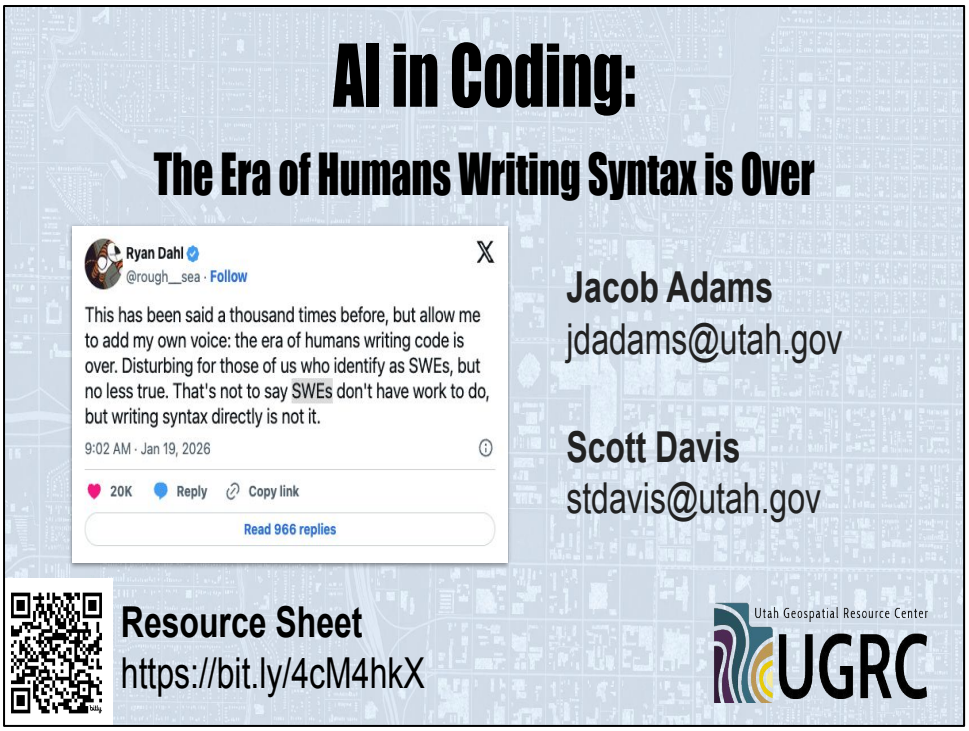
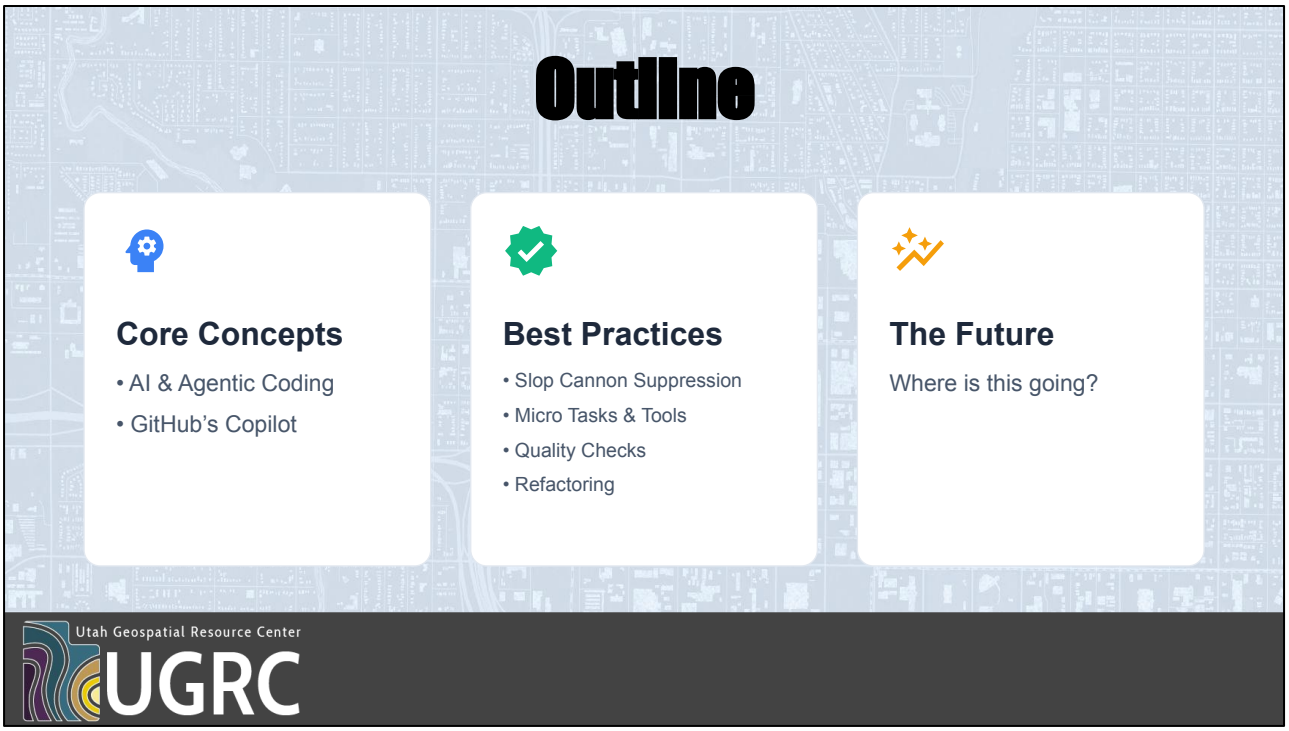


Scott
Ryan Dahl - NodeJS

Jake - Set a stopwatch


Outline
Core Concepts
• AI & Agentic Coding
• GitHub's Copilot
Best Practices
• Slop Cannon Suppression
• Micro Tasks & Tools
• Quality Checks
• Refactoring
The Future
Where is this going?
Utah Geospatial Resource Center
UGRC

Scott

Story/Demo

Create data classes for holding all the information about wordpress media items from a Wordpress REST endpoint

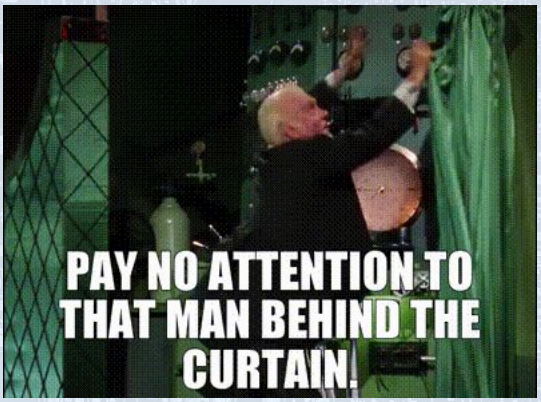
Utah Geospatial Resource Center
UGRC

Jake

What Is AI?

AI is just a Large Language Model (LLM)

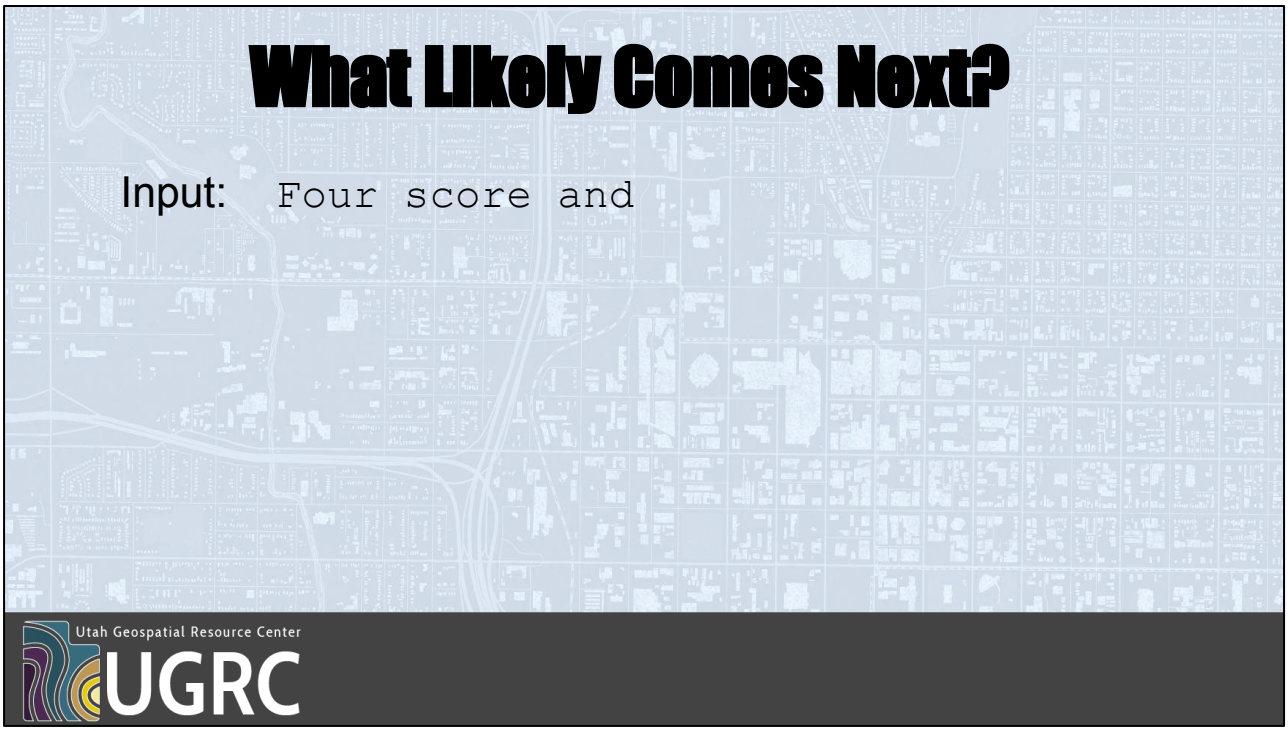
An LLM is just a mathematical construct that guesses what comes next based on probabilities



Utah Geospatial Resource Center
UGRC

Jake

Explain LLMs
Explain models

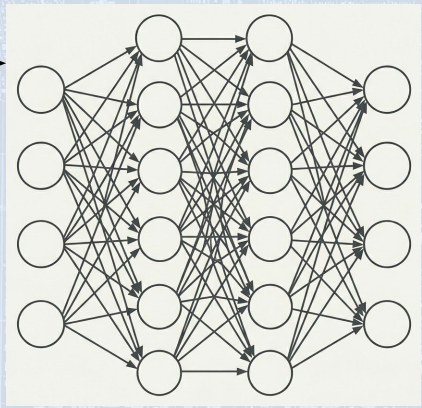


Jake

Explain LLMs
Explain models

What Likely Comes Next?

Input: `Four score and`



Utah Geospatial Resource Center
UGRC

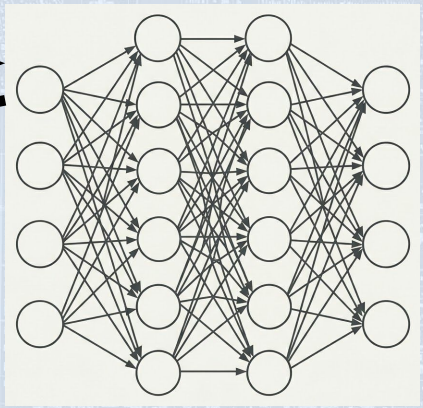
Jake

Explain LLMs
Explain models

What Likely Comes Next?

Input: `Four score and`

`Four score and seven`



Utah Geospatial Resource Center
UGRC

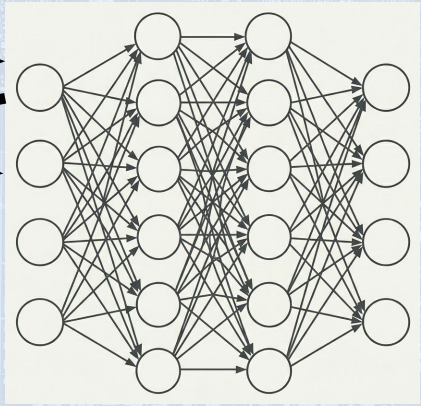
Jake

Explain LLMs
Explain models

What Likely Comes Next?

Input: `Four score and`

`Four score and seven`



Utah Geospatial Resource Center
UGRC

Jake

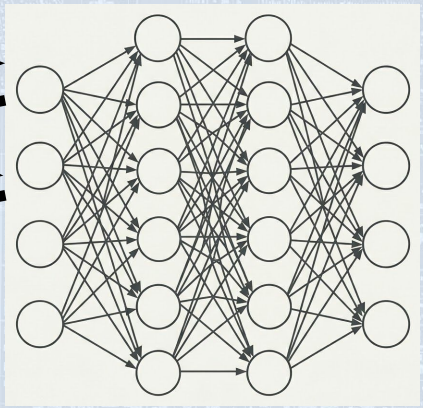
Explain LLMs
Explain models

What Likely Comes Next?

Input: Four score and

Four score and seven

Four score and seven years



Utah Geospatial Resource Center
UGRC

Jake

Explain LLMs
Explain models

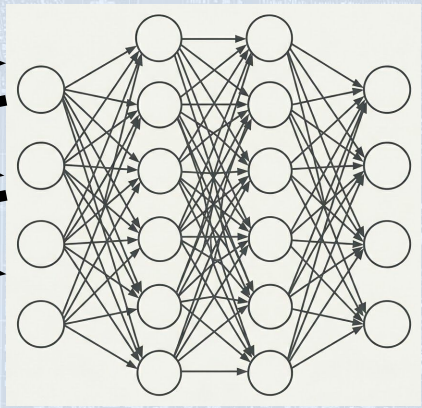
What Likely Comes Next?

Input: Four score and

Four score and seven

Four score and seven years

...



Utah Geospatial Resource Center
UGRC

Jake

Explain LLMs
Explain models

Tokenization

LLMs operate on tokens: words (or common bits of words), punctuation, etc that are assigned numeric values

AI providers charge you based on the number of input and output tokens.

Utah Geospatial Resource Center
UGRC

Jake

Explain LLMs
Explain models

Tokenization

Four Score and seven years ago

[10051, 6115, 323, 5015, 984, 4636]

10051: [-0.0151 -0.0212 0.0084...]
6115: [-0.0042 0.0118 -0.0254, ...]
323: [0.0015 -0.0183 -0.0076 ...]

Utah Geospatial Resource Center
UGRC

Jake

Explain LLMs
Explain models

Tokenization

Each token is assigned a long (1.5-3k) list, or vector, of numbers from -1 to 1 that embeds it's meaning and relationship to other tokens

```
10051: [-0.0151 -0.0212 0.0084...]
6115: [-0.0042  0.0118  -0.0254, ...]
323: [0.0015  -0.0183 -0.0076 ...]
```

Utah Geospatial Resource Center
UGRC

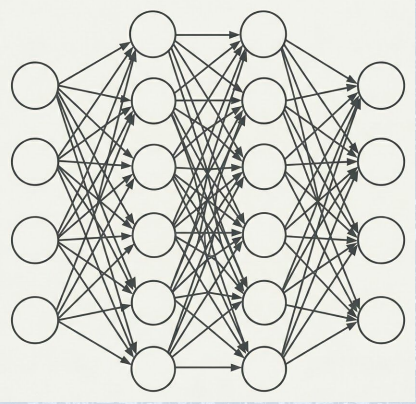
Jake

Explain LLMs
Explain models

Weights

The vectors are passed into the model, which consists of many layers of "transformers"

These transformers perform lots of additions and multiplications on the vectors



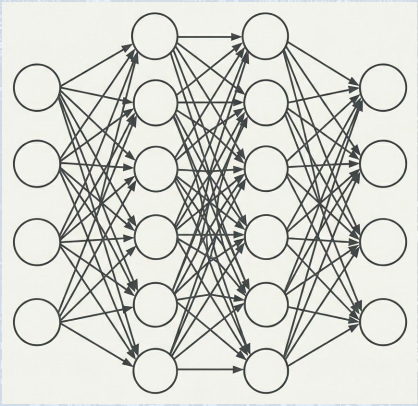
Utah Geospatial Resource Center
UGRC

Jake

Explain LLMs
Explain models

Weights

The final layer of transformers returns the probability of every token in its vocabulary to be the next token



Utah Geospatial Resource Center
UGRC

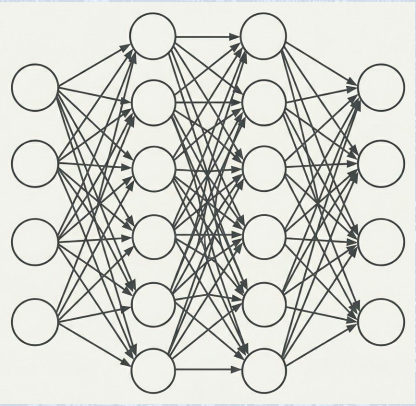
Jake

Explain LLMs
Explain models

Weights

The LLM black box multiplies these arrays of numbers by billions of other numbers (which are the result of the model training process) multiple times

The final iteration returns the probability of every token in its vocabulary to be the next response



Utah Geospatial Resource Center
UGRC

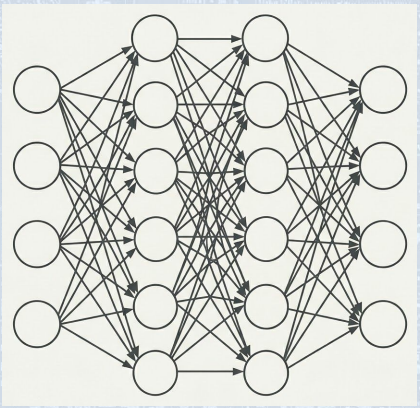
Jake

Explain LLMs
Explain models

Weights

The more weights in a model, the more info it has about relationships between the tokens in its training dataset

However, the more weights, the more computational power required to infer the next token

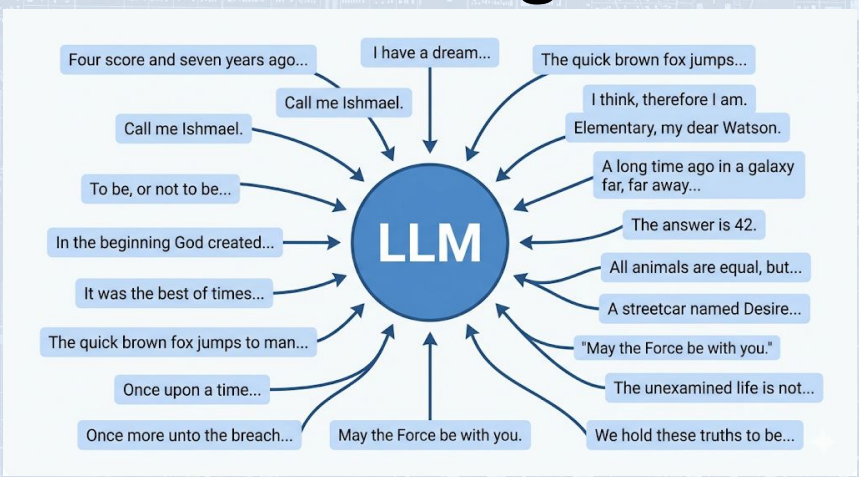


Utah Geospatial Resource Center
UGRC

Jake

Explain LLMs
Explain models

Training



Utah Geospatial Resource Center
UGRC

Jake

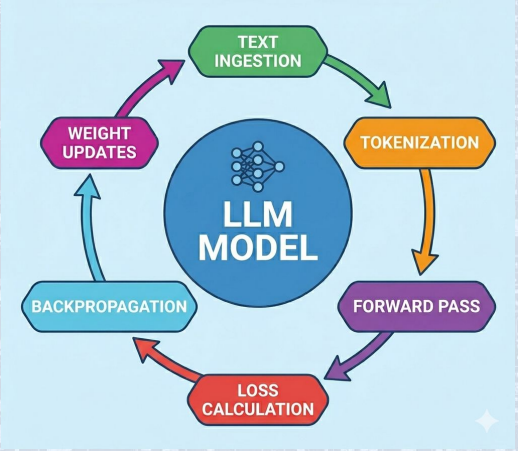
Explain LLMs
Explain models

Training

Start with random values for each weight

Feed in a training text one token at a time, tweaking the weights until it correctly predicts the next

Shampoo, rinse, repeat



Utah Geospatial Resource Center
UGRC

Jake

Explain LLMs
Explain models

Models

An AI model is the combination of transformer architecture plus weights

Each model is unique based on its training data and methods

Utah Geospatial Resource Center
UGRC

Jake

Explain LLMs
Explain models

Context

Each model has its own limit for the number of tokens it includes in each prompt, called its context

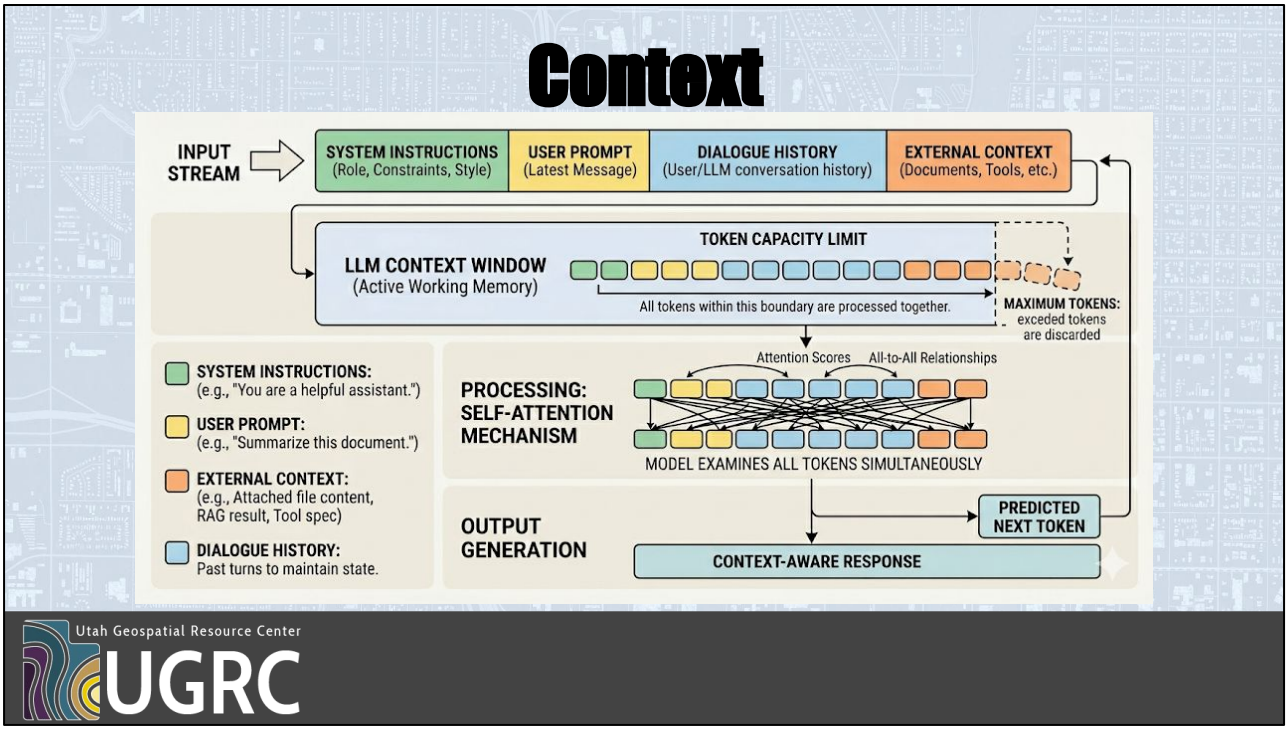
It includes instructions, inputs, discussion history, and any external context (files, MCP connections, etc)

More importance is put on tokens in the beginning and end of the context window, less on the middle

Utah Geospatial Resource Center
UGRC

Jake

Explain LLMs
Explain models



Jake

Explain LLMs
Explain models

Hallucinations

Traditional programming is deterministic: we set the value of variable `name` to `Jake`, and everytime we refer to `name` it returns `Jake`

LLMs are predictive: it guesses the correct output based on the patterns it discovered in its training data as encoded in its weights combined with the current running context

Utah Geospatial Resource Center
UGRC

Jake

Explain LLMs
Explain models

What Is AI?

- Predictive guess of what comes next based on terabytes of training data
- Non deterministic
- Purely based on patterns, not hard facts
- Entirely dependent upon its training data
- Subject to disagreements with reality (hallucinations)
- Delivered as individual models with different patterns derived from different training methods and datasets

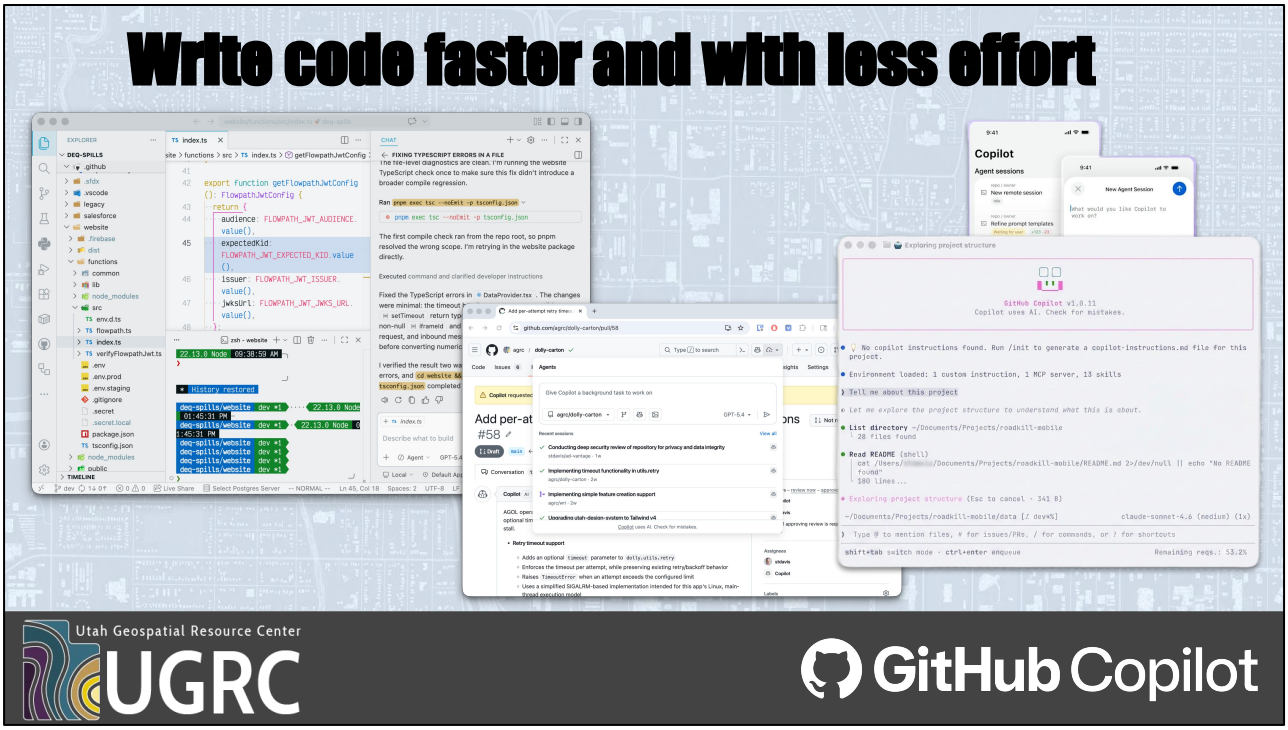
Utah Geospatial Resource Center
UGRC

Jake

Explain LLMs
Explain models


GitHub Copilot
!=
Microsoft Copilot
Utah Geospatial Resource Center
UGRC

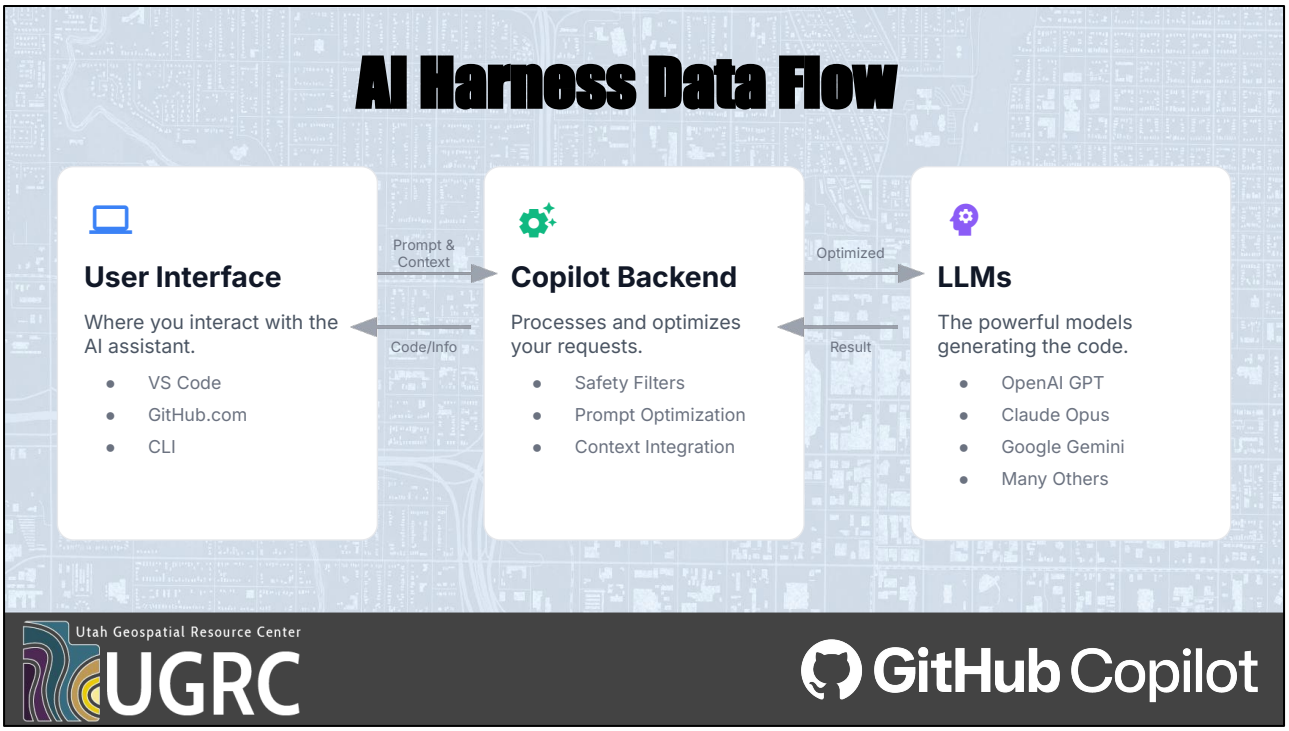
Scott



Scott
VSCode (and other IDEs)
GitHub.com
CLI
Mobile

Many other options:
Anthropics Claude Code
OpenIA Codex
Cursor

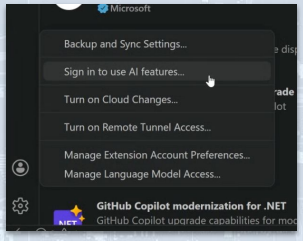
The principles that we will cover are universal.

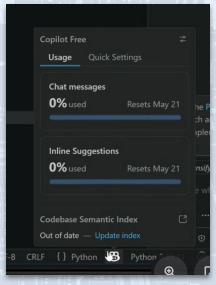


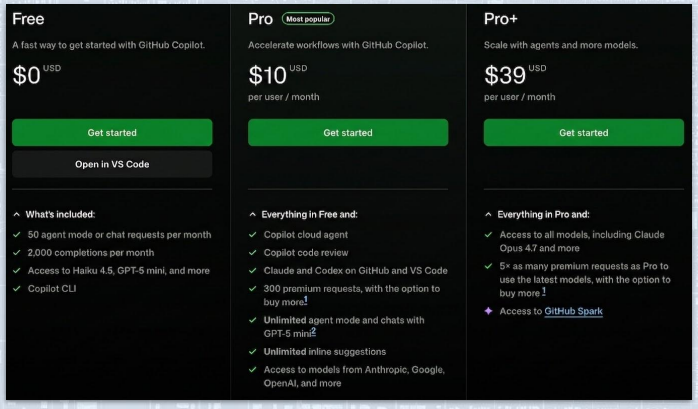
Scott
Copilot is not an LLM. It is a set of tools that you use to interact with an LLM to help code.

Getting Started

1. Create GitHub account
2. Install Visual Studio Code
3. Sign in with GitHub account



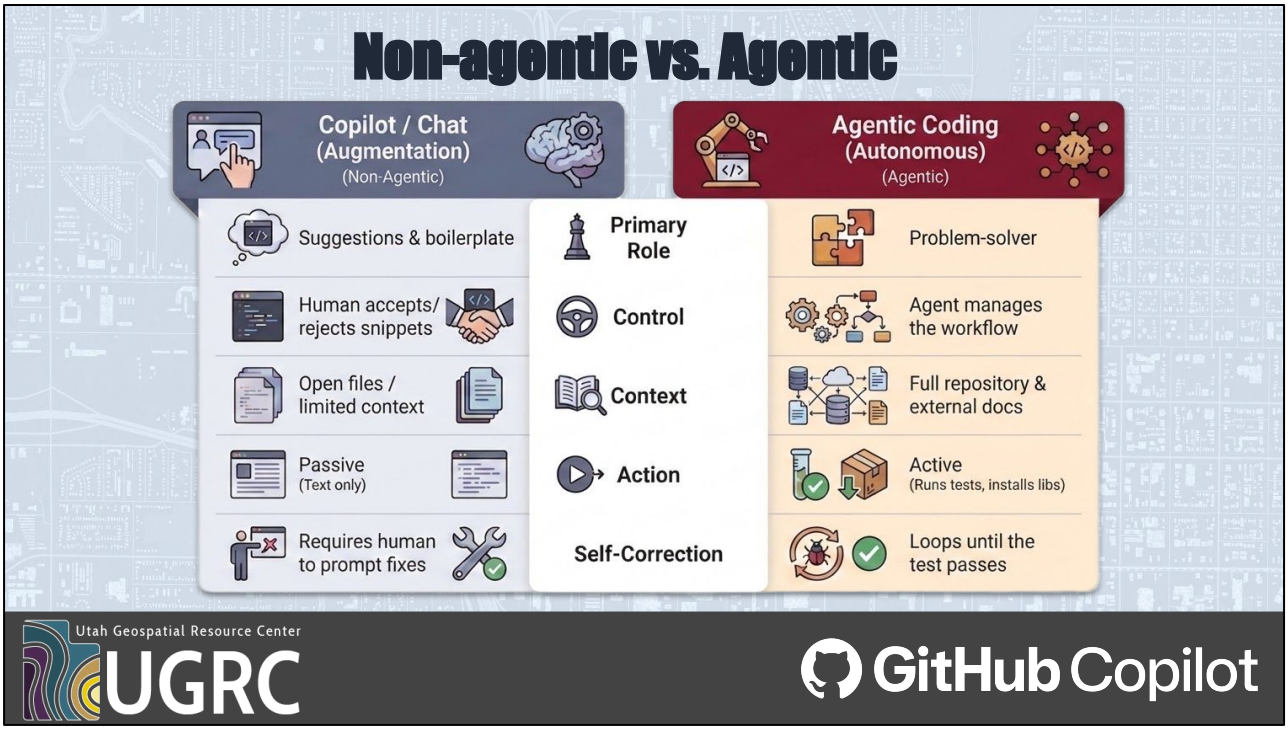




Utah Geospatial Resource Center
UGRC

GitHub Copilot

Scott



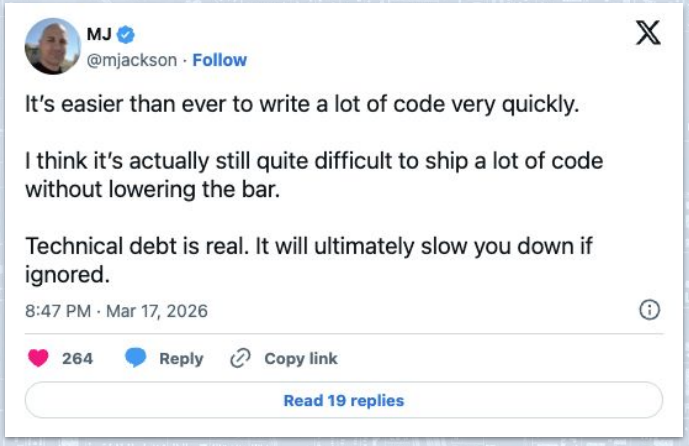
Scott
Demo - VSCode
New Python File

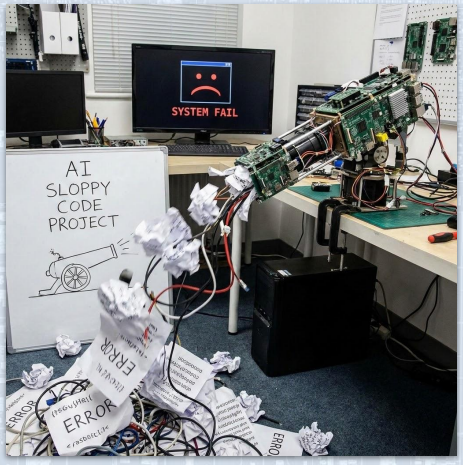
```
def multiply(
```

Hit tab to show auto-complete

```
Write tests for these functions. Make sure that they all pass.
```

Slop Cannon Suppression





Utah Geospatial Resource Center
UGRC

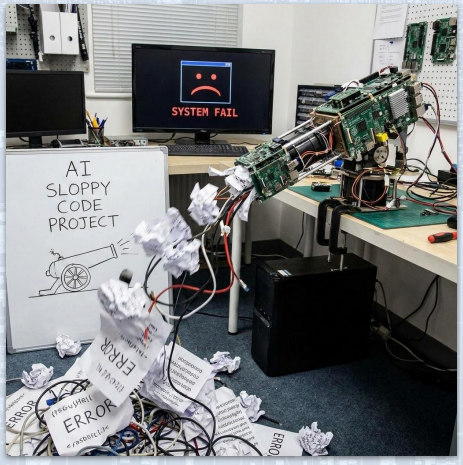
Jake?
Michael Jackson - Remix/React Router
We are going to talk about some best practices to avoid sloppy code that can sometimes be generated by these models.

Slop Cannon Suppression

If you can push a button and get content, then that content is a commodity. Its value is next to zero.

Counterintuitively, that's my biggest reason to be optimistic about AI and creativity. When hard parts become easy, the differentiator becomes love.

Andy Conen, AI Dev at Google
cannoneyed.com/projects/isometric-nyc



Utah Geospatial Resource Center
UGRC

Jake?
Michael Jackson - Remix/React Router
We are going to talk about some best practices to avoid sloppy code that can sometimes be generated by these models.

Slop Cannon Suppression

Don't think of AI as a magic button that solves all your problems

Treat AI like a power tool that makes the repetitive and boring parts of your job easier so you can get more done

Utah Geospatial Resource Center
UGRC

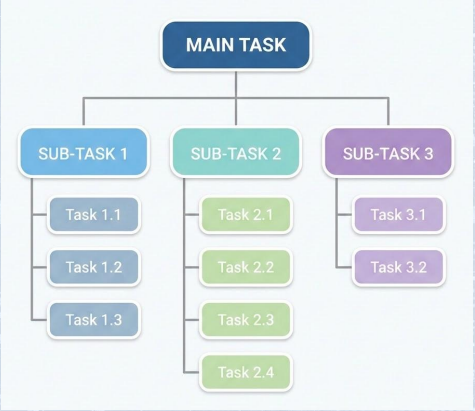
Jake

Micro Tasks

Don't ask AI to code the entire thing all at once

Break it down into micro tasks and prompt them one at a time

Read and test the results so you know how your code works



Utah Geospatial Resource Center
UGRC

Jake
Talk about plan mode?

Plan Mode

Plan mode asks the model to do the task decomposition for you

Helpful, but you can lose sight of the program's structure and pieces

Utah Geospatial Resource Center
UGRC

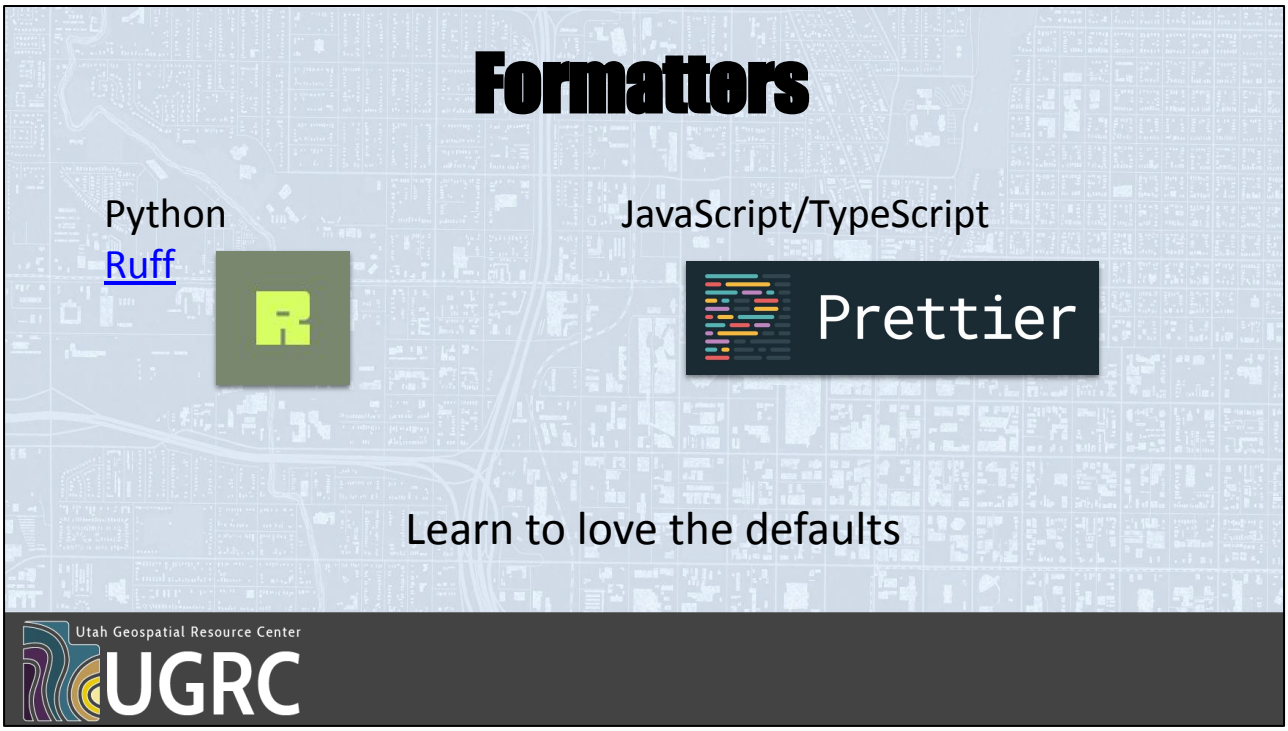
Jake
Talk about plan mode?

Code Quality Tools

Formatters
Linters
Tests

Utah Geospatial Resource Center
UGRC

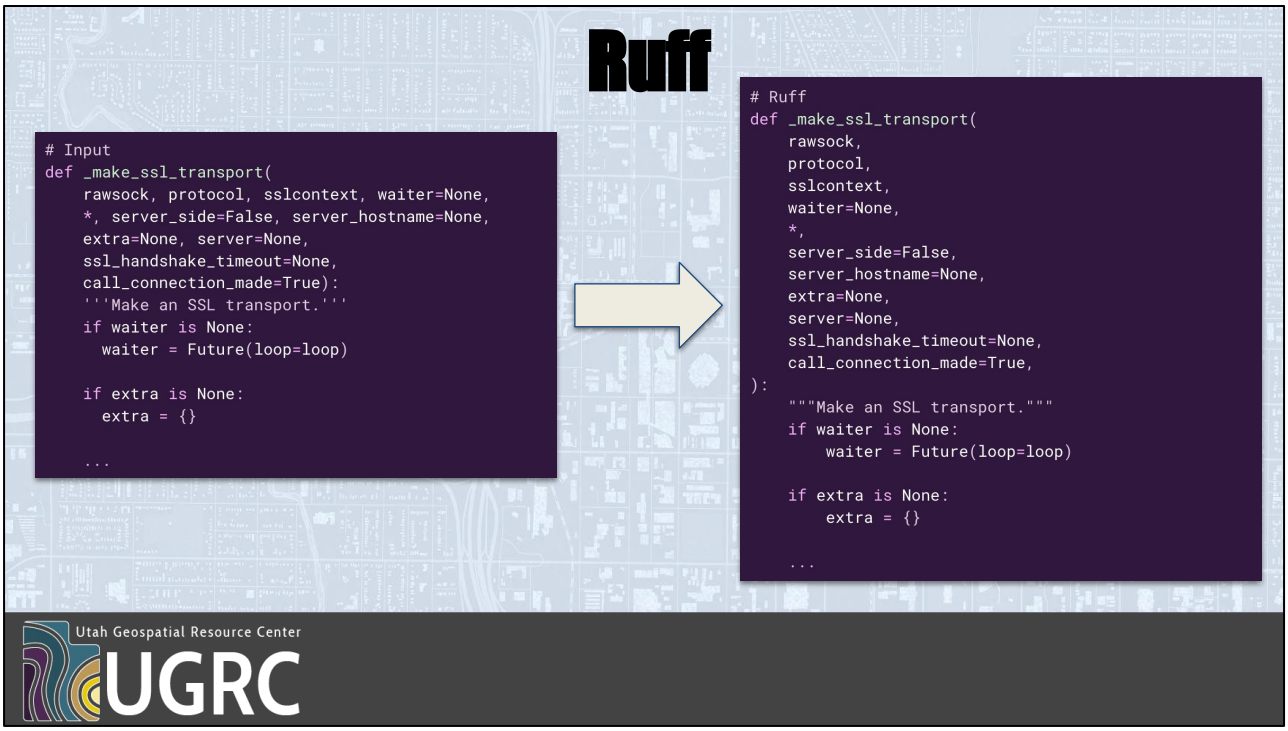
Scott



Scott
For example:

- Always use 4 spaces, not 2 or not tabs
- Always use double-quotes

Best Practice:
Learn to like the default settings rather than come up with your own. Most people these days use the default settings. You code will be easier for others including AI agents to read. Other people's code will be easier for you to read.
Only change if you have a very good reason.



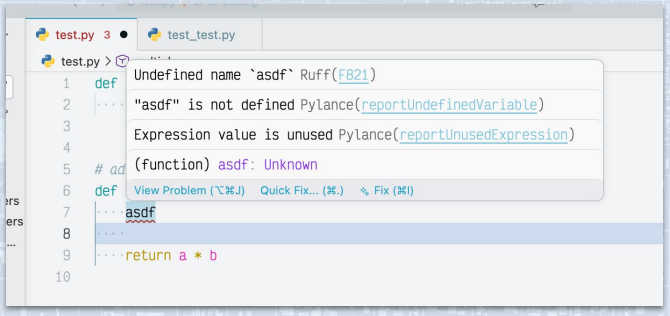
Scott
From the ruff docs website
“Code is read more than it’s written”
Differences:

- Newlines after function parameters
- Single -> double quotes

Linters

Python

JavaScript/TypeScript



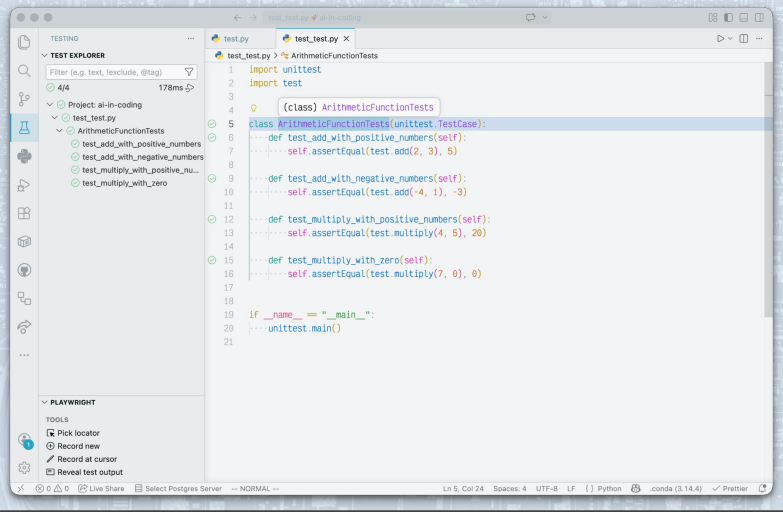
Learn to love the defaults

Utah Geospatial Resource Center
UGRC

Scott
Catch common errors and enforce best practices.
Agents can run these tools and iterate until all checks are passing
Wire them up in GitHub Actions

Tests

- Unit
- Integration
- End-to-end



Utah Geospatial Resource Center
UGRC

Jake

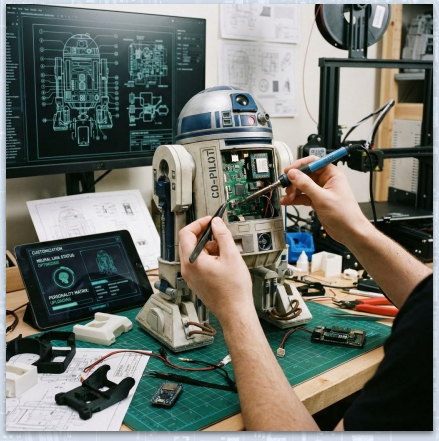
Refactoring:

Don't just stop when it's working

Utah Geospatial Resource Center
UGRC

Jake
Dax Raad - OpenCode

Customizing Copilot

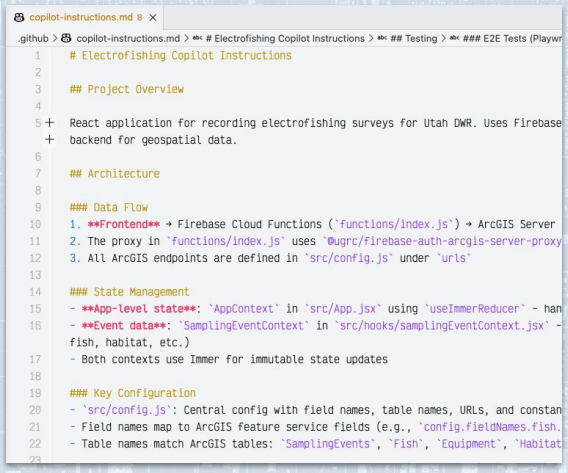


Utah Geospatial Resource Center
UGRC

Scott
Repetative coding task

Instructions Files

- Always-on
- General preferences
- Included in every request

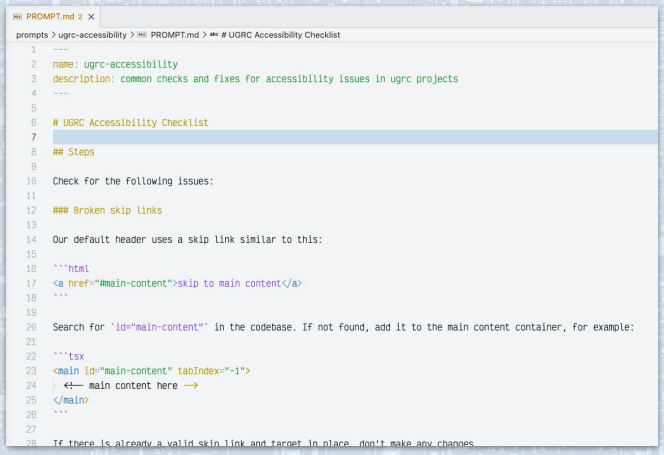


Utah Geospatial Resource Center
UGRC

Scott
Always make sure that formatting, linting and tests pass
Preference for certain libraries

Prompt Files

- Reusable tasks
- Invoked via slash command

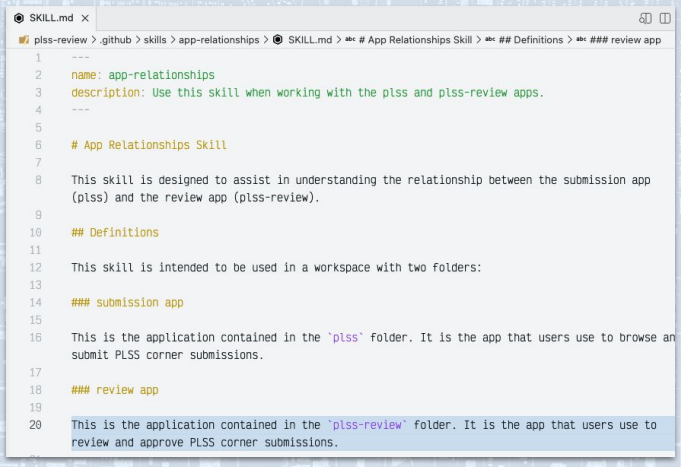


Utah Geospatial Resource Center
UGRC

Scott
Repetative coding task
Migration
Upgrade

Agent Skills

- Package multi-step workflow with scripts
- Invoked with the task matches the skill description



Utah Geospatial Resource Center
UGRC

Scott

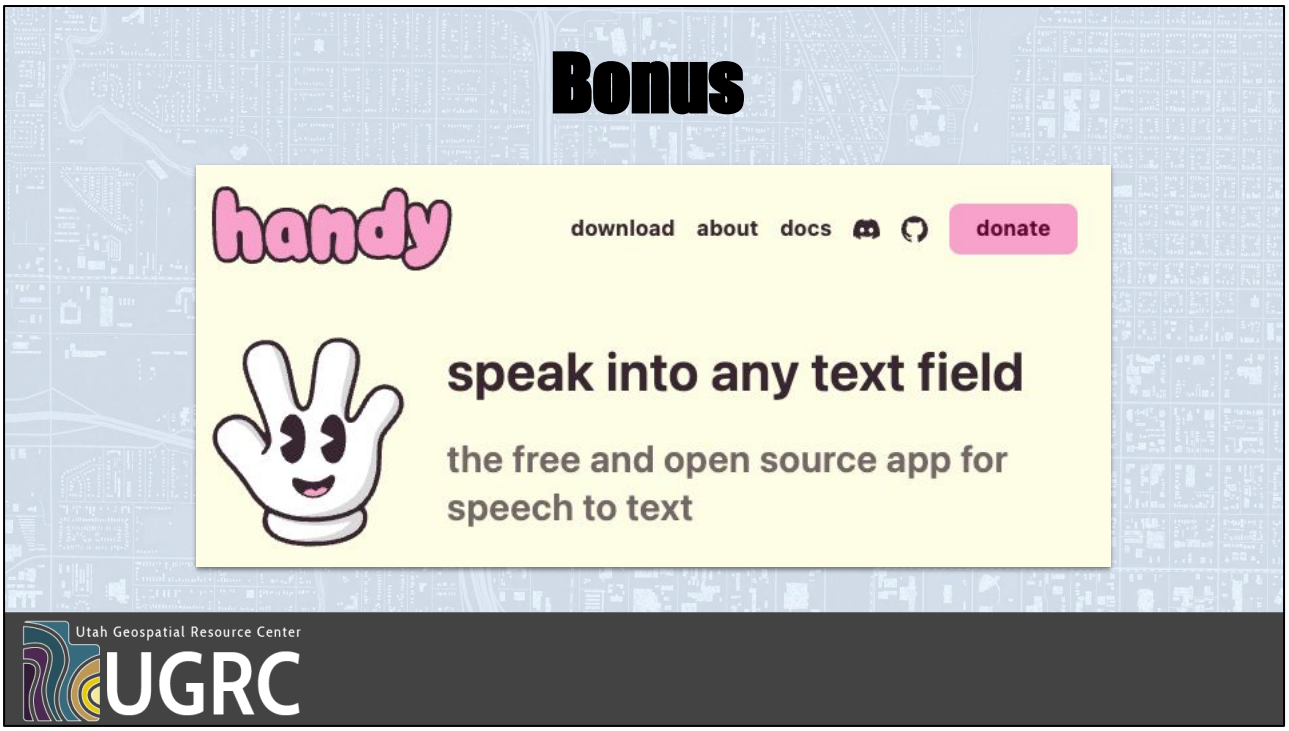
Next Level

- Custom Agents
- MCP Servers
- Agent Hooks

Utah Geospatial Resource Center
UGRC

Scott
Repetative coding task

Bonus



Utah Geospatial Resource Center
UGRC

Scott
Global hotkey

Will this replace us?

When hard parts become easy, the differentiator becomes love.

Andy Conen,
cannoneyed.com/projects/isometric-nyc

Resource Sheet
https://bit.ly/4cM4hkX

Utah Geospatial Resource Center
UGRC

Scott
Abundance
A tool for making your programming more productive
Superpower
Lower's the bar for effort to do something.
Specialized markets like GIS make our jobs harder to replace