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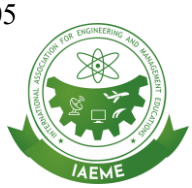

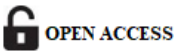

TRANSFORMING CLINICAL DOCUMENTATION AND ANALYTICS USING POWER BI AND DAX COPILOT

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ABSTRACT

Power BI is a powerful business intelligence and data visualization solution that turns tough data into actionable insights. It unifies data from disparate sources to provide real-time insights, enabling healthcare professionals to take quicker, better-informed decisions. This results in improved patient care, enhanced utilization of resources, greater operation efficiency, and easier regulatory compliance. Power BI features a simple interface and strong security, making it accessible to administrators and clinician users. The integration of Power BI and DAX Copilot streamlines data modeling and analytics operations through automated and optimized writing of Data Analysis Expressions (DAX) queries. DAX Copilot integrates conversational, ambient, and generative AI into Electronic Health Records (EHR) processes, saving time for clinicians, improving documentation quality, and reducing burnout. It is expected to be expanded to other specialties, acute and long-term care institutions, nursing, and telehealth. The platform leverages richer data from ambient clinical discussions for population health management, research, quality improvement, and health equity efforts. The platform focuses on ethical AI practices, with a focus on security, privacy,

transparency, fairness, and compliance with changing healthcare laws. DAX Copilot offers customized localization, language functions, and accessibility features.

Keywords: Power BI, Data Analysis Expressions (DAX), DAX Copilot, Telehealth, Electronic Health Records (EHR).

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1. Introduction

Power BI Desktop is a free Windows data analysis, modeling, and report generation tool through which several data sources can be connected and models created with complex structures. Power BI Service or Power BI Online is a cloud-based SaaS offering that enables creation, sharing, collaboration on, and consumption of reports and dashboards online. It provides rich data connectivity, modeling, visualization capabilities, offline report authoring, and integration with Excel and other products. Power BI Service provides access from any web browser or mobile device, collaboration, sharing, co-authoring of reports, automatic data refreshes, real-time data streaming, enterprise-grade security, role-based access, and governance features.

Power BI Desktop is a full-fledged report development and data modeling tool that provides broad data connectivity to more than 100 data sources. Its Power Query Editor feature offers advanced data transformation without writing code, and it enables people to mash up disparate data for analytics. There is powerful data modeling with DAX, calculated columns, and table linking, which offers in-depth insights. Power BI Desktop also includes more than 30 out-of-the-box and custom visualizations that make it easy for people to create interactive reports as per their unique business requirements. It is a free Windows application for developing reports offline before publishing them online. Extensibility features and performance tools, including a performance analyzer and the ability to support external tools, optimize report performance. The easy-to-use interface makes it possible for users with little technical expertise to develop detailed reports quickly.

It is a powerful tool with AI-based assistance for building, describing, and refining Data Analysis Expressions (DAX) expressions in Power BI. DAX Copilot, fueled in Power BI Desktop and Power BI Service, uses natural language inputs to assist users in writing,

describing, and debugging DAX measures and queries. With plain English inputs of what they need in terms of data, it will automatically produce the right DAX code for their semantic model. DAX Copilot can even interpret and understand complex DAX formulas, making it easier to work in teams and understand how calculations work in Power BI reports. Power BI development cycles accelerate development, minimize the technical barrier to successful data analysis, and enrich data insights by offering rich explanations and step-by-step guidance [1].

Nuance have developed an AI solution that simplifies and enhances clinical documentation processes in healthcare settings. The device records and translates patient-clinician interactions into structured clinical summaries using conversational, ambient, and generative AI. The software streamlines the documentation process, allowing physicians to focus on care. The software can be integrated with Epic and other electronic health record (EHR) systems, making documentation more precise and effective. The tool features automated writing, ambient intelligence, and safe, real-time documentation in clinical processes. The tool also minimizes burnout by minimizing time on notes and administrative tasks [2]. The tool utilizes cloud security frameworks and HITRUST-CSF privacy standards to securely store patient information.

Studies indicate that it saves doctors seven minutes per patient on average, which means a 50% reduction in documentation time and a boost in efficiency. Over 400 organizations utilize it so that doctors can have extra time with patients. The AI toolset Power BI uses the term "Copilot" to assist users in building and understanding DAX queries to analyze data. Copilot provides syntax and function selection, explains query logic in natural language, and constructs DAX queries from basic requests [2]. Power BI's DAX Copilot is an artificial intelligence assistant designed to help users query, analyze, and interpret data with DAX quicker, more easily, and more precisely.

It reduces the need for deep manual DAX expertise by creating new queries or altering existing functions based on users' input. The Copilot interprets users' straightforward English explanations of their analysis requirements into actual DAX queries and is therefore beneficial for people who are not familiar with DAX syntax. It also allows question development by means of conversation, thereby allowing users to customize their queries with further instruction. Copilot can describe DAX concepts and queries to facilitate team learning and comprehension. Syntax checks are performed to accelerate troubleshooting and deployment. DAX Copilot is natively included in Power BI Service and Desktop, and can be integrated with the Fabric platform to enhance analytics across these environments. It optimizes the productivity of Power BI users by minimizing the time it takes to define measures and advanced formulas, increasing

accuracy with AI-provided justifications and error detection, and making data modeling easier to understand through conversational comments and natural language tips [3].

2. Related Work

DAX Copilot in Power BI is a tool that is AI-driven, which helps users to author, edit, and explain DAX queries in Power BI Desktop as well as Service. It enables users to interactively refine and learn DAX formulas by their semantic models and has conversational querying in Power BI's DAX query view. The AI capabilities speed up the creation of DAX measures, report design, data discovery, and visualizations, enabling users of all levels. External applications such as DAX Studio and Tabular Editor complement Copilot by providing performance tuning, high-end debugging, and best practice checking for DAX code, useful for hand-tuned measures. Power BI community also utilizes other AI and assistive technologies, including GPT-based models, to generate and debug DAX syntax. DAX Copilot is especially useful in business and healthcare, highlighting the expanding use of AI in domain-specific data processing and automation [4].

DAX Copilot utilizes code suggestion and natural language to build DAX formulas to compare data over various time frames. For instance, the formula to display profits in last three months versus prior three months is displayed below in figure 1:

```
EVALUATE
SUMMARIZECOLUMNS(
 'Product'[ProductName],
 "Last 3 Months Profit", CALCULATE(SUM('Sales'[Profit]), DATESINPERIOD('Date'[Date], LASTDATE('Date'[Date]), -3,
MONTH)),
 "Previous 3 Months Profit", CALCULATE(SUM('Sales'[Profit]), DATESINPERIOD('Date'[Date],
DATEADD(LASTDATE('Date'[Date]), -3, MONTH), -3, MONTH))
)
```

Figure 1: Sample Instance to Display Profits in Last Three Months versus Prior Three Months

Copilot-created and hand-written DAX are two data analysis methods. Copilot DAX automatically creates queries and measures, conserving time and eliminating barriers for new users. Nevertheless, it might not include complex optimization techniques, like context transition through CALCULATE or row context reduction. Hand-written DAX, in contrast, can be tuned by refactoring for optimal scalability and prevention of bottlenecks.

It is learnable and collaborative, but its model metadata parsing and training data flexibility is restricted. Handwritten DAX offers full control for debugging, commenting, and

tailoring code to certain standards, but can be less documented if written incautiously. It applies syntax checking and model schema context to minimize errors, but outputs can vary based on prompt wording and may not be best suited for all applications. Handwritten DAX, however, has accuracy and speed defined outcomes that are progressively optimized for a particular business scenario and updated and developed over time by experts [5]. The comparison of co-pilot DAX & hand-written optimized DAX is presented in below table 1:

Table 1: Comparison b/w Copilot DAX & Hand-Written Optimized DAX

Aspect	Copilot DAX Output	Hand-Written Optimized DAX
Speed	Fast auto-generation	Slower—requires manual authoring
Accuracy	Good, with model context, but may lack deep tuning	Maximum, with domain-specific optimization
Performance	Generally efficient; rarely explicitly tuned	Highly tuned for scale and speed
Flexibility	Depends on prompt quality; can refactor code	Limitless; custom and context-aware
Learning & Explanation	Built-in comment/explanation features	Must be manually documented
Reliability	Variable with prompt; validated syntax	Full control and consistency

3. Methodology

Power BI DAX Copilot project has various phases to analyze its effectiveness, deployment, and business impact on data analysis. The phases are configuration and prerequisites, use case identification, communication and query creation, evaluation criteria, performance testing, business impact, and improvement and iteration [6] is depicted in figure 2:

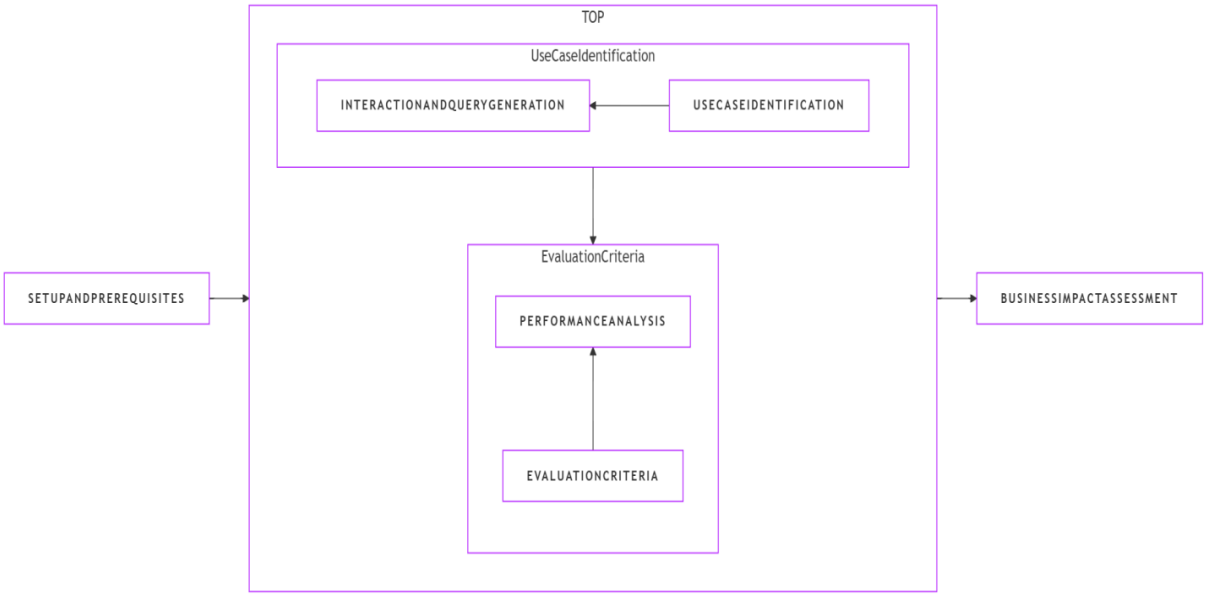

Figure 2: Phases of Power BI DAX Copilot

1. **Configuration and prerequisites:** Provide access to a Copilot-enabled workspace with the required licenses and permissions.
2. **Use case identification:** Define particular business scenarios or analysis tasks, for example, constructing complex DAX measures, explaining running queries, or generating reports.
3. **Communication and query creation:** Employ Copilot's natural language interface to input natural language queries or select measures in order to create or explain.
4. **Evaluation criteria:** Measure generated DAX query accuracy and correctness versus handwritten peers, compare time gained when developing and testing formulas, and measure usability and user experience.
5. **Performance Evaluation:** Check generated queries for optimization and runtime performance in Power BI use cases, and check robustness by testing scalability with larger data sets and semantic models.
6. **Business Impact Analysis:** Survey users regarding how Copilot has enhanced collaboration, model sharing, and decision-making, and track team-level user empowerment, error decrease, and report speed of development.
7. **Improvement and Iteration:** Continuously improve prompts, model usage recommendations, and integration approaches based on evaluation outcomes and feedback.

In AI-based software projects like DAX Copilot, development and design, project management, quality assurance, teamwork, security, AI innovation, support, and challenges topic areas addressed in close congruence with standard tasks and activities, particularly for healthcare and data analytics environments. This is a structured description that refers to applicable findings [7]:

- **Design and creation:** Creating and designing platform-independent AI applications, i.e., new features and configuration to new emerging technologies.
- **Project Management:** Managing release planning and coordination to achieve simple rollouts of AI strengths on global products.
- **Quality Assurance:** Testing and debugging AI clinical apps to develop a flawless user experience.
- **Cooperation and Arrangement:** Enabling open progress and collaboration among numerous participants.
- **Security:** Protecting sensitive data based on industry norms, especially when using AI-based solutions to handle finance or health information.
- **AI Innovation and Integration:** Exploring emerging AI models like generative AI to enhance clinical documentation or automation of data inquiry.
- **Guidance and Support:** Facilitating end-users and stakeholders to best embrace AI technologies.
- **Acquisition Challenges:** Technological alignment issues, continuity issues, cultural integration issues, regulatory clearance issues, and documentation issues while integrating technologies of merged entities.

The DAX Copilot and DAX Full Service applications have greatly enhanced clinical practice through efficiency, enhanced documentation quality, and reduced clinician burnout. Saving the clinician an average of five minutes per patient encounter, 70% of clinicians say it supports work-life balance and reduces burnout. Patients indicate that physicians spend less time on computers during visits, making their clinicians more accessible and interactive. The apps also offer personalized AI capability, such as coaching and encounter summaries, and customizable layout that reduces documentation time and enhances relevancy. Fabric integration provides system usability and functionality, and release updates enhance mobile compatibility. DAX Copilot is rolled out in the US, UK, France, and Germany to ensure smooth data access and minimize customer disruption. The app converts patient-clinician conversations

into preliminary clinical summaries, enhancing patient outcomes and clinician satisfaction by enabling clinicians to devote more time to patient care [8].

The DAX Copilot healthcare project has had a monumental impact on clinical workflows, productivity, patient satisfaction, and financial outcomes. It has resulted in time and efficiency gains, with clinicians saving as much as 50% of documentation time per patient encounter. This has translated to higher patient throughput, administrative support, and reduced burnout. DAX Copilot also improved quality of clinical documentation, and 77% of doctors experienced better quality and better work-life balance. Patients reported increased approachability, attentiveness, and fewer computer hours during visits. The initiative has also returned 80% return on investment for the University of Michigan Health-West and 112% return on investment for Northwestern Medicine. The project also enables efficient collection of clinical information during care through interoperability with over 200 Electronic Health Records (EHR) systems, and enhances data management and automation of clinical workflows through Fabric integration is depicted in below Figure 3 [9]:

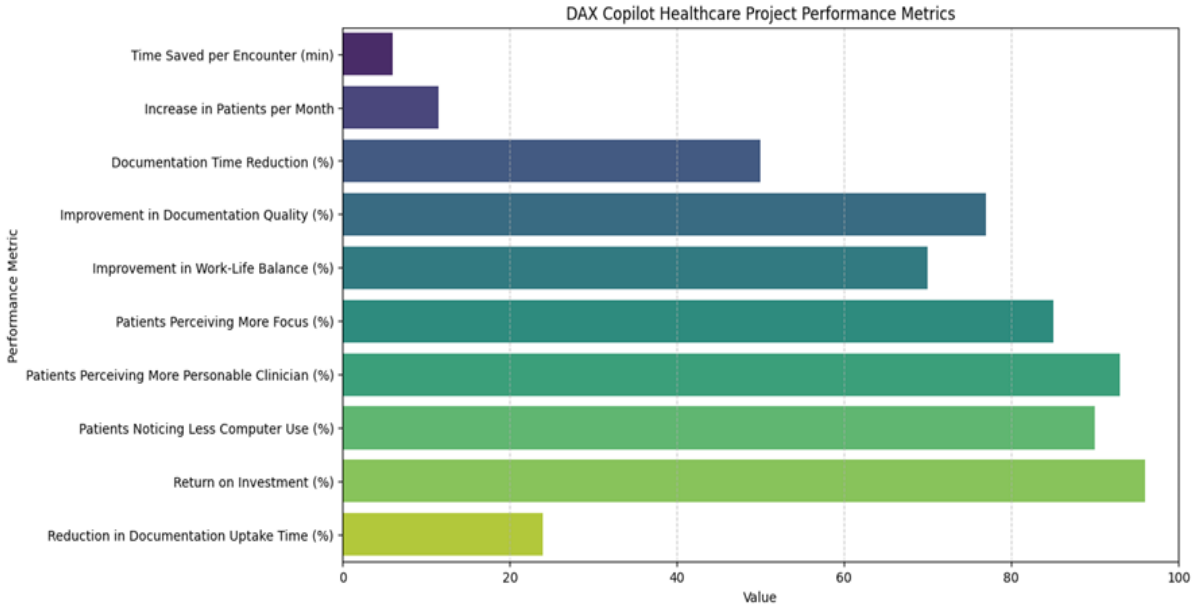

Figure 3: DAX Copilot Healthcare Project Performance Metrics

4. Conclusion

DAX Copilot is an innovative AI solution that combines conversational, ambient, and generative AI into Electronic Health Records (EHR) workflows. It frees up clinicians' time, enhances documentation quality, and mitigates burnout, leading to increased productivity and wellbeing. The solution is anticipated to extend beyond the initial specialty, acute and long-

term care environments, nursing, and telehealth. It provides greater AI capabilities, such as clinical decision support, predictive analytics, more comprehensive diagnostics, and personalized AI coaching. Fabric utilizes enriched information from surrounding clinical conversations for population health management, research, quality improvement, and health equity initiatives. The platform also concentrates on ethical AI methods, prioritizing security, privacy, transparency, fairness, and adherence to evolving healthcare regulations. DAX Copilot provides tailored localization, language support, and accessibility features to accommodate different healthcare centers and user needs. The combination of AI with broader healthcare ecosystems and digital health platforms is referred to as interoperability and ecosystem expansion.

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