

# Machine Learning

# Mathematics

## Roadmap

Linear Algebra, Statistics, Probability, Objective Functions,  
Regularization, Information Theory, Optimization, Distribution

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**FREE Resources -**

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This phase is different from books that are available on the internet. I included all the topics required to understand the whole architecture of Machine Learning algorithms.

Examples of how and where these mathematical equations are used and Interview Questions can be asked of an ML Engineer while hiring.

We will learn different concepts individually, converting mathematical equations into Python programming expressions along with their examples in the real world.

# FREE Resources →

[Mathematics for Machine Learning](#)

**Algebra, Topology, Differential Calculus, and Optimization Theory For Computer Science and Machine Learning**

**All math topics for Machine Learning by Stanford**

[Stanford CS229: Machine Learning Course | Summer 2019 \(Anand Avati\)](#)

## Chapter 1 - Linear Algebra

### Learn for FREE - Mathematics for ML - Linear Algebra

[Mathematics for Machine Learning - Linear Algebra](#)

[1 | Vectors](#)

[2 | Matrix](#)

[3 | Eigenvalues and Eigenvectors](#)

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[4 | Singular Value Decomposition \(SVD\)](#)

[5 | Gradient](#)

[6 | Tensors](#)

[7 | Jacobian Matrix](#)

[8 | Curse of Dimensionality](#)

# Chapter 2 - Statistics

## The Element of Statistical Learning

[Elements of Statistical Learning: data mining, inference, and prediction. 2nd Edition.](#)

Statistics give us 2 tools descriptive and inferential

### 1 | Descriptive Statistics

[1 | Variables](#)

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## Chapter 3 - Probability

**Probability Theory: The Logic of Science**

<https://bayes.wustl.edu/etj/prob/book.pdf>

[1 | Probability Distribution](#)

[2 | Conditional Probability](#)

[3 | Bayes' Theorem](#)

[4 | Joint and Marginal Probabilities](#)

[5 | Independence and Conditional Independence](#)

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[6 | Early Stopping](#)

[7 | Max-Norm Regularization](#)

[8 | Batch Normalization](#)

[9 | Weight Decay](#)

# Chapter 6 - Information Theory

## Information Theory, Inference and Learning Algorithms

[David MacKay: Information Theory, Pattern Recognition and Neural Networks: The Book](#)

[1 | Entropy](#)

[2 | Conditional Entropy](#)

[3 | Joint Entropy](#)

[4 | Mutual Information](#)

[5 | Relative Entropy \(Kullback-Leibler Divergence\)](#)

[6 | Cross-Entropy](#)

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[8 | Shannon-Fano Coding](#)

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- [5 | Nesterov Accelerated Gradient \(NAG\)](#)
- [6 | Adagrad \(Adaptive Gradient Algorithm\)](#)
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## Chapter 8 - Distribution

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- [5 | Uniform Distribution](#)
- [6 | Exponential Distribution](#)
- [7 | Poisson Distribution](#)

### Calculus

[Calculus 1 | Math | Khan Academy](#)

# Machine Learning, MLOps & GenerativeAI Roadmap

<https://god-level-python.notion.site/Build-a-Strong-Machine-Learning-Portfolio-Personal-Brand-Get-Tons-of-Job-Offers-in-12-Weeks-Live-b3c98407b4ab45819811db081ae9d102?pvs=4>

## About me



I am [Himanshu Ramchandani](#) a Data & Engineering Consultant. I help enterprises utilize big data to build AI-powered products & Mentor professionals to improve their skills in the data field by 1% every day.

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