



Generative AI: A Clinical Programmer's Friend!

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Agenda

- Introduction
- The Evolution of Generative AI Models
- Shiny App Development Process
- Debugging and Error Resolution
- Code Optimisation
- Key Learning Benefits of Generative AI
- Conclusion
- Questions

Introduction

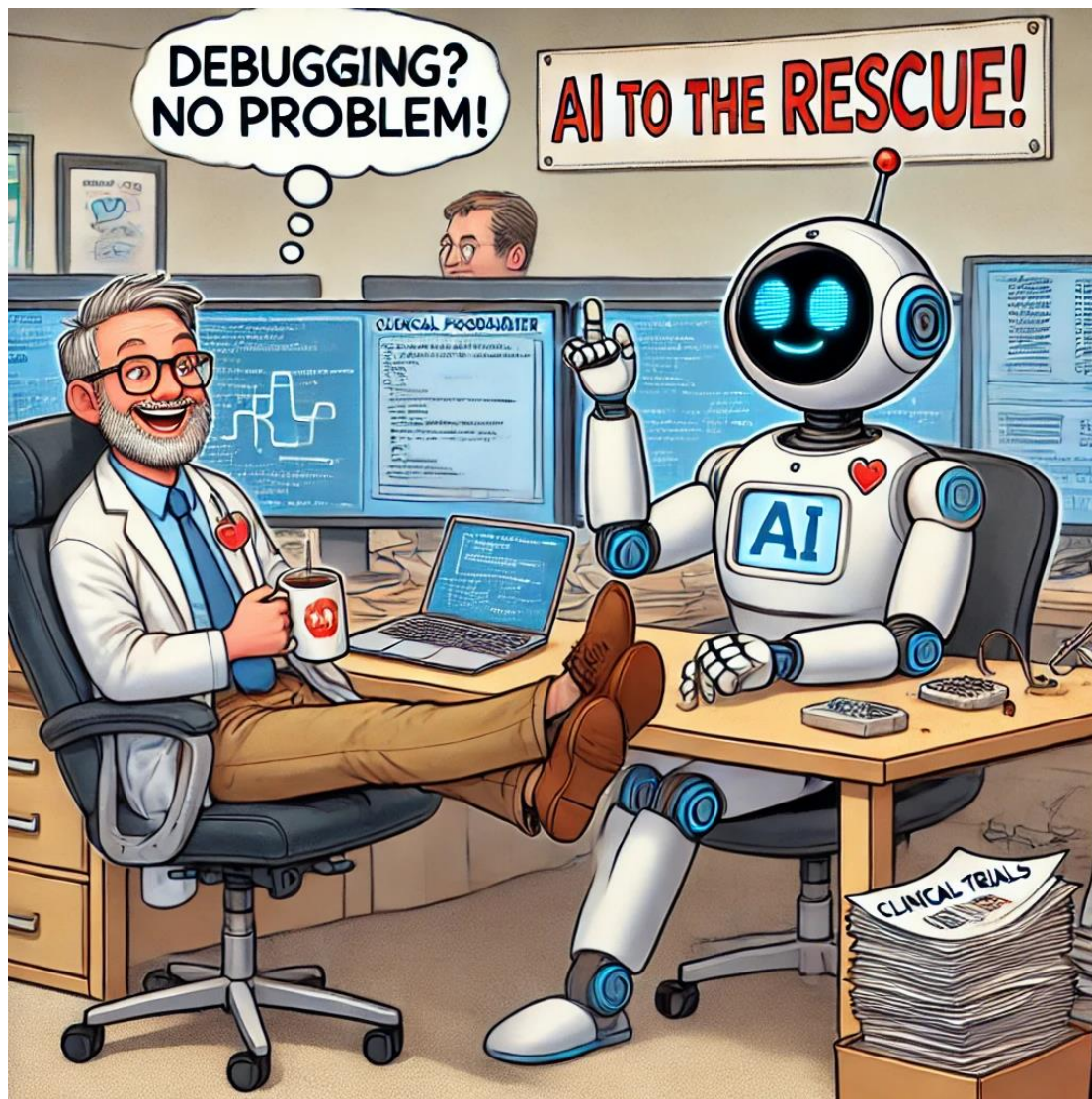


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The Evolution of Generative AI Models

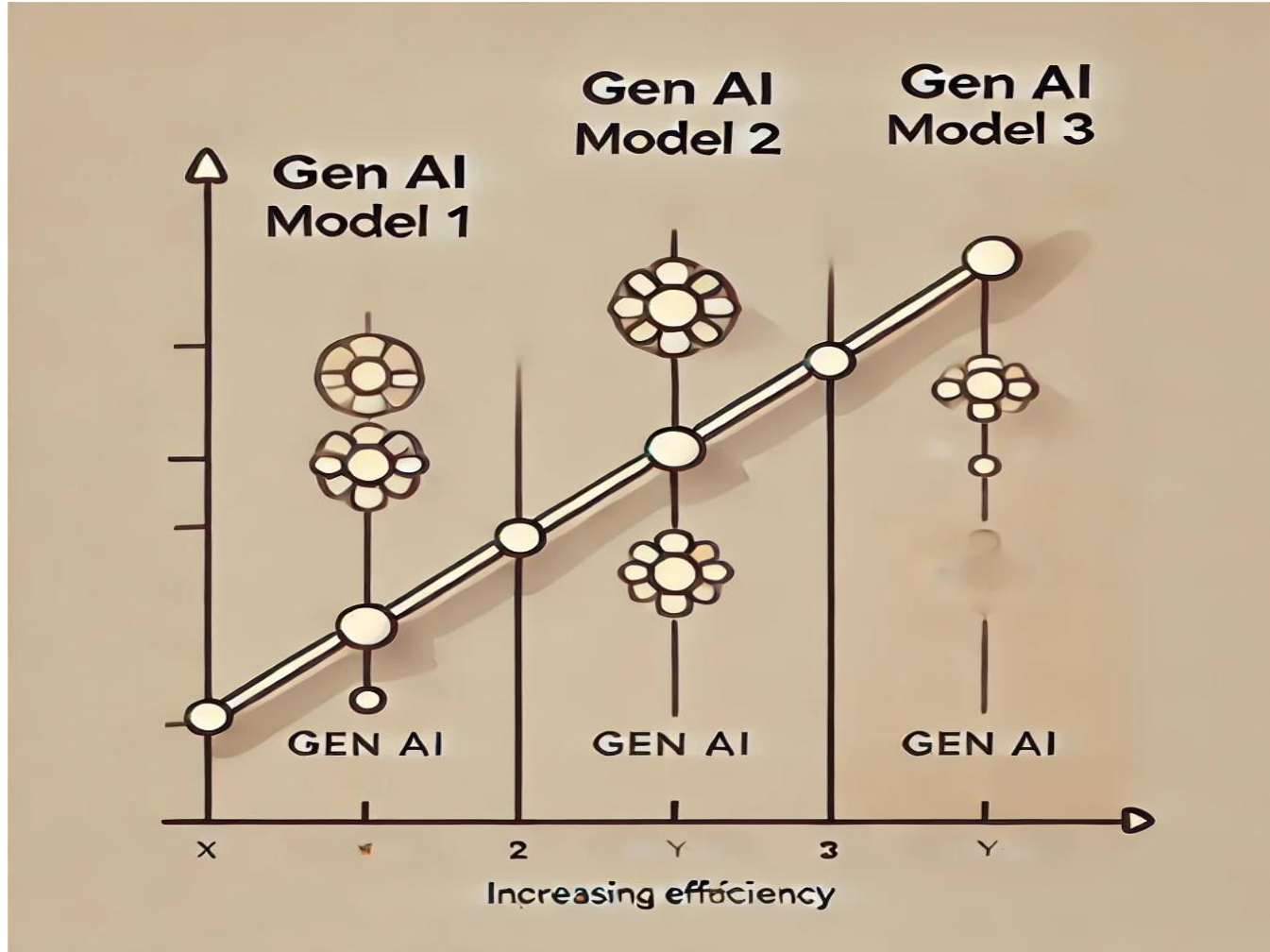


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The Evolution of Generative AI Models

Observed differences/experiences between each model

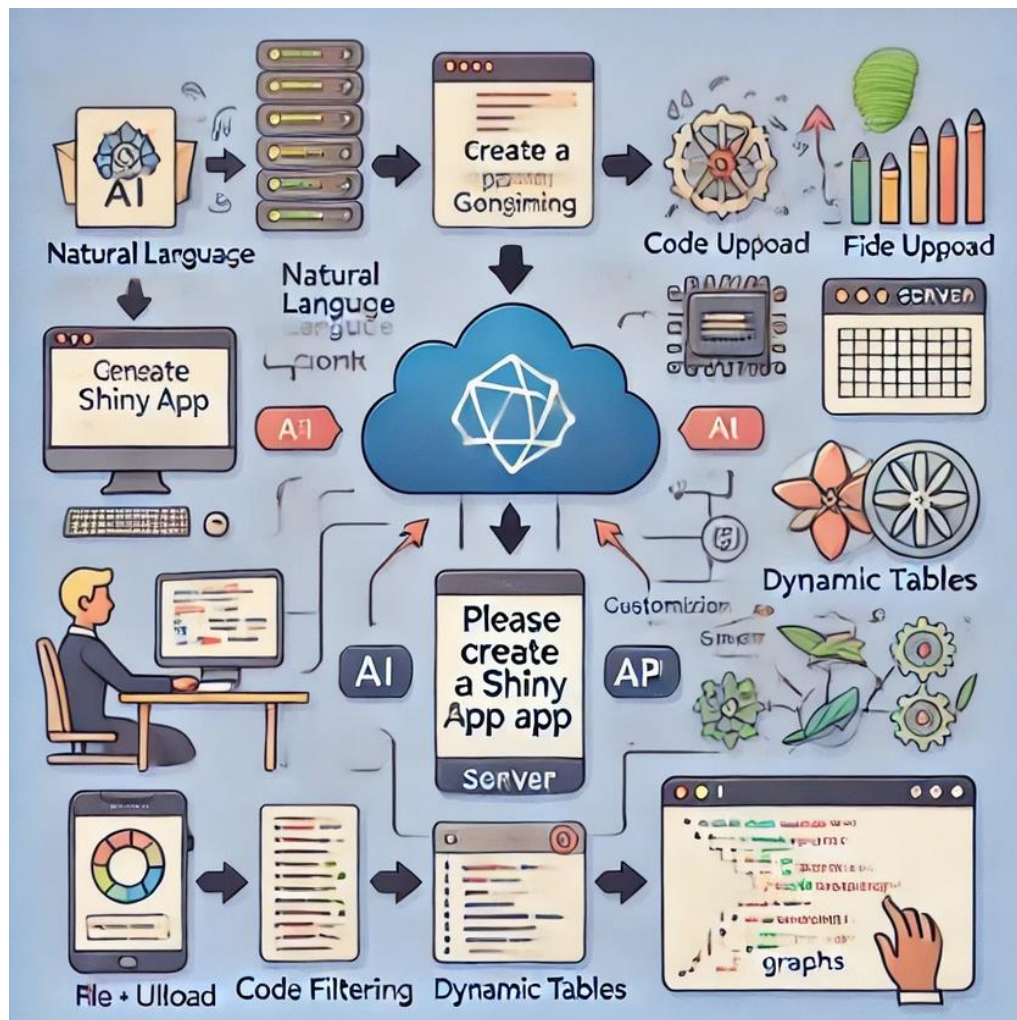
ChatGPT 3.5	ChatGPT 4.o	ChatGPT o-preview
Frequent manual intervention	More efficient, step-by-step process	Fully functional app in one prompt
Iterative debugging	Fewer errors	No errors, minimal interaction
Produced basic Shiny app	Smoother code generation	Complex tasks with high accuracy

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Shiny App Development Process

AI-Assisted Shiny App Development



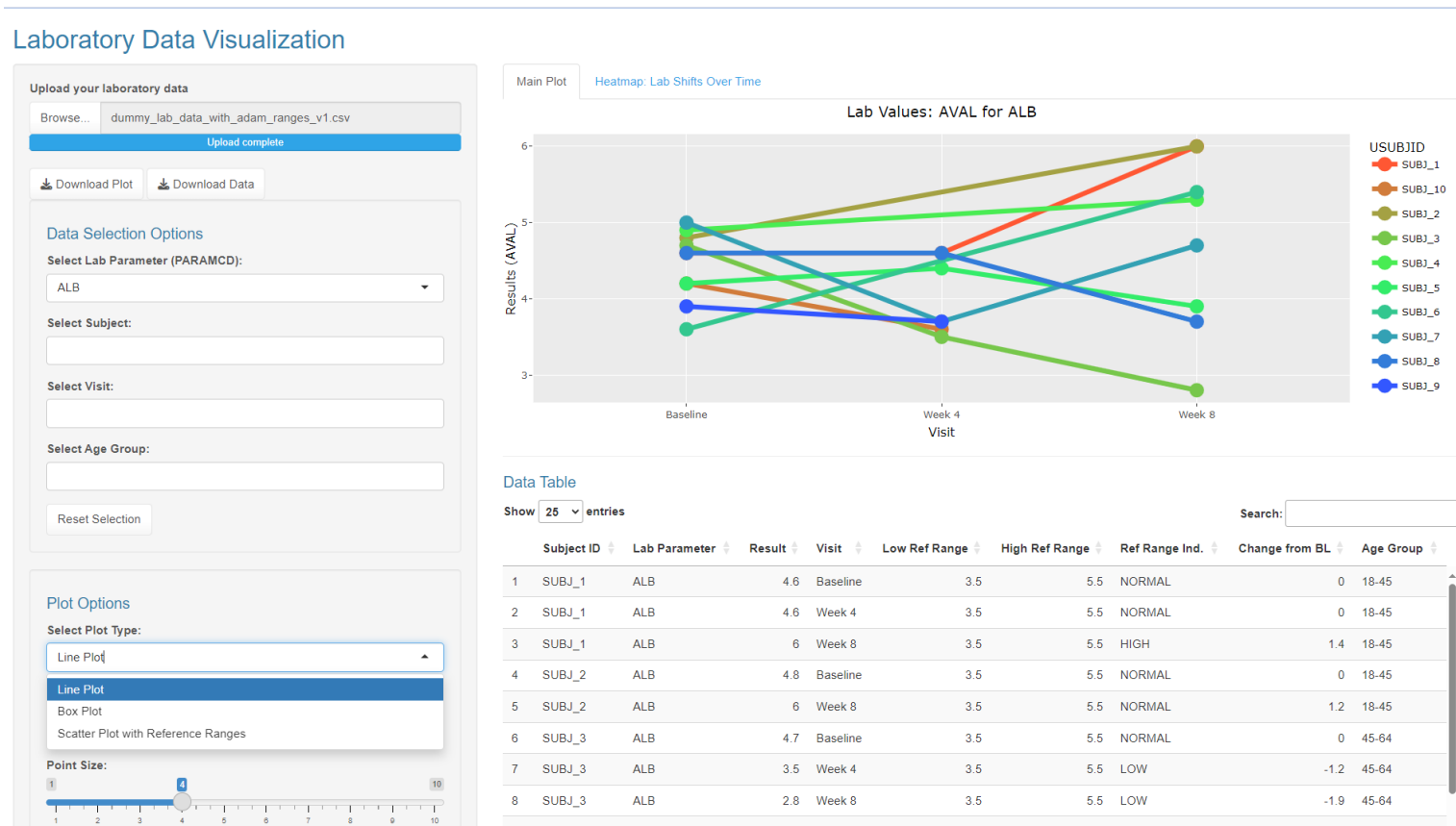
AI: capable of generating code, solving problems, and... creating typos. It's almost like it's trying to keep us humans relevant!

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Shiny App Development Process

AI-Assisted Shiny App Development (ChatGPT 4o)



Shiny App Development Process

AI-Assisted Shiny App Development (ChatGPT-o1-preview) Prompt

Act as a Shiny and R programmer, please create a Shiny app that has the following functionality. This app will help the end user to review laboratory data. The laboratory data will follow CDISC ADaM standards.

- 1.The ability to upload CSV, Excel, and SAS datasets.*
- 2.The functionality to filter the data by Subject ID (USUBJID), Laboratory parameter (PARAMCD), and visit (AVISIT). When the user uses these filters, the data table and graphs should update dynamically.*
- 3.The data should be displayed in tabular and graphical forms.*
- 4.I would like an option where the user can select between different types of graphs. Please select the best 3 graphs for visualizing laboratory data.*
- 5.Please set up a configuration file that can be used to change the appearance of the app.*
- 6.Please include any other features that you think may improve the user experience."*

Shiny App Development Process

AI-Assisted Shiny App Development (ChatGPT-o1-preview)

Laboratory Data Review App

Upload Data File

Browse... dummy_lab_data_with_adam_ranges_v1.csv

Upload complete

Select Subject ID (USUBJID):

Select Laboratory Parameter (PARAMCD):

Select Visit (AVISIT):

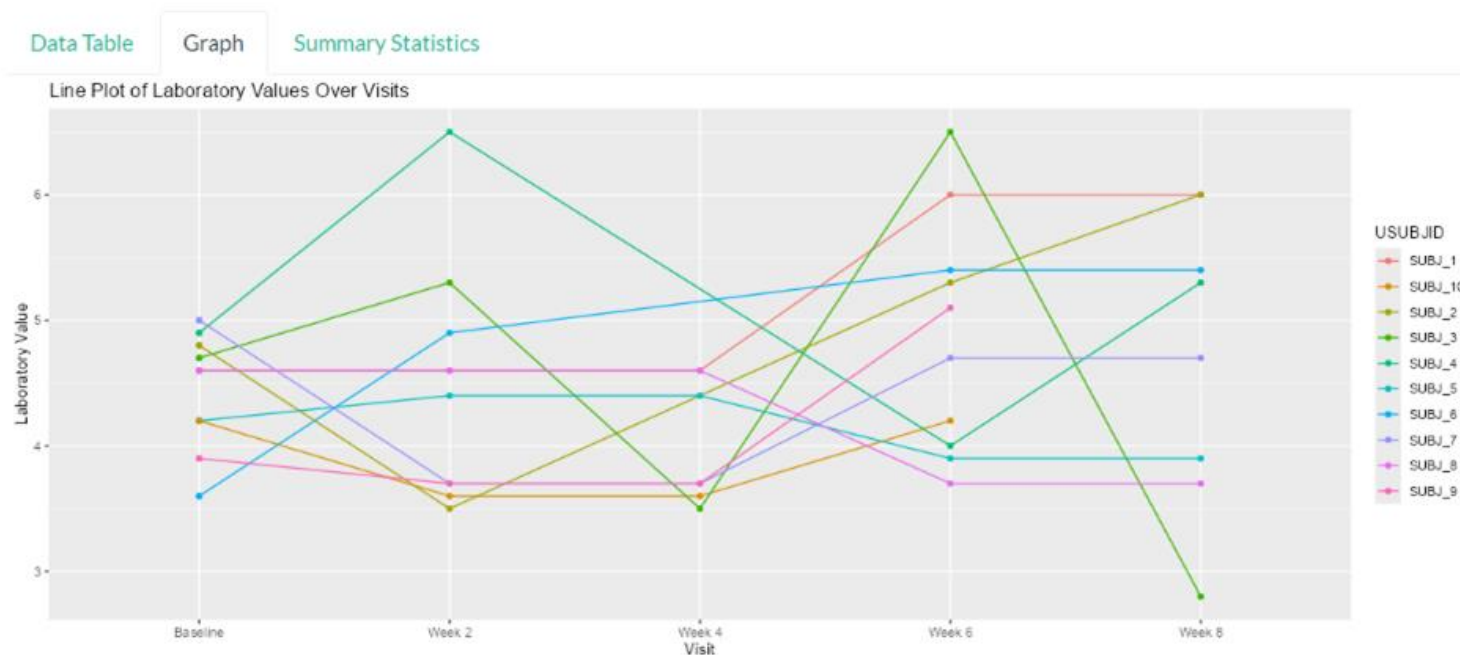
Select Graph Type:

Line Plot

Line Plot

Box Plot

Histogram



Debugging and Error Resolution

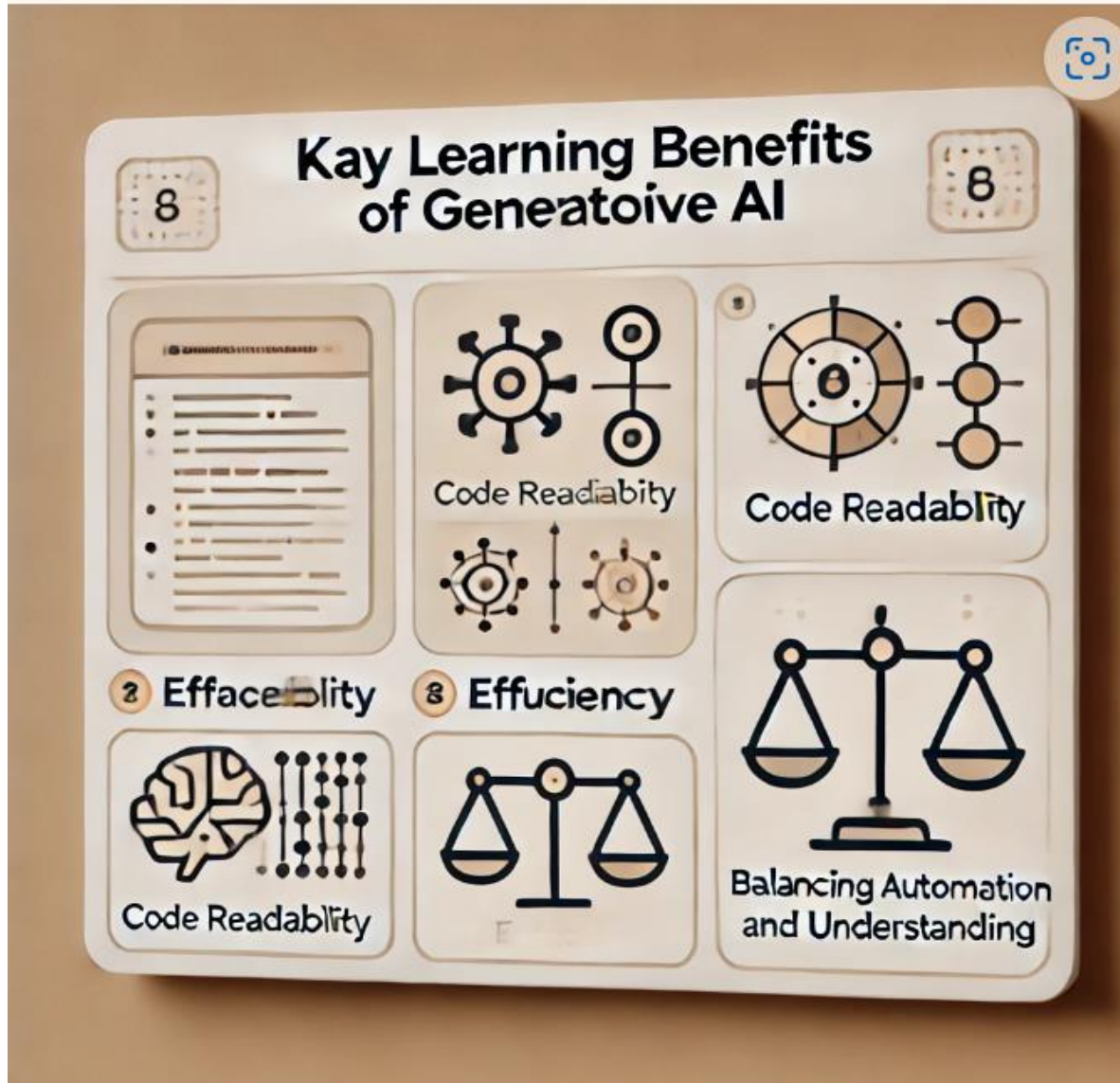
AI-Assisted Debugging

Error Type	Problem	Solution
Reactive Expression Debugging	Data not updating dynamically.	Use reactive expressions (e.g., <code>req()</code>) to trigger real-time updates in the app.
Error Message Interpretation	Plot rendering issues (e.g., "Error in unit").	Convert variables to factors (e.g., <code>as.factor()</code>) to fix mismatches.
Self-Debugging with ChatGPT 4.0	Issues with the implementation of the 'plotly' package.	ChatGPT 4.0 provided debugging suggestions and corrected its own code.

Code Optimisation

Technique	Description Solution
Configuration File Setup	Use an external JSON file to store settings like plot styles and labels, allowing easy adjustments.
Reactive Expressions Optimization	Utilize req() and isolate() to prevent unnecessary reactive updates, optimizing performance.
Modularization	Break the app into modular components, making it easier to maintain, scale, and update.

Key Learning Benefits of Generative AI



Generative AI's spelling hasn't improved....

Conclusion

- Generative AI boosts productivity and efficiency.
 - Helped automate and optimize programming tasks.
- Streamlined development process.
 - Improved code generation, debugging, and user interface enhancements.
- AI model evolution improves accuracy.
 - Progress from ChatGPT 3.5 to GPT-4-turbo reduced errors and increased functionality.
- Future of AI in clinical programming.
 - Potential to revolutionize workflows and reduce learning curves for new programmers.

Questions

Your imagination is the only limitation....



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