

A roadmap to

Generative AI



AI and Machine Learning Basics

> Fundamental Concepts:

- **Algorithms** → Supervised, unsupervised and reinforcement learning
- **Data Preprocessing** → Handling missing data, normalisation, encoding categorical data.
- **Model Evaluation** → Understanding metrics like accuracy, precision, recall etc.

> Key Algorithms:

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- **Regression** : Linear and logistic regression.
- **Classification** : Decision trees, SVM (Support Vector Machines)
- **Clustering** : K-means, hierarchical clustering.



Deep Learning Foundations

> Neural Network Basics:

- Understanding neurons, layers and activation.
- Network architectures : Feedforward,
CNNs, RNNs.

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> Core concepts:

- Backpropagation and Gradient descent.
- Overfitting and regularisation techniques like dropout and early stopping.



> Frameworks:

- Tensorflow : Basic operations, constructing neural network.
- PyTorch : Dynamic computation graphs, autograd system.



Explore Generative Models

> Generative Adversarial Networks (GANs):

- GAN Architecture : Understanding the discriminator and generator.

- Variants of GAN : Conditional GANs, CycleGANs, StyleGANs.

> Variational Autoencoders (VAE):

- Understanding the encoder-decoder architecture
- The reparameterization trick and latent space exploration.

> Applications :

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- Image generation and enhancement
- Text generation : RNN-based models, transformer-based models like GPT.
- Creative AI : Art and music generation.



↳ Advanced Topics :

- o **Style transfer:** Transferring styles from one image to another.
- o **Neural Style algorithm:** Understanding how style and content can be separated and combined.



Hands-on Projects / Experiments

- ↳ > **Implement** small projects to understand the GenAI nuances.
- ↳ > **Experiment** with different architectures and data sets.
- ↳ > Choose a domain and find out how GenAI is applied in that area.



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Stay informed

- ↳ > **Read** related research papers and articles.
- ↳ > Follow AI conferences and workshops.

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