

<https://github.com/techloset/agentic-ai>

## Applied Generative AI Cloud-Native Developer

### 1. Artificial Intelligence (AI)

- **Definition:** The simulation of human intelligence in machines designed to think and act like humans.
- **Example:** Virtual personal assistants like Siri and Alexa.

### 2. Machine Learning (ML)

- **Definition:** A subset of AI focused on building systems that learn from data to improve performance over time.
- **Example:** Email spam filters.

### 3. Deep Learning (DL)

- **Definition:** A subset of ML that uses neural networks with many layers to analyze various factors of data.
- **Example:** Autonomous driving systems.

### 4. Supervised Learning

- **Definition:** Training an algorithm with labeled data.
- **Example:** Predicting house prices based on historical data.

### 5. Unsupervised Learning

- **Definition:** Training an algorithm on data without labels.
- **Example:** Clustering customers based on purchase behavior.

### 6. Reinforcement Learning (RL)

- **Definition:** A type of ML where an agent learns to make decisions by receiving rewards for its actions.
- **Example:** Training robots to play soccer.

### 7. Neural Network (NN)

- **Definition:** A series of algorithms that mimic the operations of a human brain to recognize relationships in data.
- **Example:** Recognizing handwritten digits.

## 8. Convolutional Neural Network (CNN)

- **Definition:** A deep learning algorithm primarily used for image processing.
- **Example:** Facial recognition systems.

## 9. Recurrent Neural Network (RNN)

- **Definition:** A type of NN where connections between nodes form a directed graph along a temporal sequence.
- **Example:** Language modeling and translation.

## 11. Overfitting

- **Definition:** When a model learns the training data too well, including noise and outliers, and performs poorly on new data.
- **Example:** A complex model that performs well on training data but poorly on test data.

## 12. Underfitting

- **Definition:** When a model is too simple to capture the underlying patterns in the data.
- **Example:** A linear model used for complex, non-linear data.

## 13. Cross-validation

- **Definition:** A technique for assessing how the results of a statistical analysis will generalize to an independent dataset.
- **Example:** 10-fold cross-validation in model training.

## 14. Hyperparameter Tuning

- **Definition:** The process of optimizing the parameters that control the learning process.
- **Example:** Grid search for finding the best learning rate.

## 15. Backpropagation

- **Definition:** An algorithm for training neural networks by propagating the error gradient backward through the network.
- **Example:** Used in training deep neural networks.

## 16. Dropout

- **Definition:** A regularization technique where randomly selected neurons are ignored during training to prevent overfitting.
- **Example:** Dropout layers in CNNs.

## 17. Batch Normalization

- **Definition:** A technique to improve training speed and stability by normalizing inputs in each mini-batch.
- **Example:** Batch normalization in deep networks.

## 18. Transfer Learning

- **Definition:** Applying a pre-trained model to a new but related problem.
- **Example:** Using a model trained on ImageNet for medical image classification.

## 19. Generative Adversarial Networks (GANs)

- **Definition:** A class of ML systems where two networks, a generator and a discriminator, compete against each other.
- **Example:** Generating realistic human faces.

## 20. Natural Language Processing (NLP)

- **Definition:** The field of AI focused on the interaction between computers and humans through natural language.
- **Example:** Chatbots and language translation services.

## 21. Computer Vision

- **Definition:** A field of AI that enables computers to interpret and make decisions based on visual data.
- **Example:** Image classification and object detection.

## 22. Autonomous Systems

- **Definition:** Systems capable of performing tasks without human intervention.
- **Example:** Self-driving cars.

## 23. Accuracy

- **Definition:** The ratio of correctly predicted instances to the total instances.
- **Example:** A model with 90% accuracy.

## 24. Precision and Recall

- **Precision:** The ratio of correctly predicted positive instances to the total predicted positives.
- **Recall:** The ratio of correctly predicted positive instances to all actual positives.
- **Example:** Evaluating a disease detection system.

## 25. F1 Score

- **Definition:** The harmonic mean of precision and recall.
- **Example:** Used for evaluating classification models.

## 26. Confusion Matrix

- **Definition:** A table used to describe the performance of a classification model.
- **Example:** Used to visualize true vs. predicted classes.

## 27. Support Vector Machine (SVM)

- **Definition:** A supervised ML algorithm that can be used for classification or regression.
- **Example:** Classifying emails as spam or not spam.

## 28. Decision Tree

- **Definition:** A model that uses a tree-like graph of decisions and their possible consequences.
- **Example:** Used in loan approval systems.

## 29. Random Forest

- **Definition:** An ensemble learning method that constructs multiple decision trees.
- **Example:** Used for feature selection and classification.

## 30. K-Nearest Neighbors (KNN)

- **Definition:** A simple, instance-based learning algorithm.
- **Example:** Used in recommendation systems.

## 31. Principal Component Analysis (PCA)

- **Definition:** A technique for reducing the dimensionality of datasets.
- **Example:** Used in exploratory data analysis.

## 32. K-Means Clustering

- **Definition:** An unsupervised learning algorithm for clustering data into K clusters.
- **Example:** Customer segmentation.

## 33. Recurrent Neural Networks (RNN)

- **Definition:** Networks with loops allowing information to persist.
- **Example:** Time series forecasting.

## 34. Long Short-Term Memory (LSTM)

- **Definition:** A type of RNN capable of learning long-term dependencies.
- **Example:** Speech recognition.

## 35. Attention Mechanism

- **Definition:** A technique that allows models to focus on specific parts of the input sequence.
- **Example:** Machine translation.

### 36. Transformer Model

- **Definition:** An architecture that uses self-attention mechanisms.
- **Example:** BERT and GPT models.

### 37. Autoencoder

- **Definition:** A type of neural network used to learn efficient codings of input data.
- **Example:** Image denoising.

## Practical Tools and Libraries

### 38. TensorFlow

- **Definition:** An open-source ML framework developed by Google.
- **Example:** Training deep learning models.

### 39. PyTorch

- **Definition:** An open-source ML library developed by Facebook.
- **Example:** Building and training neural networks.

### 40. scikit-learn

- **Definition:** A Python library for ML, built on NumPy, SciPy, and matplotlib.
- **Example:** Implementing various ML algorithms.

### 41. Keras

- **Definition:** A high-level neural networks API.
- **Example:** Simplifying the creation of complex neural networks.

### 42. OpenAI GPT

- **Definition:** A series of language models developed by OpenAI.
- **Example:** Text generation and language understanding.

### 43. Pandas

- **Definition:** A data manipulation and analysis library for Python.
- **Example:** Handling dataframes in ML projects.

### 44. NumPy

- **Definition:** A fundamental package for scientific computing with Python.
- **Example:** Handling arrays and matrices.

By understanding these terms and concepts in depth, your students will be well-equipped to grasp the foundational and advanced topics in AI, machine learning, and deep learning.

Regards:

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