AI/ML

GenerativeAI | MLOps Roadmap

Build Your Strong Machine Learning Gen AI MLOps Portfolio/Personal Brand with a Life-Long Community 🚀

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https: //embeds.beehiiv.com/f5d8b90b-b131-434f-8e5c-45dd815e67b1

Modules→

1 → Python for Machine Learning 🚀

2 → Data Structures & Algorithms

3 → Git & GitHub Make Recruiters reach You, Build your stunning profile

4 → Data X NumPy, Pandas, Matplotlib, Seaborn

5 → Mathematics in Machine Learning

6→Machine Learning AlgorithmsXDataProcessing

7 → Natural Language Processing X Deep Learning

8 → Generative AI - GANs, VAEs, LLMs

9 → Computer Vision X Deep Learning

10 → MLOps | Machine Learning Operations

11 → Machine Learning System Design

12 → Major Capstone Projects

13 → Machine Learning, GenAI Interview

14 → Personal Branding & Portfolio

15 → Others

Technology Stack

- Python Data Structures NumPy
- Pandas Matplotlib Seaborn
- Scikit-Learn Statsmodels
- Natural Language Toolkit (NLTK
-
-
-
-
-)
- PyTorch
- Structure Query Language (SQL)
- Docker
- Jupyter(Tool - Code Editor)
- VScode(Code Editor)
- TensorFlow
- 5 Major Projects
- Git and GitHub
- AWS
- GCP
- Azure

1 | Python Programming and Logic Building

I prefer Python Programming Language. Python is the best for starting your programming journey.

1 | Introduction and Basics

- Installation
- PythonOrg,Python3
- Variables
- Printfunction
- Inputfromuser
- DataTypes
- TypeConversion
- FirstProgram

2 | Operators

- ArithmeticOperators
- RelationalOperators
- BitwiseOperators
- LogicalOperators
- AssignmentOperators
- CompoundOperators
- MembershipOperators
- IdentityOperators

3 | Conditional Statements

- IfElse
- If
- Else
- ElIf(elseif)
- IfElseTernaryExpression

4 | While Loop

- Whilelooplogicbuilding
- SeriesbasedQuestions
- Break
- Continue
- NestedWhileLoops
- Pattern-BasedQuestions
- pass
- Loopelse

5 | Lists

- ListBasics
- ListOperations
- ListComprehensions/Slicing
- ListMethods

6 | Strings

- StringBasics
- StringLiterals
- StringOperations
- StringComprehensions/Slicing
- StringMethods

7 | For Loops

- Rangefunction
- Forloop
- NestedForLoops
- Pattern-BasedQuestions
- Break
- Continue
- Pass
- Loopelse

8 | Functions

- Definition
- Call
- FunctionArguments
- DefaultArguments
- Docstrings
- Scope
- SpecialfunctionsLambda,Map,andFilter
- Recursion
- FunctionalProgrammingandReferenceFunctions

9 | Dictionary

- DictionariesBasics
- Operations
- Comprehensions
- DictionariesMethods

10 | Tuple

- TuplesBasics
- TuplesComprehensions/Slicing
- TupleFunctions
- TupleMethods

11 | Set

- SetsBasics
- SetsOperations
- Union
- Intersection
- DifferenceandSymmetricDifference

12 | Object-Oriented Programming

- Classes
- Objects
- MethodCalls
- InheritanceandItsTypes
- Overloading
- Overriding
- DataHiding
- OperatorOverloading

13 | File Handling

- FileBasics
- OpeningFiles
- ReadingFiles
- WritingFiles
- EditingFiles
- Workingwithdifferentextensionsoffile
- WithStatements

14 | Exception Handling

- CommonExceptions
- ExceptionHandling
- Try
- Except
- Tryexceptelse
- Finally
- Raisingexceptions
- Assertion

15 | Regular Expression

- BasicREfunctions
- Patterns
- MetaCharacters
- CharacterClasses

16 | Modules & Packages

- Differenttypesofmodules
- Inbuiltmodules
- OS
- Sys
- Statistics
- Math
- String
- Random
- Createyourownmodule
- BuildingPackages
- Buildyourownpythonmoduleanddeployitonpip

17 | Data Structures

- Stack
- Queue
- LinkedLists
- Sorting
- Searching
- LinearSearch
- BinarySearch

18 | Higher-Order Functions

- Functionasaparameter
- Functionasareturnvalue
- Closures
- Decorators
- Map,Filter,ReduceFunctions

19 | Python Web Scrapping

- UnderstandingBeautifulSoup
- ExtractingDatafromwebsites
- ExtractingTables
- DatainJSONformat

20 | Virtual Environment

- VirtualEnvironmentSetup

21 | Web Application Project

- Flask
- ProjectStructure
- Routes
- Templates
- Navigations

22 | Git and GitHub

- Git-VersionControlSystem
- GitHubProfilebuilding
- ManageyourworkonGitHub

23 | Deployment

- HerokuDeployment
- FlaskIntegration

24 | Python Package Manager

- WhatisPIP?
- Installation
- PIPFreeze
- CreatingYourOwnPackage
- UploaditonPIP

25 | Python with MongoDB Database

- SQLandNoSQL
- ConnectingtoMongoDBURI
- FlaskapplicationandMongoDBintegration
- CRUDOperations
- Find
- Delete
- Drop

26 | Building API

- API(ApplicationProgrammingInterface)
- BuildingAPI
- StructureofanAPI
- PUT
- POST
- DELETE
- UsingPostman

27 | Statistics with NumPy

- Statistics
- NumPybasics
- WorkingwithMatrix
- LinearAlgebraoperations
- DescriptiveStatistics

28 | Data Analysis with Pandas

- DataAnalysisbasics
- Dataframeoperations
- Workingwith2-dimensionaldata
- DataCleaning
- DataGrouping

29 | Data Visualization with Matplotlib

- MatplotlibBasics
- Workingwithplots
- Plot
- PieChart
- Histogram

30 | What to do Now?

- Discussionsonhowtoprocessfurtherwiththisknowledge.

2 | Data Structure & Algorithms

Data Structure is the most important thing to learn not only for data scientists but for all the people working in computer science.

0 | Data Structures & Algorithms Starting Point

- Getting Started
- Variables
- Data Types
- Data Structures
- Algorithms
- Analysis of Algorithm
- Time Complexity
- Space Complexity
- Types of Analysis
- Worst
- Best
- Average
- Asymptotic Notations
- Big-O
- Omega
- Theta

Data Structures - Phase 1

1 | Stack

2 | Queue

3 | Linked List

4 | Tree

5 | Graph

Algorithms - Phase 2 6 | List and Array 7 | Swapping and Sorting 8 | Searching 9 | Recursion 10 | Hashing 11 | Strings

- How to create your stunning GitHub profile?
- How to build your own viral repository?
- Building a personal landing page for your Portfolio for FREE
- How to grow followers on GitHub?
- How to work with a team?

Git Resources

Git - Version Control System

Resources and Cheatsheets

Personal Profile

GitHub Resources

Resources and Tools

Interview Questions

Portfolio of Projects

Repo Description

4 | Data X Pandas Numpy Matplotlib Seaborn

Numpy

- Vectors, Matrix
- Operations on Matrix
- Mean, Variance, and Standard Deviation
- ReshapingArrays
- Transpose and Determinant of Matrix
- Diagonal Operations, Trace
- Add, Subtract, Multiply, Dot, and Cross Product.

Pandas

- Series and DataFrames
- Slicing, Rows, and Columns
- Operations on DataFrame
- Different ways to create DataFrame
- Read, Write Operations with CSV files
- Handling Missing values, replacing values, and Regular Expression
- GroupBy and Concatenation

Matplotlib

- Graph Basics
- Format Strings in Plots
- Label Parameters, Legend
- Bar Chart, Pie Chart, Histogram, Scatter Plot

5 | 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

3 | Factorization

4 | Singular Value Decomposition (SVD)

5 | Gradient

6 | Tensors

7 | Jacobian Matrix

8 | Curse of Dimensionality

Chapter 2 - Statistics

Elements of Statistical Learning: data mining, inference, and prediction. 2nd Edition.

Statistics give us 2 tools descriptive and inferential

1 | Descriptive Statistics

1 | Variables

2 | Mean

3 | Median

4 | Mode

5 | Standard Deviation

6 | Variance

7 | Range

8 | Percentile

9 | Skewness

10 | Kurtosis

2 | Inferential Statistics

1 | Sampling Distributions

2 | Central Limit Theorem

3 | Hypothesis Testing

4 | Confidence Intervals

5 | T-Tests

6 | Analysis of Variance (ANOVA)

7 | Chi-Square Test

8 | Regression Analysis

9 | Bayesian Inference

10 | Maximum Likelihood Estimation (MLE)

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

Chapter 4 - Objective Functions

1 | Mean Squared Error (MSE)

2 | Mean Absolute Error (MAE)

3 | Binary Cross-Entropy (Log Loss)

4 | Maximum Likelihood Estimation (MLE)

5 | Gini Impurity

Chapter 5 - Regularization

1 | L1 Regularization (Lasso Regression)

2 | L2 Regularization (Ridge Regression)

3 | Elastic Net Regularization

4 | Dropout Regularization

5 | Max-Norm Regularization

6 | Batch Normalization

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 | Cross-Entropy

5 | Information Gain

6 | Data Entropy

Chapter 7 - Optimization

1 | Gradient Descent

2 | Stochastic Gradient Descent (SGD)

3 | Adagrad (Adaptive Gradient Algorithm)

4 | Adam (Adaptive Moment Estimation)

Chapter 8 - Distribution

1 | Bernoulli Distribution

2 | Binomial Distribution

3 | Multinomial Distribution

4 | Normal (Gaussian) Distribution

Calculus

Calculus 1 | Math | Khan Academy

6|Machine Learning AlgorithmsX Data Processing

Chapter 1 - Categories of Machine Learning

1 | Supervised

2 | Unsupervised

3 | Reinforcement

Algorithms

- LinearRegression
- LogisticRegression
- DecisionTree
- GradientDescent
- RandomForest
- RidgeandLassoRegression
- NaiveBayes
- SupportVectorMachine
- KMeansClustering

Chapter 2 - Types of Machine Learning

1 | Regression

2 | Classification

3 | Clustering

4 | Dimensionality Reduction

5 | Density Estimation

Chapter 3 - Parameter Tuning

1 | Hyperparameter 2 | Cross-validation 3 | Regularization 4 | Overfitting 5 | Underfitting

Chapter 4 - Ensemble Methods

1 | Bagging

2 | Boosting

Chapter 5 - Performance Analysis

1 | Confusion Matrix

2 | Accuracy

3 | Precision, Recall and F1 score

4 | ROC and AUC curve

5 | Mean Squared Error (MSE)

6 | Mean Absolute Error (MAE)

7 | R-squared

8 | Bias-Variance Tradeoff

Chapter 6 - Libraries and Framework

1 | NumPy

2 | Pandas

3 | Scikit-Learn

4 | TensorFlow

5 | PyTorch

6 | Keras

7 | Natural Language Processing X Deep Learning

Understanding Models and Hands-On Implementation

1 | NLP Fundamentals

2 | PyTorch x NLP

3 | The model building API - Keras

4 | Word to Vector Representation

5 | Convolutional Neural Network

6 | Named Entity Recognition using Recurrent Neural Network(RNN)

7 | Long Short Term Memory (LSTM)

8 | Generating Text using LSTM

9 | Transformers Basics

Others

- Sentimentanalysis
- POSTagging,Parsing,
- Textpreprocessing
- StemmingandLemmatization
- SentimentclassificationusingNaiveBayes
- TF-IDF,N-gram,
- MachineTranslation,BLEUScore
- TextGeneration,Summarization,ROUGEScore
- LanguageModeling,Perplexity
- Buildingatextclassifier

8 | Generative AI - GANs, VAEs, LLMs

1 | Foundational Understanding of Large Language Models (LLMs)

2 | TensorFlow Revision

3 | Environment Setup

4 | Understanding Docker, Kubernetes, and Kubeflow

5 | Deep Learning Fundamentals

6 | Understanding Variational Autoencoders (VAEs)

7 | GANs (Generative Adversarial Networks)

8 | LSTM (Long Short-Term Memory networks) Revision

9 | GPTs (Generative Pre-trained Transformers)

10 | Generative AI

11 | Prompt Engineering

9 | Computer Vision X Deep Learning

1 | Image Classification

2 | Transfer Learning

3 | Autoencoders Noise Reduction

4 | Image Captioning

5 | Segmentation & Object Detection

6 | In-Depth DeepFakes

Others

- PyTorchTensors
- Understanding Pretrained models like AlexNet, ImageNet, and ResNet.
- NeuralNetworks
- Buildingaperceptron
- Buildingasingle-layerneuralnetwork
- Buildingadeepneuralnetwork
- Recurrentneuralnetworkforsequentialdataanalysis

10 | MLOps | Machine Learning Operations

Deploy your models in production and let the world see your portfolio

Not knowing any of the cloud platform for production AWS, GCP or Azure is a concern.

Chapter 1 - Fundamentals

1 | Basics of ML Operations

2 | ML Model, Data and Code

Chapter 2 - Pipeline

3 | Building Machine Learning Pipeline

4 | Deployment

5 | CI/CD Pipeline and APIs

6 | Monitoring

7 | Orchestration

Chapter 3 - AWS

1 | MLOps Fundamentals on AWS

2 | Containers

3 | Analytics using Amazon RedShift Serverless

4 | SageMaker

Chapter 4 - Project Deployment and end-to-end Pipeline

1 | Amazon EKS and KubeFlow

Resources

https: //github.com/GokuMohandas/mlops-course

https://github.com/DataTalksClub/mlops-zoomcamp

- Deploy ML models using Flask
- Amazon Lex—Natural Language Understanding
- AWS Polly—Voice Analysis
- Amazon Transcribe—Speech to Text
- Amazon Textract—Extract Text
- Amazon Rekognition—Image Applications
- Amazon SageMaker—Building and deploying models
- Working with Deep Learning on AWS

11 | Machine Learning System Design

Create Your ML Design

Understanding the whole Machine Learning architecture from a birds-eye view, so that you will not end up knowing anything.

Resources

https: //github.com/CathyQian/Machine-Learning-System-Design

https: //github.com/ifding/ml-system-design

Chapter 1

1 | Fundamentals

2 | Pinterest → Visual Search ML System

3 | YouTube → Video Search ML System

4 | Video Recommendation System

12 | Major Capstone Project

Check the following list of 600 ML Projects

https: //github.com/hemansnation/God-Level-Data-Science-ML-Full-Stack/tree/master/projects

Projects

Here is the list of project ideas

13 | Machine Learning, GenAI Interview

Interview Questions

LLMs Interview Questions

Machine Learning Interview Questions

Resume Checklist

14 | Personal Branding & Portfolio

Portfolio

Work on your craft.

1. Technicalblogs(Postsonsocialmedia)-
   Newsletter(LinkedIn, BeeHiive, CovertKit, Medium)
2. Projects - Live (Proof of Work) - read.cv
3. Certification - Google Cloud (ACE)
4. Soft skills - Leadership, Talk, Session, NGO
5. Story - Your Story
6. Research Paper

Personal Branding

1. ProfilePageasLandingPage
2. How to Post
3. Who to connect with
4. Tools to use to make it better

15 | Others