Python Execution in ChatGPT and Claude

MGMT 675: Generative AI for Finance

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Why Code Execution Matters

- LLMs can write code, but writing is not the same as running
- Code execution enables:
  - Data analysis with real calculations
  - Visualizations and charts
  - File processing (Excel, CSV, PDF)
  - Iterative debugging—run, fix, repeat
- Transforms chatbots into computational tools

Two Approaches

ChatGPT Code Interpreter

- Python execution
- Server-side sandbox
- 300+ pre-installed libraries
- File upload/download
- Integrated since 2023

Claude Analysis Tool

- JavaScript execution
- Runs in your browser
- Lightweight libraries
- Combined with Artifacts
- Released October 2024

ChatGPT Code Interpreter

What is it?

- A Python environment that runs inside ChatGPT
- ChatGPT writes code, executes it, and returns results
- If code fails, it reads error messages and fixes them
- Sandboxed environment: secure but limited

Accessing Code Interpreter

- Requires ChatGPT Plus subscription ($20/month)
- Select GPT-4o from the model dropdown
- Code Interpreter is enabled automatically
- Upload files directly to the conversation
- As of March 2025, also available in o3-mini

ChatGPT: What You Can Do

Data Analysis

- Upload CSV, Excel files
- Statistical analysis
- Time series processing
- Create visualizations
- Download results

Finance Tasks

- Portfolio optimization
- Stock return analysis
- Risk metrics (VaR, Sharpe)
- DCF calculations
- Monte Carlo simulation

ChatGPT: Pre-installed Libraries

- **Data:** pandas, numpy, scipy
- **Visualization:** matplotlib, seaborn, plotly
- **Machine Learning:** scikit-learn, statsmodels
- **Files:** openpyxl, PyPDF2, Pillow
- 300+ packages total—no manual installation
- **Cannot install additional packages**

ChatGPT: Limitations

- **No internet access**—cannot fetch live data
- Maximum file upload: 100 MB
- Runtime limit: 120 seconds per execution
- Session state clears when environment resets
- Pre-installed packages only

Workaround: Download data first, then upload to ChatGPT

ChatGPT: Finance Example

Example Prompt

“I’m uploading a CSV with daily returns for AAPL, MSFT, and GOOGL. Please:

1. *Calculate annualized mean return and volatility for each stock*
2. *Compute the correlation matrix*
3. *Find the minimum variance portfolio weights*
4. *Plot the efficient frontier*

”

ChatGPT will write Python code, run it, show results, and let you download the chart.

Claude: Two Code Execution Features

Analysis Tool

- JavaScript in your browser
- Fast, lightweight
- CSV parsing (Papa Parse)
- Utility functions (Lodash)
- Creates artifacts

Code Execution Tool

- Python/Bash on server
- Full Ubuntu environment
- **Can install packages (pip)**
- 9GB RAM, 5GB disk
- No internet access

Claude Analysis Tool

- Runs JavaScript directly in your browser
- No server round-trip—instant execution
- Available on Claude.ai (free and Pro)
- Enable in Settings → Feature Preview → Analysis Tool
- Results feed into Artifacts for visualization

Claude Artifacts

What are Artifacts?

- Interactive content in a panel next to the chat
- Types: code, documents, visualizations, web apps
- View, edit, and iterate in real-time
- Export as files or share with others
- Can create React components, SVG graphics, charts

Claude: Visualization Power

- Analysis Tool + Artifacts = interactive dashboards
- Libraries available in Artifacts:
  - React for UI components
  - Recharts for charts and graphs
  - Tailwind CSS for styling
  - Three.js for 3D graphics
- Charts are interactive—hover, zoom, filter

Claude: Limitations

- Analysis Tool: JavaScript only (not Python)
- Limited libraries: Lodash, Papa Parse
- No direct file system access
- Uploaded files consume context window
- Code Execution Tool (Python): API only, in beta

Best for: Quick calculations, interactive visualizations, prototypes

Claude: Finance Example

Example Prompt

“Create an interactive artifact that:

1. *Lets me input expected returns for 3 stocks*
2. *Lets me input a covariance matrix*
3. *Calculates the tangency portfolio*
4. *Shows a chart of the efficient frontier*

”

Claude creates a React app with input fields, calculations, and a Recharts visualization—all in one artifact.

Side-by-Side Comparison

Feature	ChatGPT	Claude
Language	Python	JavaScript / Python
Execution	Server-side	Browser / Server
Libraries	300+ pre-installed	Lodash, Papa Parse / pip
Install packages	No	Yes (Code Exec Tool)
File upload	Yes (100 MB)	Yes (context limit)
Internet access	No	No
Output format	Files, charts	Artifacts, apps
Subscription	Plus ($20/mo)	Free tier available

When to Use Which?

Use ChatGPT for:

- Heavy data processing
- Statistical analysis
- Machine learning
- File format conversion
- Downloading results

Use Claude for:

- Interactive dashboards
- Quick prototypes
- React/web apps
- Visual explanations
- Shareable artifacts

Workflow: Data Analysis

ChatGPT Workflow

1. Upload CSV/Excel file
2. Describe analysis in plain English
3. ChatGPT writes and runs Python code
4. View output, ask follow-up questions
5. Download charts and results

Workflow: Interactive Tool

Claude Workflow

1. Describe the tool you want to build
2. Claude creates an Artifact (React app)
3. Interact with the tool in real-time
4. Ask Claude to modify or enhance it
5. Share or publish the artifact

Get Started: ChatGPT

1. Go to chat.openai.com and log in
2. Select GPT-4o from the model menu
3. Upload a CSV file with stock prices
4. Ask: “Calculate daily returns and plot them”
5. Ask: “What is the annualized volatility?”
6. Download the resulting chart

Get Started: Claude

1. Go to claude.ai and log in
2. Enable Analysis Tool in Feature Preview (if needed)
3. Ask: “Create an interactive compound interest calculator”
4. Try the artifact—enter values and see results
5. Ask Claude to add a chart showing growth over time
6. Publish or share the artifact

Finance Exercise: Portfolio Analysis

Try Both Tools

ChatGPT:

1. Download 1 year of daily prices for 5 stocks from Yahoo Finance
2. Upload to ChatGPT and ask for mean returns, volatilities, correlations
3. Ask for minimum variance portfolio weights

Claude:

1. Ask Claude to create an interactive mean-variance optimizer
2. Input the returns and covariance from ChatGPT
3. Explore different risk levels on the efficient frontier

Summary

- **ChatGPT Code Interpreter:** Python sandbox for data-heavy tasks
- **Claude Analysis Tool:** JavaScript for quick calculations
- **Claude Artifacts:** Interactive apps and visualizations
- Both tools transform chatbots into computational assistants
- **Neither has internet access**—download data first
- Combine them: ChatGPT for analysis, Claude for presentation