

Coding with AI Workshop

Tools and Strategies for AI-Powered Coding: An Overview

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Popular AI tools and platforms used for coding

These are some other tools that are designed to help programmers:

1. Cursor
 - <https://cursor.sh/>
2. OpenAI Codex
3. Polycoder
 - by Carnegie Mellon University
4. CodeT5
 - by Salesforce
5. Google Colab
 - by Google

OpenAI ChatGPT

- <https://openai.com/chatgpt>
- Free and paid (\$20/mo)
- GPT-4 option to use the Internet through MS Bing.

Microsoft Copilot

- <https://adoption.microsoft.com/en-us/copilot/>
- Only available on Windows 11. GWIT plans to upgrade during summer 2024.
- Students can use through Github ([link](#)).

Google Bard

- <https://bard.google.com/>
- Able to use in personal accounts.
- Not available for use in GW accounts due to security assessments.
- Integrated with Google Docs.

AI-powered coding tools: Key features and capabilities

First, we want to ask...

**What tools have you found, as well
as their features and capabilities
(beyond those we just listed)?**

OpenRead, Sonar, Qubit AI
Replit
ChatPDF, Sherpa



AI-powered coding tools: Key features and capabilities

Here are some things that you should be considering as you identify and explore AI-powered coding tools.

Code generation

- Getting started

Code suggestions

- Identifying possible solutions

Code completion

- Filling-in the gaps

Multilingual support

- Translating
Python, JavaScript, SQL, C#, C/C++, R

Error detection and cleaning

- Showing the problems



Selecting the right tool for your needs

Know your need

- What are you building?
- Web app; Mobile app; Data analysis project

Do your research

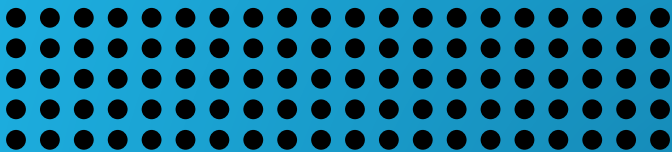
- What tools fit your criteria? What do the reviews say? What support is there?
- Consider learning curve, scalability, performance, community.

Try them out

- Create a small prototype.

Explore integration

- Identify what tool goes best with what task.
- Define an integrated workflow.



Guidelines to writing a prompt



Elements of approach

1. Envision GAI as a **partner**.
2. Write as though you are communicating with a **colleague/peer**.
3. Be thoughtful to the **details** in your prompt.

General guidelines

1. Tell it who you want it to be.
2. State the topic clearly.
3. Give specific and concrete context.
4. Define values that tell the expected output.
5. Chunk into specific parts.
6. Refine your prompt(s).
7. Follow-up by asking for an explanation.

4 strategies for working with GAI



When approaching these strategies, you should actively do the following:

1. Imagine GAI as your partner.
2. Follow the prompting guidelines.
3. Practice your prompting by refining what and how you ask.
4. Use the output as a starting point.

Deeper

- Refine an idea

Broader

- Explore outwardly

Solution

- Ask for multiple solutions

Explanation

- Seek solution reasoning

Deeper | Refine an idea



About

Use the AI as a partner by asking it help you find new language, refined questions, additional questions, outlining, structuring ideas, and technical guidance.

Examples

⚠️ *"What are some different techniques to handle missing data in a machine learning project?"*

✅ *"Please list for me 5 techniques for handling missing data in a machine learning project along with a description and an example of how to apply the technique with Python."*

Broader | Explore outwardly



About

Use the AI to help you explore alternative approaches, particularly if you are not sure where you want to go.

Example

⚠️ *"How can the regression imputation technique be used for handling missing data?"*

✅ *"Show me how to use the regression imputation technique for handling missing data with different languages. Also, can you recommend alternative approaches along with an example in Python?"*

Solution | Ask for multiple solutions



About

Use the AI to help you identify and work through the technical bits of a problem solution.

Example

⚠️ *"Provide three different Python functions that can calculate the mean of a list of numbers."*

✅ *"I want to explore something with multiple solutions and problems. For example, I know there can be different functions in Python to calculate the mean of a list of numbers. First please generate a list of 20 random numbers. Then using those numbers, please show me 3 different Python functions for calculating the mean of that number list. I'd like to see the functions ranked from least to most efficient."*

Explanation | Seek solution reasoning



About

Use the AI to explain all or part of the reasoning for a given solution so that you can follow the logic and decide on the soundness of the approach.

Example

⚠️ *"Explain why you recommended using a Random Forest algorithm for banking problems."*

✅ *"Can you explain to me in terms of technical approach and rationale why random forest algorithm is recommended for fraud detection?"*

Let's see some examples

Scan this QR code to go to the Google Doc, and then you can click on the following links.

Alternative URL: <https://tinyurl.com/5h2kkkbs>



Examples of the strategies applied

#1 | Deeper

- Question refinement
- Questions and exploration into learning with ChatGPT.
- Outline expansion → → → → →

URL: <https://chat.openai.com/share/202f6015-1297-4175-83d3-d0548ee132de>

URL: <https://chat.openai.com/share/89062b0c-b73d-4f5e-9ca4-5d57aa0697ca>

Start at...

"I'd like you to act as an outline expander. Please generate a bullet point outline based on the input that I give you and then ask me which bullet point you should expand on. Each bullet point can have at most 3 sub bullets. For the bullet point I select, create a new outline. After each outline, ask me which bullet you should expand next."

Examples of the strategies applied

#2 | Broader

- Flipped interaction

URL: <https://chat.openai.com/share/89062b0c-b73d-4f5e-9ca4-5d57aa0697ca>

Start at...

"I would like you to ask me questions to help me create a visualization of historical land and ocean temperatures with data from NASA. Ask me questions until you have enough information to identify the easiest approach to creating my visualization. Please ask me one question at a time."

Examples of the strategies applied



#3 | Solution

- Alternative approaches

URL: <https://chat.openai.com/share/89062b0c-b73d-4f5e-9ca4-5d57aa0697ca>

Start at...

"I want to explore something with multiple solutions and problems. For example, I know there can be different functions in Python to calculate the mean of a list of numbers. First please generate a list of 20 random numbers. Then using those numbers, please show me 3 different Python functions for calculating the mean of that number list. I'd like to see the functions ranked from least to most efficient."

Examples of the strategies applied

#4 | Explanation

- Solution identification
- Explanation of approaches based on stated level of expertise

URL: <https://chat.openai.com/share/d21d5548-cc88-4881-97fc-331094e29fee>

Start at...

"Please behave as though you are an expert data visualizer. I'm working with global temperature data. What types of visualizations would be appropriate for this type of data?"

