

Introduction to Generative AI – Summary Notes

1. Definition: Generative AI creates new content (text, image, audio, video) using patterns learned from data.

2. AI Overview: AI builds intelligent systems that can reason, learn, and act like humans.

3. Machine Learning (ML): Subset of AI where models learn from data.

- Supervised – labeled data → prediction
- Unsupervised – unlabeled data → discovery

4. Deep Learning: Uses neural networks with many layers to detect complex patterns. Enables semi-supervised learning.

5. Generative AI in Context: Subset of Deep Learning using neural networks to generate new data/content.

6. Model Types:

- Discriminative – classify data (is this a dog?)
- Generative – create new data (generate a dog image)

7. GenAI Output: Not GenAI → numeric/class output; GenAI → text/image/audio/video.

8. Traditional ML vs GenAI: ML predicts; GenAI generates.

ML uses labeled data → model → prediction. GenAI uses labeled/unlabeled data → foundation model → new content.

9. Evolution: Rules → Neural Nets → Generative AI (content creation).

10. Key Google Models: Gemini (multimodal), LaMDA (dialogue).

11. Official Definition: GenAI learns from existing content to create new outputs using trained statistical models.

12. Model Types (Text Input):

- Text→Text (translation)
- Text→Image (diffusion)
- Text→Video (generate scenes)
- Text→3D (3D objects)
- Text→Task (perform actions)

13. Foundation Models: Pre-trained large models fine-tuned for tasks (sentiment, vision). Available via Vertex AI Model Garden.

14. GenAI Applications: Code generation, debugging, explanation, SQL writing, translation, documentation, chatbot creation.

15. Google Cloud Tools:

- Vertex AI Studio – explore, fine-tune, deploy models.
- Vertex AI Agent Builder – build chatbots/search tools with low code.
- Gemini – multimodal, scalable, powerful.

16. Transformers: Encoder-decoder models enabling NLP revolution; can face hallucination issues due to poor data/context.

17. Prompts: Input text guiding LLM output; prompt design = crafting effective instructions.

18. Summary: AI → ML → Deep Learning → GenAI. GenAI *creates*; ML *predicts*. Foundation Models like Gemini power multimodal applications via Vertex AI.