ML Training Level One

Novice Practitioner

Course Objectives

* • Provide solid foundational theory with practical exercises to solidify concepts through real world examples  
       • Identify the types of challenges that ML can help solve using basic ML techniques and tools  
       • Basic evaluation techniques to choose the correct ML model to match challenge  
       • A high-level understanding of the tools available to you such as Reinforcement Learning, NLP and Deep Learning  
       • Create a foundation of practical knowledge for applying ML techniques and tools  
       • Provide the basis for continued learning in the ML space and supporting the creation of the broader ML community at Hearst

Prerequisites

Mathematics and Statistics

Machine Learning requires a firm understanding of high school level mathematics and statistics. The courses listed below offer a refresher for those starting this program. Deeper and more complete training of these topics are outside the scope of this program, however there are resources listed for you to self-teach these topics if required.

To begin Level 1 of the training, you must be able to perform the following:

* • Understand how to add two vectors and multiply a matrix  
       • Understand Cosine Similarity  
       • Determine if a line is linear or non-linear  
       • Perform linear regressions  
       • Know how to compute a derivative and second derivative  
       • Perform basic Statistics such as Create Normal Distribution, and Compute Mean, Median and Standard Deviation)  
       • Explain probability through an example using two dice  
       • Manually produce a Histogram  
       • Define and give examples of true positives and false positives  
       • Explain a confusion matrix

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| Course (Total 2 Hours) | Duration |
| [Adding Two Vectors](https://www.khanacademy.org/math/precalculus/vectors-precalc/vector-addition-subtraction/v/adding-vectors) | 8 Minutes |
| [Multiplying a Matrix](https://www.khanacademy.org/math/precalculus/precalc-matrices/multiplying-matrices-by-matrices/v/multiplying-a-matrix-by-a-matrix) | 6 Minutes |
| [Cosine Similarity](https://www.khanacademy.org/math/linear-algebra/vectors-and-spaces/dot-cross-products/v/dot-and-cross-product-comparison-intuition) | 20 Minutes |
| [Linear vs. Non-Linear](https://www.khanacademy.org/math/cc-eighth-grade-math/cc-8th-linear-equations-functions/linear-nonlinear-functions-tut/v/linear-and-nonlinear-functions-example-3) | 3 Minutes |
| [Linear Regressions](https://www.khanacademy.org/math/statistics-probability/describing-relationships-quantitative-data/more-on-regression/v/regression-line-example) | 10 Minutes |
| [Ccomputing First & Second Derivatives](https://www.youtube.com/watch?v=rAof9Ld5sOg) | 10 Minutes |
| [Creating a Normal Distribution](https://www.khanacademy.org/math/statistics-probability/modeling-distributions-of-data/more-on-normal-distributions/v/introduction-to-the-normal-distribution) | 27 Minutes |
| [Mean, Median & Mode](https://www.khanacademy.org/math/probability/data-distributions-a1/summarizing-center-distributions/v/statistics-intro-mean-median-and-mode) | 9 Minutes |
| [Variance, Range & Standard Deviation](https://www.khanacademy.org/math/probability/data-distributions-a1/summarizing-spread-distributions/v/range-variance-and-standard-deviation-as-measures-of-dispersion) | 13 Minutes |
| [Probability (Die Roll)](https://www.khanacademy.org/math/precalculus/prob-comb/independent-events-precalc/v/events-and-outcomes-2) | 6 Minutes |
| [Create Histogram](https://www.khanacademy.org/math/probability/data-distributions-a1/displays-of-distributions/v/histograms-intro) | 8 Minutes |
| [Find True Positives & False Positives](https://www.youtube.com/watch?v=2LnvcMlc5EE) | 5 Minutes |
| [Confusion Matrix](https://www.khanacademy.org/math/precalculus/precalc-matrices/intro-to-matrices/v/introduction-to-the-matrix) | 6 Minutes |

These courses will provide the necessary refresher for beginning the Level 1 track. Depending on If you feel that these individual reviews are not sufficient, and you would like a more detailed training course for the required mathematics, you may find the following courses helpful.

* • [Linear Algebra](https://www.khanacademy.org/math/linear-algebra)  
       • [Statistics and Probabilities](https://www.khanacademy.org/math/statistics-probability)  
       • [Pre-Calculus](https://www.khanacademy.org/math/precalculus)

Programming Experience

You will be learning basic Python & R programming to complete practical exercises and examples. While you do not require Python or R programming experience, you should have experience programming in at least one language.

Machine Learning Tools

You are not required to have previous knowledge or experience in using ML tools.

What This Course Will Cover (Duration: 41 Hours)

* • Part 1: Data Preprocessing  
       • Part 2: Regression: Simple Linear Regression, multiple Linear Regression, Polynomial Regression, SVR, Decision Tree Regression, Random Forest Regression  
       • Part 3: Classification: Logistic Regression, K-NN, SVM, Naïve Bayes, Decision Tree Classification, Random Forest Classification  
       • Part 4: Clustering: K-Means, Hierarchical Clustering  
       • Part 5: Association Rule Learning: Apiori, Eclat  
       • Part 6: Reinforcement Learning: Upper Confidence Bound, Thompson Sampling  
       • Part 7: Natural Language Processing: Bag-of-words model and Algorithms for NLP  
       • Part 8: Deep Learning: Artificial Neural Network, Convolutional Neural Networks  
       • Part 9: Dimensionality Reduction: PCA, LDA, Kernel PCA  
       • Part 10: Model Selection and Boosting: k-fold Cross Validation, Parameter Tuning, Grid Search, XGBoost

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1. Vector has magnitude and direction. Adding two vectors – add two values at the top and then add the two values at the bottom. Letter with arrow on the top. If you add vectors, you will find that the traversal will complete to form a triangle in the case of adding two vectors
2. Matrices multiplication – Dot product.