Can Gen-AI Plugins Work As a Savior for MS-Excel Based Health Economic Models?

MSR44

Tushar Srivastava, Shilpi Swami

ConnectHEOR, London, UK. Email: tushar.srivastava@connectheor.com

BACKGROUND

Context: Excel-based health economic (HE) models are widely used in health technology assessment (HTA) due to their flexibility and user-friendliness. However, these models often face challenges, especially with complex calculations, debugging issues, and heavy formula usage. Although there is a transition from Excel to advanced software like R due to R's advanced capabilities[1], the shift is slow because many users are unfamiliar with R.

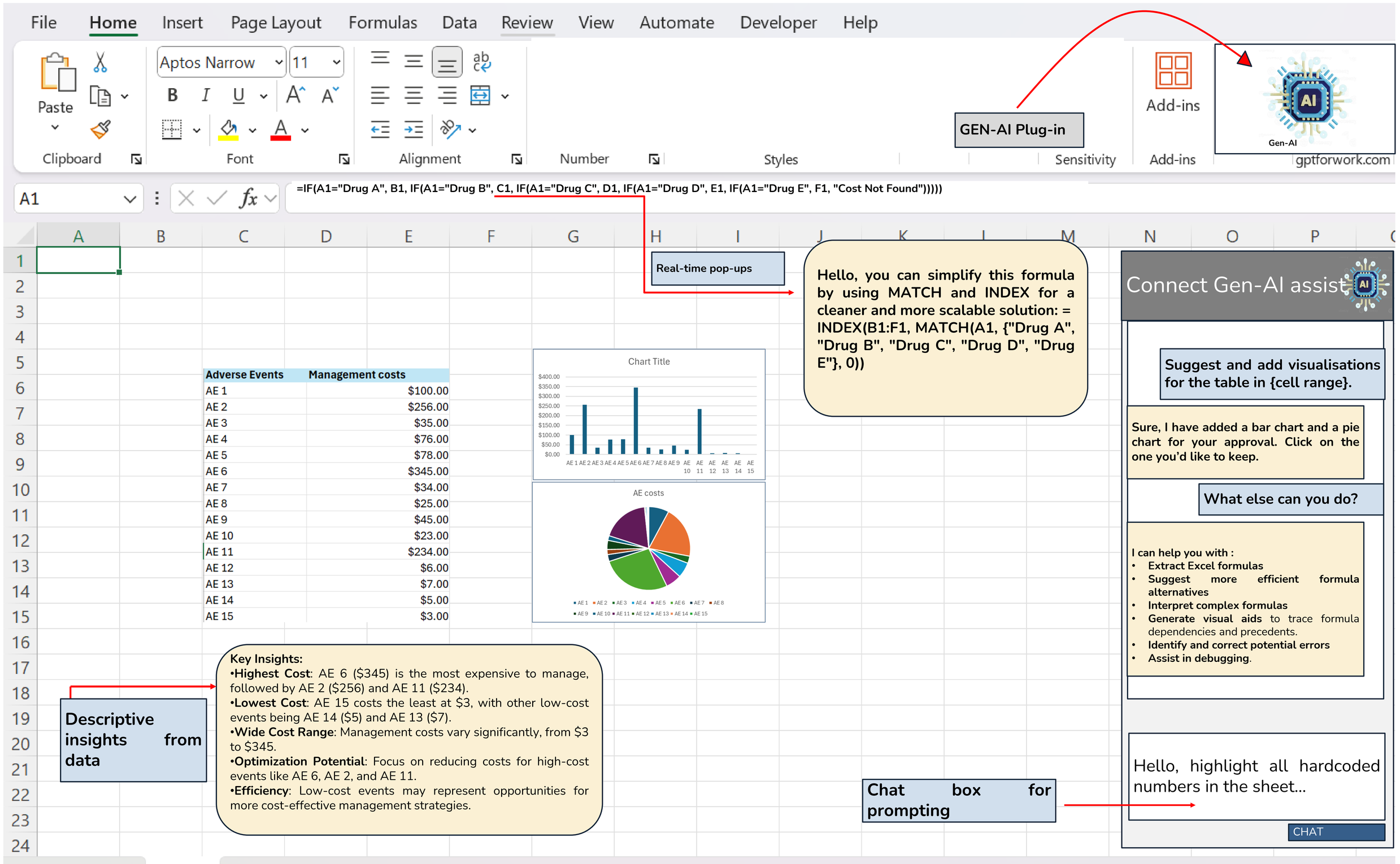
Aim: This study explores whether Gen-AI based agent plugins[2] can serve as a savior by maintaining the Excel platform while enhancing its functionality. Specifically, this research investigates if Gen-AI plugins can assist in reviewing formulas, providing interpretations, and suggesting optimizations within Excel.

METHODS

A proof-of-concept Gen-AI plugin was developed and integrated into Excel. The plugin's functionality includes extracting formula from cells, creating a prompt using the extracted formula, and sending this prompt to a Gen-AI model. The AI model processes the prompt and returns a response and displays within Excel plugin window.

The Gen-AI plugin was developed in Python, utilizing a programming environment that facilitated integration with Excel and enabled seamless interaction with Gen-AI models. The plugin's capabilities were tested to see if it could assist in reading complex formulas, providing more efficient formula suggestions, interpreting formulas in layman's terms, and generating simple visual aids to trace dependencies and precedents.

IMPLEMENTATION



RESULTS

The Gen-AI plugin successfully read complex Excel formulas and provided suggestions for more efficient alternatives by following programming best practices. It interpreted complex formulas into simple text, making them easier to understand. Additionally, the plugin generated layman graphical representations of trace dependencies and precedents, helping users grasp the context quickly.
The AI also identified potential errors and provided suggestions to correct inconsistent flows, significantly improving the model's reliability and user comprehension within a limited time.

FUTURE SCOPE

The scope of the plugin can be expanded by integrating additional capabilities like:

- Automated Sensitivity Analysis to quickly assess the impact of variable changes.
- Scenario Planning and Forecasting for long-term predictions.
- Real-time Data Integration for dynamic updates from healthcare databases.
- Collaborative Modeling with cloud-based functionality for teamwork.
- Advanced Error Diagnosis for better debugging and formula optimization.
- Customizable AI Insights tailored to user needs (e.g., financial, statistical).
- Enhanced Data Visualization with interactive charts and decision trees.
- Natural Language Querying for user-friendly model interaction.
- Guided Learning to teach users while optimizing models.

References.

1. Naylor, N. R., et al. PharmacoEconomics 2023; 41: 21–32.
2. Zhao, W., Hou, Z., Wu, S., et al. (2024) NL2Formula: Generating Spreadsheet Formulas from Natural Language Queries. arXiv.

This proof-of-concept study demonstrates that Gen-AI plugins can significantly enhance the functionality of Excel-based HE models.

- **By integrating AI into Excel, the plugin offers several advantages, including simplifying complex calculations, automating formula optimization, and improving user understanding of intricate models.**
- **These enhancements enable users to continue using Excel, a familiar platform, while benefiting from the advanced capabilities of AI.**
- **Furthermore, the plugin's ability to assist with model implementation, error detection, and verification paves the way for greater precision, reliability, and efficiency in HE models.**

As a result, this technology has the potential to transform the way HE professionals manage and assess health-related data, leading to more effective decision-making and optimized resource allocation in healthcare settings.

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