Welcome to "Little Bits to Big Ideas"

Lab 8: LLMs and Generative AI

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What is Generative AI?

Generative: find a value that fits a gap in a provided pattern.

This is an|example

Typically a mix of tools:

- Machine learning with a little domain-specific human guidance
- Repeatedly fill small gaps (one word/pixel at a time)
- For non-text, input understanding ≠ output generation

LLM

1. User provides a prompt (text)
2. Text is broken into tokens (words) and converted to vectors (list of numbers)
3. A transformer moves word vectors closer together, providing a kind of context-aware meaning
4. An Artificial Neural Network (ANN) finds the vector of a new word that belongs after those provided
5. The vector is decoded as a word to show, and added to the encoded prompt to make another word

Reasoning and Agentic LLMs

LLMs just complete text.

To add **reasoning**, LLMs are guided through multiple steps, asking questions about their prompt and their earlier responses and using web search to add additional context.

To become **agents**, LLM outputs may include instructions to run other programs, with program outputs becoming additional LLM prompts.

Other generative models

Images: Often based on *denoising* an image: adjusting individual pixels to create smoother, more likely images based on training. Start with a tiny image, scale it up, add noise, remove noise, repeat. Training pairs images with text around them, allowing text to guide denoising.

Audio: Often handled by a transformer architecture, much like an LLM, but with more complicated tokenization

Rapid Paired Creative Work

In this lab, you and your partner will create something using GenAI.

To help, consider using a **yes-and** approach, common in improv:

- “Yes” - accept each idea you or your partner proposes.
- “And” - add to ideas rather than rejecting or changing them.

We require you to use **multiple** GenAI tools. We list some free ones, but you’re welcome to use others you have access too as well.

Expect each tool to treat the same prompts differently!