models.

Project: Creating Customer Segments

Part 6: Reinforcement Learning

Use Reinforcement Learning algorithms like Q-Learning to train artificial agents to take optimal actions in an environment.

Project: Teach a Quadcopter How to Fly

Build a quadcopter flying agent that learns to take off, hover and land using reinforcement learning.

Supporting Lessons

Lesson	Summary
RL in Continuous Spaces	Review the fundamental concepts of reinforcement learning, and learn how to adapt traditional algorithms to work with continuous spaces.
Deep Q-Learning	Extend value-based reinforcement learning methods to complex problems using deep neural networks.
Policy-Based Methods	Policy-based methods try to directly optimize for the optimal policy. Learn how they work, and why they are important, especially for domains with continuous action spaces.
Actor-Critic Methods	Learn how to combine value-based and policy-based methods, bringing together the best of both worlds, to solve challenging reinforcement learning problems.

Part 7: Machine Learning Capstone

Have an idea of a problem in the real world that can be solved using machine learning? Here you have the opportunity to do just that using a dataset of your choice.

Project: Capstone Proposal

Before working on a machine learning problem, write up a proposal of your project to get valuable feedback!

Project: Capstone Project

Now you will put your Machine Learning skills to the test by solving a real world problem using the algorithms you have learned in the program so far.