

# AI Engineering Roadmap

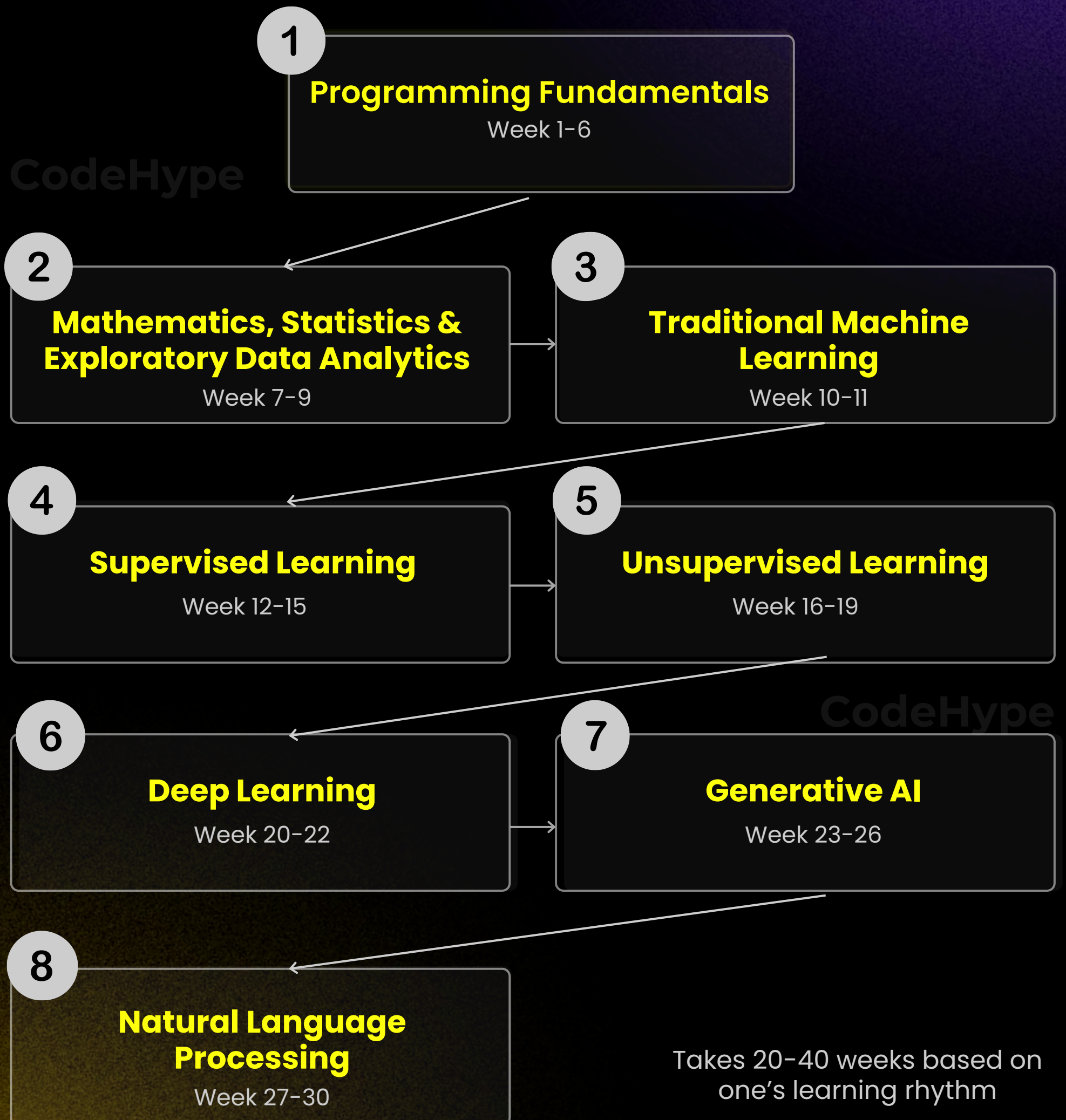
I wish I had this

when I started!





# Roadmap Overview





# #1 Programming Fundamentals

Foundational coding skills in Python, SQL, converting syntax, data structures and basic algorithms.

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What is AI?

Field Knowledge in  
AI & Data Science

Learning Strategies

## PYTHON

Variables

Collections

Strings, Functions, Numbers

Conditional Logic

Lists & Dictionaries

Objects & Modules

REST API's

Scraping

DSA

## SQL

Field exploration

Records

Joins

Aggregate

Sub queries

Constraints

Stored Procedures & Functions





# #2 Mathematics, Statistics & Exploratory Data Analytics

Core mathematics concepts (linear algebra, calculus) & statistical methods for data analysis.

## MATHEMATICS

Linear Algebra

Integral Calculus

Mathematical Analysis

Differential Calculus

## A/B TESTING

Performance Testing

Business Experiments

Executing A/B Testing

## STATISTICS

Descriptive Statistics

Visualizations

Probability

Data Distribution

Central Limit Theorem

## DATA ANALYSIS

Pandas

Matplotlib, Seaborn

Data Cleaning

Data Frames



# #3 Traditional Machine Learning

Introduction to classical machine learning and its practical applications.

Modeling Techniques

Training Modes

Model Evaluation

Basics of Time Series Analysis

Modeling Time

Stochastic Processes

Arima Modeling

## ML APPLICATIONS

AutoML

Business Applications

Ethical AI

ML Ops Basics



# #4 Supervised Learning

Techniques for training models on labeled data including classification, regression & evaluation metrics.

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## CLASSIFICATION

Classification Algorithm

Naive Bayes

Spam Classification

Sentiment Analysis

Class Imbalance

Evaluation & Cross Validation

Linear Classifiers

Multiclass Classification

## REGRESSION

Linear Regression Models

Assumptions

Overfitting & Regularisation

## SIMILARITY MODELS

KNN Classifiers

Tuning KNN

KNN Regression

Decision Trees

Random Forest

SVM

Kernel Trick

ID3

Ensemble  
Modeling

Gradient  
Boost

Linear SVM





# #5 Unsupervised Learning

Methods like clustering and dimensionality reduction to uncover patterns in unlabeled datasets.

## CLUSTERING

K-Means

Evaluating Clusters

Hierarchical Clustering

DBSCAN

Gaussian Mixture Model

UMAP

## DIMENSIONALITY REDUCTION

Principal Component Analysis (PCA)

t-Distributed Stochastic  
Neighbor Embedding (t-SNE)

Non-negative Matrix Factorization

LLE (Locally Linear Embedding)

Isomap



# #6 Deep Learning

Neural networks, CNNs, RNNs, and frameworks like TensorFlow and Keras for complex data modeling.

## NEURAL NETWORKS

Perceptron Models

Supervised Neural Networks

Unsupervised Neural Networks

Loss Functions

Batch Size & Epochs

Learning Rates

Backpropagation Intuition

Recurrent Neural Networks

Convolutional Neural Networks

## ADDITIONAL TOPICS

History of Artificial Neural Networks

TensorFlow

Keras

Zero Padding

Max Pooling

Transfer Learning & Fine-tuning

Long Short-Term Memory  
Networks (LSTM)



# #7 Generative AI

Creating new content (images, text) using models like GANs, VAEs, and diffusion models.

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## DIFFUSION & VAE-BASED METHODS

Stable Diffusion

Latent Diffusion Models

Image Generation

CLIP

Autoencoders

U-Net

Inference with a Diffusion Model

Masking

Training a Diffusion Model

HuggingFace Diffusers

## GANs & OTHER GENERATIVE TOOLS

Generative Adversarial Networks (GANs)

GAN Discriminator

GAN Generator

Deep Convolutional GAN

Embeddings API

RAG (Retrieval-Augmented Generation)

AI Agents

Agentic Reasoning





# #8 Natural Language Processing

Techniques for text processing, sentiment analysis, and building language models.

## FUNDAMENTALS & TECHNIQUES

Basics of NLP

Supervised NLP

Unsupervised NLP

NN Word2Vec

Sense2Vec

N-Gram Models

Sequence Models

Building Your Own Model

## APPLICATIONS & TOOLS

Chatbots

Using OpenAI API

Feature Engineering

Text Generation

Text Summarization

Text Extraction

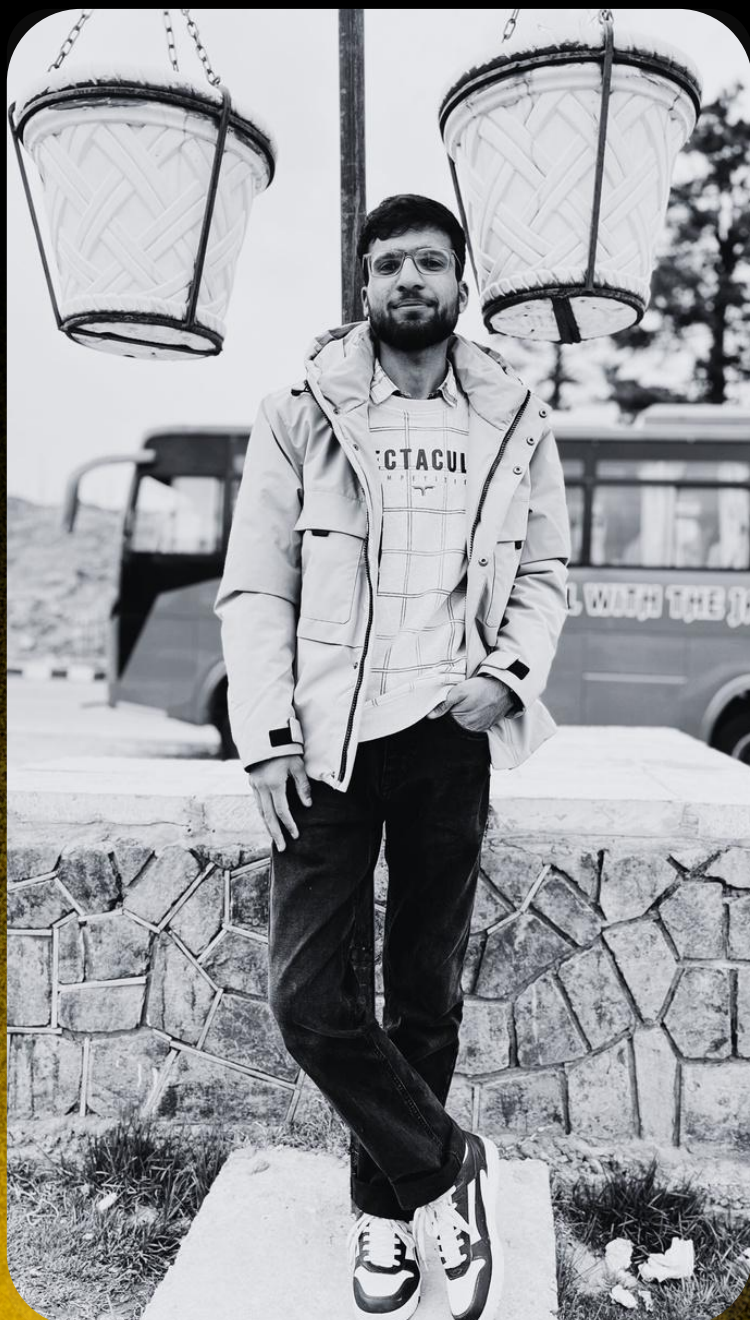
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