

Original Article

Comparative Analysis of Artificial Intelligence (GenAI) in Business Intelligence Platforms

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Abstract - This study presents a comprehensive comparative analysis of artificial intelligence (AI) capabilities and their applications in business intelligence (BI) platforms. The rapid advancement of generative AI, particularly large language models, has opened new frontiers for data-driven decision-making and insights generation. However, the integration of these cutting-edge technologies into BI platforms remains largely unexplored in academia.

The research employs a mixed-methods approach, like qualitative evaluation of user experiences, the feature themes, their availability in key platforms and integration with other platforms. The findings reveal significant variations in the approach taken by different BI tools for similar generative AI tasks. Certain platforms focus on integrating AI with the rest of their ecosystem tools, providing a unified enterprise experience with data and insights, while others focus on capabilities in data discovery and curation experiences. Importantly, the study highlights the synergistic potential of combining multiple generative AI capabilities and opportunities for startups and enterprises to innovate in the BI space.

This research contributes to the field by providing a comprehensive framework for evaluating and integrating AI in BI platforms, enabling more informed decision-making and driving innovation in data-driven business practices. The implications extend to various industries, paving the way for enhanced competitive advantages through the adoption of cutting-edge AI technologies.

Keywords - Artificial intelligence, Business intelligence, Data insights, Machine learning, Visualizations.

1. Introduction

Business intelligence (BI) platforms have traditionally empowered data analysts and business analysts to extract insights from data, visualize trends through charts and dashboards, and support data-driven decision-making. However, the growing volume and complexity of data, coupled with the increasing demand for real-time insights across various domains, have created a bottleneck as analysts struggle to keep up with the deluge of requests and domain-specific queries. This bottleneck has hindered the ability of organizations to fully leverage the potential of their data assets and gain a competitive edge. Fortunately, the advent of artificial intelligence (AI) has emerged as a game-changer, offering a solution to this long-standing challenge. Generative AI models, such as large language models, have demonstrated remarkable capabilities in understanding natural language queries, generating insightful reports and visualizations, and providing domain-specific insights without the need for extensive technical expertise or SQL knowledge. By integrating these AI capabilities into BI platforms like Microsoft's PowerBI and Salesforce Tableau,

domain experts can now directly interact with data, ask questions in natural language, and receive tailored insights, effectively streamlining the bottleneck created by the reliance on analysts. This paradigm shift has the potential to democratize data access, accelerate decision-making processes, and unlock new avenues for innovation and competitive advantage across various industries. However, as enterprise companies make the decision to choose a BI tool based on GenAI technology, there is not enough literature to make informed choices. The integration of GenAI in BI Platforms is a new field, so comparative studies do not go over GenAI capabilities. This paper addresses this analysis gap and provides a mixed methods approach to evaluating BI platforms for their GenAI capabilities.

2. Comparative Analysis Methodology

2.1. Purpose and Scope of the Analysis

This comparative analysis dives into the AI capabilities like natural language interface, data visualization assistance and proactive insights; the integration capabilities with the semantic layer and other enterprise tools; and finally, the



price point of Microsoft's PowerBI and Salesforce Tableau. The goal is to provide a detailed evaluation that assists enterprises in making informed decisions about whether their organization is ready for such capabilities, especially based on their data maturity. Secondly, this also assists BI platforms and BI startups on gaps and opportunities they can take, to inform the solutions they are building.

2.2. Criteria for Comparison

The comparative analysis is structured around several key dimensions critical to business intelligence platforms. These dimensions include:

2.2.1. Natural Language Processing (NLP) Capabilities

Evaluating the ability of the platforms to understand and respond to natural language queries effectively, summarizing the results into understandable analytics, and assisting in SQL generation through natural language.

2.2.2. Data Visualization and Insight Recognition

Assessing the platforms' proficiency in generating visualizations, identifying patterns within complex reports and datasets, and providing insights and actionable recommendations.

2.2.3. AI Integration with Other Tools

Evaluating the flexibility of the platforms to embed AI capabilities in specific business domains or integrating AI with other tools that knowledge workers use every day in their workflows, like chat apps, document processors, or presentation tools.

2.2.4. Pricing and Commercial

Assessing the pricing strategy, including various tiers of access, editions and freemium capabilities.

2.3. Data Collection Methodology

The data for this study has been primarily collected and used from business intelligence platforms, ie. PowerBI and Tableau's website, including product and marketing pages, product documentation, articles, blog posts, videos and any case studies presented. Further, specific versions of the products that are generally available were tested on public datasets available for access through the platform.

3. Microsoft PowerBI

PowerBI has introduced generative AI that allows you to leverage CoPilot for Microsoft Fabric in public preview. In addition, it also provides AI Insights and Machine Learning services for various use-cases that extend the benefit of traditional ML to find data insights.

3.1. Natural Language Processing

PowerBI supports Q&A capabilities to answer questions using natural language. It supports specific queries of the

type: 'show total units by year and product manufacturer'. Q&A is available in reports, dashboards, in mobile and embedded reports. PowerBI does not support Q&A across all user reports and dashboards. These are single-turn responses only, meaning users cannot ask followup questions, nor can Copilot provide suggested next prompts. Copilot can write synonyms that users can add to Q&A to improve the Q&A's visual ability to understand user questions.

Smart narratives in PowerBI help provide a quick text summary of visuals and reports. Smart narratives are available for pages and visuals only. Copilot can generate summaries, even if users do not have edit permissions to the data.

3.2. Data Visualization and Insights Recognition

Copilot in PowerBI saves users hours of time, by quickly creating entire report pages in just a few clicks and prompts. It starts by suggesting content for a report, evaluating the data and making suggestions. Copilot can also be used to add descriptions to the semantic model measures.

Insights in PowerBI[2] enable business users to explore and find insights. It notifies users of interesting insights and provides explanations for them. Insights are available on individual visuals, on dashboard tiles, on data sets and also on entire data models.

For reports, PowerBI proactively performs analyses for anomalies, trends, and KPIs. For dashboard tiles, PowerBI can find 10 types of insights[3]. However, Copilot does not have insights into the Q&A chat capabilities.

3.3. AI Integration with other tools

PowerBI integrates with Microsoft Fabric and Azure Synapse services, which together form the data backbone for enterprises. PowerBI also integrates with Cognitive Services and Azure Machine Learning to leverage customer models and AutoML directly in PowerBI. However, PowerBI Q&A features are not available in Microsoft Teams for enterprise chat apps. They are also not available in Microsoft PowerPoint for slide preparation or Microsoft Word for data insights in document processing. While Microsoft offers PowerBI mobile apps for both IOS and Android, a mobile app for Windows was retired earlier this year. Many of the AI capabilities are also not available on mobile.

3.4. Pricing and Commercial

Copilot in PowerBI requires a Premium plan. The tenant admin requires enabling the Copilot settings at the tenant level. The workspace also requires PowerBI premium capacity or F64. If GPU capacity is limited, Copilot may be throttled. Copilot sends customer data to Azure OAI, where it is stored for 30 days.

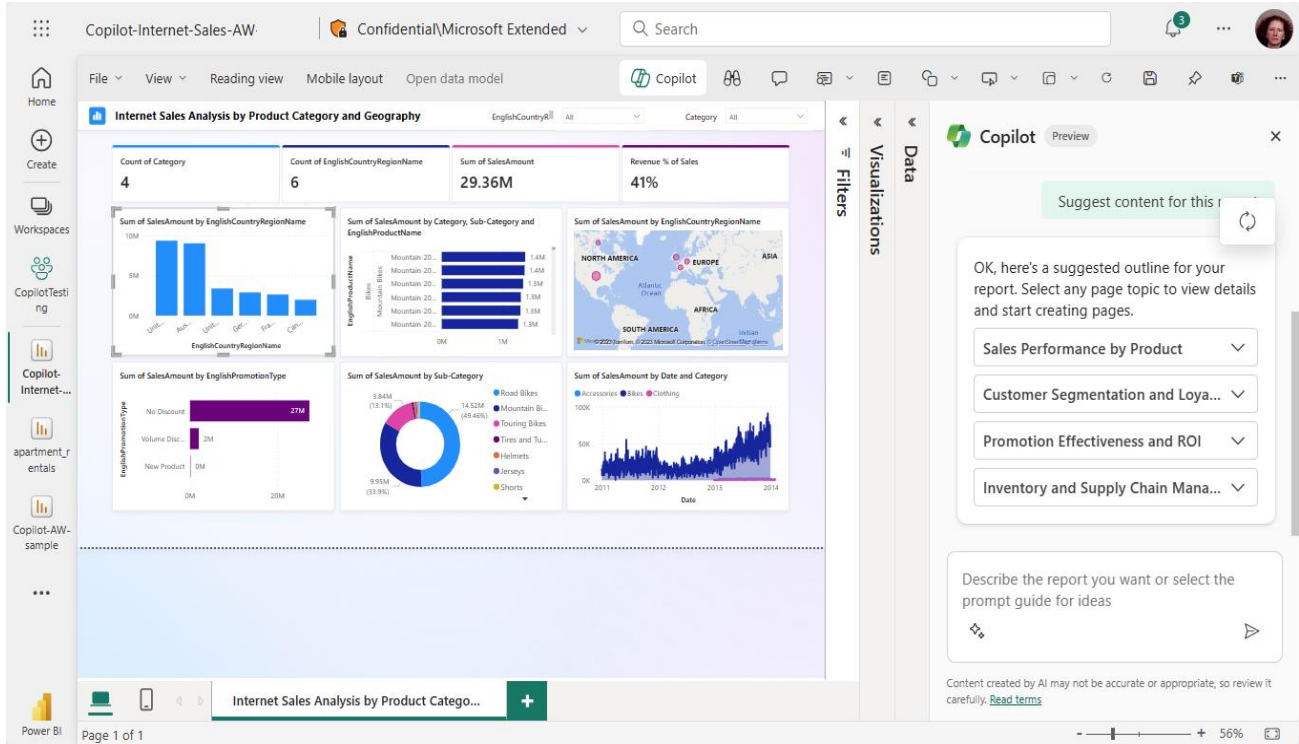


Fig. 1 PowerBI copilot example

4. Salesforce’s Tableau

Tableau has introduced Tableau AI, which, as Salesforce’s calls it: “brings trusted generative AI”[6]to the entire Tableau Platform to democratize data analysis and simplify insights consumption, which is built on the Einstein Trust Layer. The company claims it “ensures a secure and privacy-safe AI-powered experience”[7]. Tableau also has an entirely new data experience called Tableau Pulse.

4.1. Natural Language Processing

Tableau supports Einstein Copilot, Salesforces’ conversational assistant that is AI-powered. The Copilot provides in-context help guides. It is able to help create new charts, reports and dashboards. Copilot also aids data analysts through recommending a compelling way to tell a visual story or write complex analytical expressions in natural language. A previous way to chat with Tableau Data was through Ask Data where users can ask questions to get quick answers. The answers are guided by search suggestions.

Einstein Copilot is limited to conversations about specific metrics only. However, Tableau Pulse, a new data experience, extends the natural language answers to follow-up conversations by recommending specific questions the user might want to ask. The questions detect whether any trends or outliers exist.

Explain Data is an interactive feature that provides AI-driven explanations for the value of the data point based on

statistical models. This is used primarily as a starting point for more complex analysis.

4.2. Data Visualization and Insights Recognition

Einstein Copilot builds bespoke calculations when prepping the data and automates metadata in the data catalogue. Tableau Pulse provides Insights summaries, another feature with large language model (LLM) based key insights. The key insights are based on specific metrics that the user can decide to follow and watch. Pulse has a new homepage experience and delivers digests- that are a combination of a visual, a text summary and the expected trend or, anomaly or insight that help analysts decide whether to dive deeper. This enables analysts to zoom out of a single report and dashboard and get an entire view of the metrics and KPIs they care about at a macro level.

In reports, Einstein Discovery for reports automatically gives users AI-powered insights directly to understand what happened and why it happened. Einstein scans report data using various machine learning models and comprehensive statistical analysis. Einstein discovery dashboard extension surfaces real-time predictions that let users explore what-if scenarios based on a single set of input values.

Next, Data Stories in Tableau provide descriptive insights in reports that add plain language explanations to the dashboards. It breaks down data by relevant dimensions and presents insights as bullet points that are easy to read and understand.

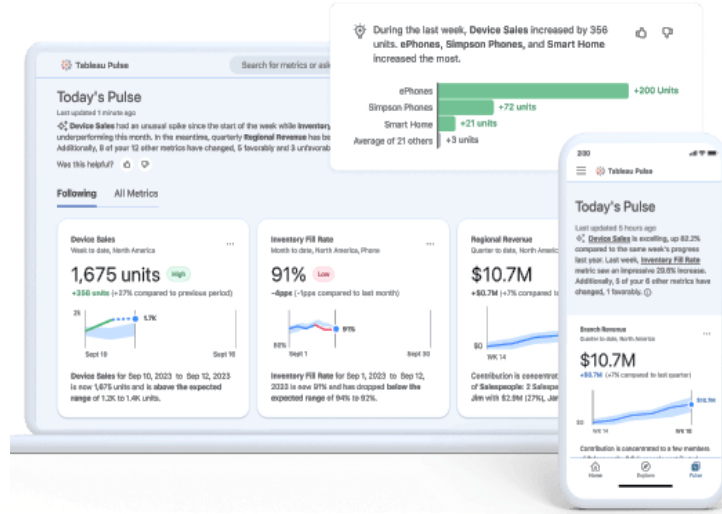


Fig. 2 Tableau pulse example

4.3. AI Integration with Other Tools

Tableau Pulse is available on mobile, so anyone on iOS and Android can access insights. Tableau Pulse also integrates with typical enterprise productivity apps like metrics delivered in email and Slack digests. Tableau AI is also integrated with the Salesforce CRM so that users can derive insights into customer relationship data.

4.4. Pricing and commercials

Tableau Pulse is available only on Tableau Cloud and Embedded Analytics editions. However, free trials are available for everyone to try these. Tableau Cloud is also available on the AWS marketplace so IT leaders can directly purchase on their Cloud environment.

5. Comparative Results

5.1. Natural Language Processing

PowerBI's natural language capabilities in Q&A stand out as far more durable since they support questions in natural language without any metrics. While Tableau's Einstein Copilot answers a lot more types of questions, they require a metric in the question. Data analysts may work with several definitions of metrics and may not have one single metric always. Tableau solves this problem differently by providing a single metrics layer; however, this may not be relevant for organizations that do not use their metrics layer.

Further, PowerBI also provides Q&A synonyms that help analysts cater the glossary to their organization-specific metrics and verbiage. Tableau does not offer functionality to cater to curating the natural language vocabulary or synonyms.

Both platforms provide summarization features that provide textual summaries in bullet format for the report content, as well as visual narratives that are LLM-based. Both platforms use OpenAI models to power AI-based capabilities

like natural language assistance, although they provide enterprises with their own models for custom reporting.

5.2. Data Visualization and Insights Recognition

Tableau and PowerBI both provide a very differentiated offering in terms of data analysis and visualization. PowerBI powers insights, analysis and visualization based on charts, reports and dashboards. The insights are very specific types, like trends, anomalies and KPIs, that are based on machine learning and statistical techniques.

Tableau offers insights into the content of specific metrics that the user follows. It is able to analyze trends and outliers and convert those into recommended questions in chat-type experiences in Tableau Pulse. Therefore, these are a combination of machine learning techniques as well as large language models.

5.3. AI Integration with other Tools

PowerBI's integration is far more tighter with seamless one-click integrations with Microsoft's Azure Cloud offering, so organizations already leveraging Azure Synapse, Microsoft Fabric, and other services will find it handy to extend PowerBI and its AI capabilities to the users. While Microsoft does have a productivity suite with Microsoft Office, the PowerBI capabilities do not appear in Word, PowerPoint, Excel or Tableau.

In contrast, Tableau leans on enterprise productivity apps and the Salesforce family of acquisitions like Slack. Through email digests and chat app integration, the approach is to meet the business users where they already are. The availability of Pulse in mobile democratizes access to insights in a far more accessible way. Conversely, Tableau is integrated with Salesforce CRM but not as heavily into the Salesforce Data Cloud. Tableau has connectors that power data from Salesforce databases, warehouses and analytics, but Tableau does not offer dedicated capabilities.

5.4. Differentiation

PowerBI’s differentiation lies in its comprehensive capabilities for comprehensive insights types. It boasts powerful platform integrations that make BI investments a no-brainer for enterprises invested in Microsoft Cloud. PowerBI also powers data apps that differentiate the offering through core data analysis and deeper platform integrations, more than AI-only capabilities. Therefore, while Microsoft is investing in AI capabilities, these appear to be grounded in much more utility than novel use cases.

Tableau’s differentiation lies in its curated homepage and discovery experience, which are entirely new data experiences. It differentiates by meeting the user where they are, like in Slack, through email digests, and on mobile. These proactive insights might be limited based on what analysts expect today, but paves the path for personalization and contextual data analysis in enterprises, where business analysts can use these as a starting point. Further, Tableau also lays a foundation of trusted and secure data through the Einstein Trust Layer, leading to a source of significant differentiation.

Table 1. Feature Comparison between AI in PowerBI and Tableau AI

Key Features Themes	Power BI	Tableau
Theme 1: Insights and Analysis		
Insights Types	<p>10 types of insights in dashboard tiles: Category outliers, Change points in time series, Correlation, Low Variance, Majority factors, Outliers, Overall trends in time series, Seasonality in time series, Steady share, Time series outliers</p> <p>3 types of insights in reports: Anomalies, Trends and KPIs</p>	<p>5 types of metrics-specific insights in Pulse: Anomalies, Key Drivers, Trends, Outliers What-if analysis</p> <p>Predictive Analytics in Einstein Discovery</p>
Sharing AI Insights	Not supported	‘Follow insights’ to subscribe to metrics
Alerts for Insights	Report-level alerts: In-product notifications	Slack alerts: Personalized digest for anomalies
Interactivity on visual insights	Filters on charts in AI-created charts. Interactive charts available, without AI specifics	Filters on change in metrics. Interactive charts with advanced statistical models to explain data in visuals.
Insights into chat experience	Not supported	Tableau Pulse supports metrics-based insights into the homepage experience
Theme 2: Conversational Analyst		
Conversational experience	PowerBI Q&A supports insights in dashboards, reports (single turn conversation)	Questions require a metric to be selected.
Keyword driven	Support natural language queries and synonyms	Specific keywords like metrics or ‘trends’ ‘outliers’
Guided followup questions	Not supported	Recommended questions in Pulse
Theme 3: Integrations with other tools		
Enterprise productivity suite	AI capabilities are not available in document processing, PowerPoint or chat apps.	Pulse available in Slack chat and alerts in email digest
Data Warehouse	Tight integrations with Azure Synapse and Microsoft Fabric	Loose integrations with Salesforce Data Cloud and CRM

Source: https://help.tableau.com/current/tableau/en-us/about_tableau_gai.htm, <https://techcommunity.microsoft.com/t5/educator-developer-blog/power-bi-ai-features-for-all-data-analysts/ba-p/38354>

6. Discussion and Recommendations

The comparative analysis unfolds the themes where PowerBI and Tableau stand out. This lends itself to two types of discussions below.

6.1. Enterprises looking for AI Capabilities in BI Tool

The ideal choice for an enterprise depends on the organizational needs, the prime use cases and problems it is looking to solve, and its data maturity to lend itself to AI capabilities. A Total Cost of Ownership (TCO) and Return on Investment (ROI) analysis is also useful for understanding the business case.

In its current state today, both PowerBI and Tableau are investing in several AI features. In enterprises where data and dashboard overload is an imminent problem, with large volumes of data, dashboards and metrics but no single source of truth or difficulty finding the right content, Tableau might be a better choice, given its discovery and homepage data experiences. Similarly, if your enterprise requires insights on the go and in everyday tools like email, Tableau's current offerings deliver AI experiences in these formats.

In enterprises where large volumes of data exist, but insights might be scarce, or data analysts are short-staffed, PowerBI might be a better option as its Copilot offerings offer robust natural language capabilities where anyone can ask data a question, and the AI-powered analyst can help scale the grammar, vocabulary and insights the organization uses. This is especially valuable if the organization does not care as much about where the AI experiences are available like everyday productivity tools or mobile apps.

6.2. Startups looking to Disrupt with AI in BI Tools

The comparative analysis unfolds important themes and gaps in current AI offerings by popular BI tools. This presents an opportunity for various startups to disrupt the BI space with AI capabilities in specific phases during data analysis. More specifically, this analysis identified three key themes when doing data analysis, as shown in Figure 3: (a) Data Modelling and Schema, (b) Data Exploration and Insights Finding with Curated Stories and (c) Building dashboards and reports.

In data modeling and schema updates, business intelligence tools can leverage LLMs and powerful AI technology to automatically build a data model that adapts to the enterprise context and usage. Whether it is assisting

analysts with SQL generation, querying data, or generating descriptions for metrics and dimensions, the AI-based data model presents a compelling opportunity for startups.

In data exploration, insights finding and curated stories, LLMs offer opportunities to reveal data trends and curated narratives. Large BI platform players like PowerBI and Tableau are already innovating in this space with narrative visuals, data summaries, insights and data stories. Further opportunities include personalized and contextual recommendations.

When building data dashboards and reports, today, conversational analysts serve as starting points for report and page generation. Current innovation in this space includes generated content and recommendations. Further opportunities exist for automated and contextual data access, governed data sources, and trusted metrics through AI-native capabilities.

More importantly, by combining various themes and AI capabilities in different phases, startups may be able to come up with unique combinations to innovate in the BI space.

7. Conclusion

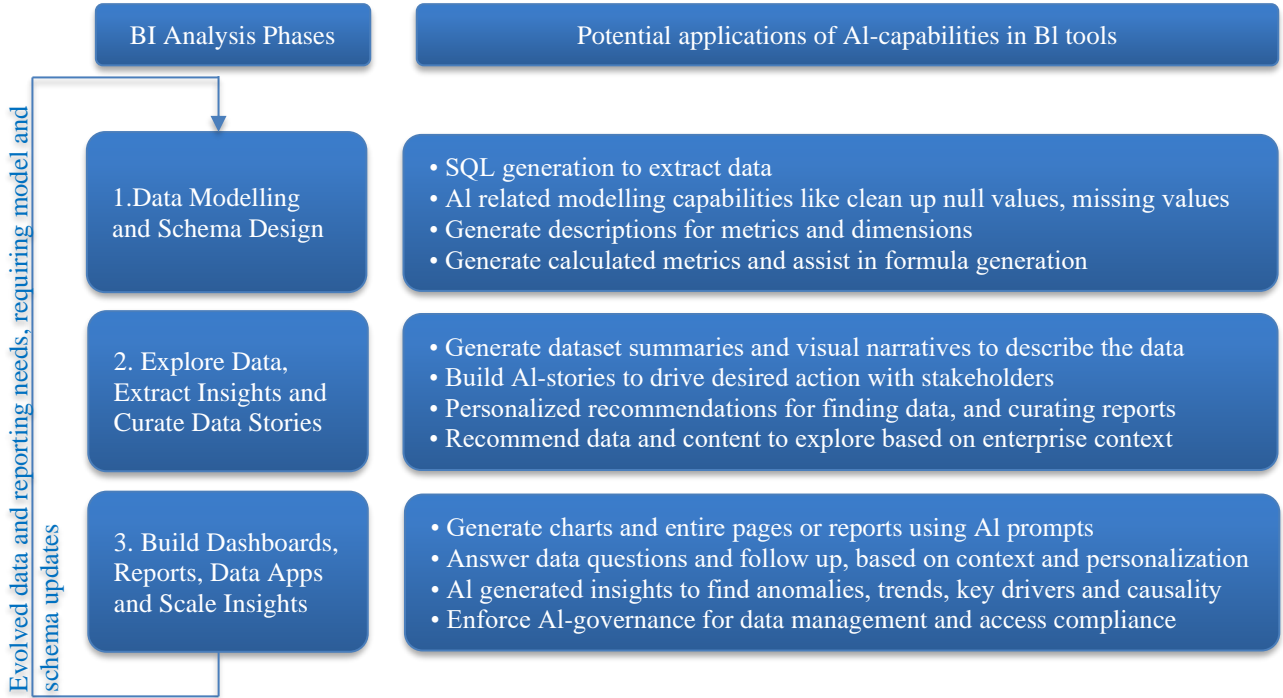
In this comparative analysis, we compare Microsoft PowerBI with Salesforce Tableau in terms of their cutting-edge AI capabilities. The analysis is important and relevant in two primary aspects. For enterprises looking to make choices for AI products, the paper lays out a framework for systematically evaluating the various features and themes and making informed choices. For startups looking to innovate in the BI space, this paper presents areas and opportunities for enhanced competitive advantages through the adoption of cutting-edge AI technologies.

Conflicts of Interest

There is no financial or monetary gain for the author. The views expressed in this paper solely belong to the author and should not be attributable to their employer. This is a disclosure that the author's employer offers Business Intelligence products like Looker Studio and GenAI integrations like Gemini in Looker. However, no analysis has been made on aforesaid products.

Funding Statement

This research paper has been self-funded.



Potential areas for AI assist in business intelligence Products

Fig. 3 Potential AI applications mapped to each of the BI phases

References

[1] Overview of Copilot for Power BI, Microsoft Build, 2024. [Online]. Available: <https://learn.microsoft.com/en-us/power-bi/create-reports/copilot-introduction>

[2] Find Insights in your Reports, Microsoft Build, 2024. [Online]. Available: <https://learn.microsoft.com/en-us/power-bi/create-reports/insights>

[3] Types of Insights Supported by Power BI, Microsoft Build, 2024. [Online]. Available: <https://learn.microsoft.com/en-us/power-bi/consumer/end-user-insight-types>

[4] Tableau Pulse, Tableau. [Online]. Available: <https://tableau.com/products/tableau-pulse>

[5] Nate Nichols, and Homer Wang, What is Tableau AI?, Tableau. [Online]. Available: <https://www.tableau.com/blog/what-is-tableau-ai>

[6] Einstein Generative AI and Trust, Tableau Help. [Online]. Available: https://help.tableau.com/current/tableau/en-us/tableau_gai_einstein_trust.htm

[7] Einstein Trust Layer, Tableau Help. [Online]. Available: https://help.tableau.com/current/tableau/en-us/tableau_gai_einstein_trust_layer.htm

[8] The Gartner 2023 Analytics & BI Platforms Magic Quadrant Highlights, Gartner. [Online]. Available: <https://www.gartner.com/en/webinar/530670/1195866>

[9] A Comprehensive Guide to PowerBI AI Features, Pop Automation, 2023. [Online]. Available: <https://www.popautomation.com/post/power-bi-ai-features>

[10] Daniel Platt, Tableau Data Stories, Tableau, 2023. [Online]. Available: <https://www.tableau.com/blog/tableau-natural-language-data-stories>