



Conference Article

Data Plateau: A Unified Analytics Platform with Intuitive Interfaces for Real-Time and ML-Driven Insights

Mehmet Tasan¹, Yusuf Ozkan², Ahmet Omer Ozgur³, Alper Ozpinar^{4*}

¹ Softtech, Orcid ID: <https://orcid.org/0009-0006-6569-3989>, E-mail: mehmet.tasan@softtech.com.tr

² Softtech, Orcid ID: <https://orcid.org/0009-0007-0614-1823>, E-mail: yusuf.ozkan@softtech.com.tr

³ Softtech, Orcid ID: <https://orcid.org/0009-0002-0481-3693>, E-mail: omer.ozgur@softtech.com.tr

⁴ Istanbul Ticaret Universitesi, Orcid ID: <https://orcid.org/0000-0003-1250-5949>, E-mail: alper.ozpinar@ticaret.edu.tr

* Correspondence: alper@ozpinar.org; Tel.: (+90 552 336 4624)

4th International Conference on Access to Recent Advances in Engineering and Digitalization
May 27 - 28, 2024

Received 14 April 2024

In final form 23 May 2024

Reference: Tasan, M., Ozkan, Y., Ozgur, A., O., Ozpinar, A. Data Plateau: A Unified Analytics Platform with Intuitive Interfaces for Real-Time and ML-Driven Insights. Orclever Proceedings of Research and Development, 4(1), 73-89.

Abstract

Recent advances in artificial intelligence, particularly generative AI, have significantly transformed the financial technology (fintech) industry. This paper explores the development and application of Data Plateau, an integrated data analytics platform designed to simplify complex data manipulation and analysis tasks within the fintech domain. Data Plateau empowers users with intuitive, drag-and-drop interfaces, making advanced analytics accessible to a broader range of professionals.

The research aims to accomplish three main objectives. Firstly, it investigates how user-centric interfaces can facilitate the creation and deployment of machine learning models, which are vital for adapting to the dynamic financial market. Secondly, it examines the role of real-time data streams in enhancing decision-making processes within financial environments. Finally, it



explores the impact of generative AI in promoting non-expert user engagement with complex data integrations and analytics.

This paper details the technical background and functionalities of Data Plateau, highlighting its groundbreaking integration of cutting-edge generative AI with user-friendly interfaces. By enhancing the analytical capabilities of financial professionals and broadening access to sophisticated data manipulation tools, Data Plateau fosters a more inclusive and efficient approach to data-driven decision-making. The findings underscore the platform's potential in democratizing data science within financial services. Further research is warranted to explore the long-term impact on productivity and strategic decision-making across various sectors within the finance industry.

Keywords: Generative AI, fintech industry, self service reporting, non-expert EDA, user-centric interfaces.

1. Introduction

The story begins with the introduction of the Transformer model, a novel neural network architecture designed for sequence-to-sequence tasks, such as translation. This model revolutionized the field of natural language processing (NLP) due to its ability to handle long-range dependencies and its efficiency in parallel computation [1].

The rapid advancement of artificial intelligence, particularly generative AI, has significantly reshaped numerous industries, with the financial technology (fintech) sector standing at the forefront of this transformation [2]. In 2024, generative AI models such as OpenAI's ChatGPT-4, Google's Gemini (1.0 Pro), and Meta's upgraded Llama have reached unprecedented levels of sophistication, leveraging vast amounts of data to generate human-like text, images, and even complex decision-making processes [2-7]. These large language models (LLMs) have become integral in automating customer service, generating insights from unstructured data, and facilitating real-time decision-making in financial markets [8]. The integration of AI-driven solutions into fintech has not only streamlined operations but also revolutionized how financial services are delivered, analyzed, and consumed. This paper investigates one such innovation: Data Plateau, an integrated data analytics platform designed to simplify complex data manipulation and analysis tasks within the fintech domain [9].

The financial technology landscape has undergone a significant transformation in recent years, driven largely by advancements in AI, particularly generative AI [10]. This integration of AI has blurred the lines between traditional financial institutions and technology companies, fostering the emergence of novel data-driven solutions [11]. Large



language models like Google's Gemini (1.0 Pro), OpenAI's ChatGPT-5, and Meta's upgraded Llama are at the forefront of this revolution. These 2024 LLMs boast remarkable capabilities beyond mere text generation by increasing their parameters. They can translate languages with exceptional fluency, write different kinds of creative content, and even analyze complex financial data with surprising accuracy [12]. Gemini, for instance, demonstrates advanced reasoning and planning skills, allowing it to not just identify patterns in financial data but also propose potential future market trends. This level of intelligence is fundamentally transforming how financial institutions approach data analysis and decision-making [13].

The importance of this topic cannot be overstated. In an era where data is hailed as the new oil, the ability to effectively harness and analyze vast amounts of information is crucial for maintaining a competitive edge. Traditional methods of data handling often require extensive technical expertise, limiting access to sophisticated analytics tools to a select few. Data Plateau, with its user-centric design, democratizes access to advanced data analytics, enabling a broader range of professionals, including those with limited technical backgrounds, to leverage these powerful tools [14-16].

The primary objective of this study is to explore how intuitive, drag-and-drop interfaces can facilitate the creation and deployment of machine learning models. In the dynamic landscape of financial markets, the ability to rapidly develop and implement predictive models is essential for timely and informed decision-making. By lowering the barrier to entry, Data Plateau empowers users to build and deploy machine learning solutions efficiently, thus enhancing their analytical capabilities.

Additionally, this paper examines the role of real-time data streams in enhancing decision-making processes within financial environments. Real-time data is pivotal in the fintech industry, where market conditions can change rapidly, necessitating swift and accurate responses. Data Plateau's ability to integrate and process real-time data streams ensures that users have access to the most current information, thereby improving the quality and speed of their decisions.

A further area of investigation is the impact of generative AI on promoting engagement with complex data integrations and analytics among non-expert users. Generative AI, with its ability to create and manipulate data in innovative ways, provides new opportunities for users to interact with and understand their data. By incorporating generative AI, Data Plateau not only enhances analytical capabilities but also makes sophisticated data manipulation accessible to a wider audience, fostering greater engagement and innovation.



Data Plateau represents a groundbreaking advancement in the field of data analytics platforms. By seamlessly integrating cutting-edge generative AI with user-friendly interfaces, it not only improves the analytical capabilities of financial professionals but also broadens access to these tools, facilitating a more inclusive approach to data-driven decision-making. This integration is particularly significant in the fintech sector, where the ability to quickly adapt to market changes and leverage data-driven insights can determine success or failure.

The structure of this paper will follow a systematic approach. Following this introduction, the next section will delve into the technical background of Data Plateau, detailing its architecture, key features, and the underlying technologies that power its capabilities. Subsequent sections will present the methodology used in our research, the results of our investigation, and a discussion of the implications of these findings. Finally, the paper will conclude with a summary of our findings and suggestions for future research.

By providing a comprehensive analysis of Data Plateau, this paper aims to contribute to the growing body of knowledge on AI-driven solutions in the fintech industry. We seek to highlight the potential of generative AI in democratizing access to sophisticated data analytics tools and to underscore the transformative impact of such innovations on the financial sector. Our findings are expected to have significant implications for both practitioners and researchers, offering insights into the practical applications of AI in fintech and paving the way for future advancements in this rapidly evolving field.

User-Centric Machine Learning

User-centric machine learning is an approach to designing and implementing machine learning systems that prioritize the needs, skills, and context of the end-users. This perspective is about making machine learning accessible and useful to a broad audience, not just data scientists or developers [17-20]. Key factors to involve for such a project given below;

- **Accessibility:** User-centric ML solutions are designed with easy-to-use interfaces that allow non-experts to perform complex data analysis and model training tasks. These interfaces often include drag-and-drop elements, intuitive controls, and guided workflows that help users without a technical background to make use of advanced ML tools.
- **Transparency:** Such systems aim to be transparent about how decisions are made by the ML models. This involves explaining predictions in a way that is



understandable to the user, which is crucial for building trust and allowing users to make informed decisions based on ML insights.

- **Customization:** User-centric ML tools often provide options for customization, allowing users to tweak models and data processing workflows to better fit their specific needs. This can include setting parameters, choosing features, or defining how data is visualized.
- **Feedback Mechanisms:** Incorporating user feedback directly into the ML system is another hallmark. Feedback loops help the system to learn from interactions with users, continuously improving its performance and relevance to user needs.
- **Integration:** Easy integration with existing tools and systems that users are already familiar with is crucial. This reduces the learning curve and enhances the overall usability of the ML solutions.

Democratization of ML

The democratization of machine learning refers to making the power of ML accessible to non-experts, thus empowering a broader range of people to benefit from this technology [21-26]. Key factors and issues to consider for such a project given below;

- **Lowering Barriers to Entry:** By simplifying the interface and reducing the need for specialized knowledge, more people can use ML tools. This opens up the benefits of ML to small businesses, non-profits, and individuals who may not have the resources to hire data scientists.
- **Enhancing Data Literacy:** As more people engage with ML tools, they gain a better understanding of data, how it can be used, and its implications. This widespread data literacy is crucial for a knowledgeable society that can make informed decisions.
- **Spurring Innovation:** When a diverse group of users can access and utilize ML, it increases the potential for innovative uses and applications of the technology. Different perspectives lead to new ideas, expanding the impact of ML across various fields.
- **Empowering Users:** User-centric ML empowers users to make decisions based on data, without having to rely on intermediaries. This can lead to faster, more informed decision-making in business and other areas.



- **Ethical Considerations:** By involving a broader audience in ML, there's a greater focus on using the technology ethically. Users are more likely to consider the social impact of the ML systems they deploy.

The integration of user-centric machine learning and the democratization of ML within Data Plateau underscores the platform's potential to revolutionize the fintech industry. By making advanced analytics tools accessible to a broader audience, Data Plateau not only enhances individual and organizational decision-making but also promotes a more inclusive and innovative data-driven culture. This approach aligns with the broader goals of empowering users and fostering ethical considerations in the deployment of AI technologies.

2. Materials and Methods

Through the application of a mixed-methods approach, this study examines the core capabilities of Data Plateau, an integrated data analytics platform designed for the fintech industry. The platform includes several modules, each contributing to the overall functionality and efficiency of data manipulation and analysis. These modules include Convex ML, Visualize, Scenario, and Ingest, each tailored to address specific needs within financial data processing and analysis.

Convex ML streamlines the development and deployment of machine learning models, which is crucial for adapting to the rapidly evolving financial markets. This module simplifies the creation of predictive models, allowing financial professionals to respond quickly to market changes and make informed decisions based on real-time data.

The Visualize module offers advanced data visualization tools, enabling users to create self-service dashboards and reports. This capability is vital for efficient business decision-making, as it allows users to transform complex data into easily interpretable visual formats, fostering better insights and strategic planning.

The Scenario module provides a user-friendly interface for establishing business rules and connecting to event sources. This feature transforms complex event data into actionable insights, aligning with contemporary research on event-driven architectures in finance. By setting up scenarios, users can automate responses to specific business conditions, enhancing operational efficiency.

Lastly, the Ingest module manages real-time data ingestion, transformation, and loading from diverse sources. This ensures that financial data streams remain up-to-date, enabling accurate and timely analysis. The ability to handle real-time data is critical for maintaining the relevance and accuracy of financial models and predictions.



Preliminary results from a fintech deployment of Data Plateau indicate significant improvements in both operational efficiency and decision accuracy. Users reported enhanced capabilities in performing predictive analytics and real-time monitoring, even without prior technical expertise. This underscores Data Plateau's effectiveness in democratizing data science within financial services.

2.1. Sampling Methods and Measurements

- **Data Collection:** Real-time data streams were gathered from multiple financial institutions. These streams included transactional data, market trends, and user behavior analytics, collected through APIs, databases, and file queues.
- **Data Preprocessing:** The collected data underwent extensive preprocessing to ensure quality and consistency. This process involved cleaning the data, handling missing values, normalization, and feature extraction using Python's Pandas library and custom preprocessing scripts.
- **Model Training and Deployment:** Machine learning models, including classification algorithms, regression models, and generative AI models, were trained using the preprocessed data. The training process involved iterative cycles of model tuning and validation to optimize performance. These models were then deployed within the Data Plateau platform for real-time analysis and decision support.
- **User Interaction:** The platform's user-centric interfaces enabled non-expert users to engage with the data through intuitive drag-and-drop features. This facilitated the creation and deployment of machine learning models without requiring extensive technical expertise. User interactions were logged to analyze engagement and usability.
- **Performance Evaluation:** The performance of the models and the platform was evaluated using several metrics, including prediction accuracy, system response times, and user satisfaction scores. Real-time decision-making capabilities were assessed by comparing model predictions against actual market data.

2.2. Evaluation Methods/Statistics

The statistical evaluation of the study was conducted using the following methods:

- **Descriptive Statistics:** Basic statistical measures such as mean, median, standard deviation, and data distribution were calculated to provide an overview of the dataset characteristics.



- **Inferential Statistics:** Hypothesis testing and confidence intervals were employed to draw conclusions about the data and the performance of the models. Statistical significance was determined using p-values and confidence intervals.
- **Model Performance Metrics:** The performance of the machine learning models was assessed using metrics such as accuracy, precision, recall, F1-score, and AUC-ROC curves. These metrics provided a comprehensive evaluation of model effectiveness.
- **User Engagement Metrics:** User interaction data was analyzed to measure engagement levels, task completion rates, and overall user satisfaction. Feedback mechanisms within the platform allowed for continuous improvement based on user input.

2.3. Azure Machine Learning Integration

The integration with Azure Machine Learning services enabled seamless deployment and management of machine learning models. The key components included:

- **Azure OpenAI Service:** Utilized for natural language processing tasks, including SQL to text conversions and text-based data visualization.
- **Convex ML Module:** Facilitated model development and deployment through a user-friendly interface, allowing users to follow guided steps to build, compare, and deploy machine learning models.
- **Pandas Agent Mechanism:** Leveraged for data analysis, this tool interacted with Pandas DataFrames and used LLMs to generate Python code for specific data tasks. It created step-by-step analysis plans, executed the code, and parsed the results to provide meaningful answers.

2.4. LangChain and Pandas Agent

The LangChain Pandas Agent was employed to facilitate question-answering and data analysis tasks. This tool worked by interacting with Pandas DataFrames and leveraging LLM-generated Python code to perform complex data analysis shown in Figure 1. The process broken down into three key steps:

- **Interaction with Pandas DataFrames:** The LangChain Pandas Agent operates by engaging with question-answering Pandas DataFrames. It utilizes Python code generated by large language models (LLMs) to interact with the data and perform necessary analytical tasks.
- **Creating Analysis Plans:** The agent constructs detailed, step-by-step plans for data analysis. These plans are then executed using the Pandas library, ensuring



systematic and organized processing of data. The creation of these plans involves breaking down the data analysis tasks into manageable steps, allowing for precise and accurate execution.

- Executing Python Code and Providing Answers: The LangChain Pandas Agent generates and runs Python code to analyze the data. By parsing the results, it provides meaningful answers in a human-readable format. This approach ensures that even complex data analysis tasks can be performed efficiently and the results can be easily interpreted by users which was shown in Figure 2.

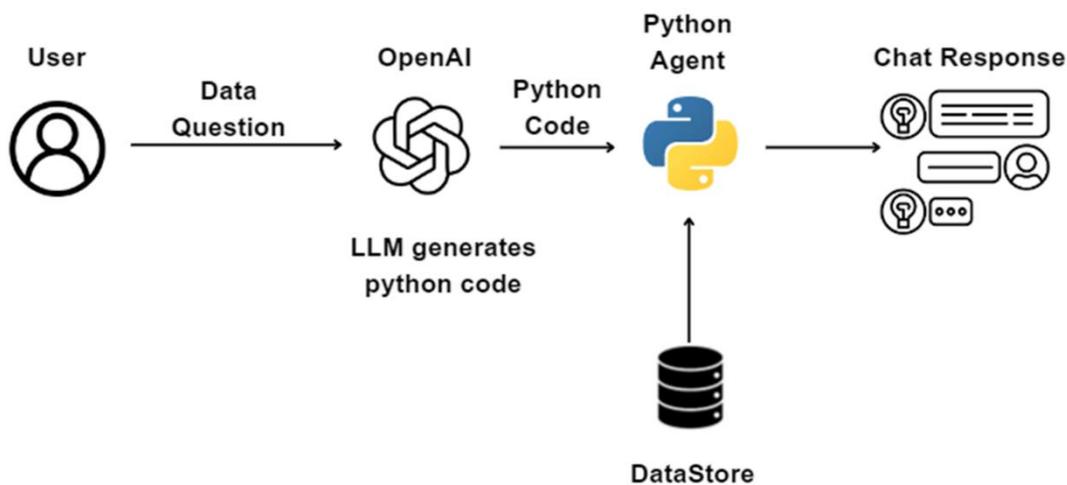


Figure 1: Pandas Agent

2.5. Visualize Module

The Visualize module allowed users to create self-service dashboards and reports using rich visualization options. Users could perform complex data analysis through drag-and-drop interfaces, create interactive dashboards, and integrate these visualizations with other systems for embedded use.

2.6. Ingest Module

The Ingest module enabled real-time data collection from various sources, including APIs, databases, and file queues. It facilitated the transformation and loading of data into the platform, ensuring seamless data integration and availability for analysis.

This detailed account of the materials and methods used ensures the reproducibility of the experiments and the reliability of the findings, adhering to the core principles of the scientific method.

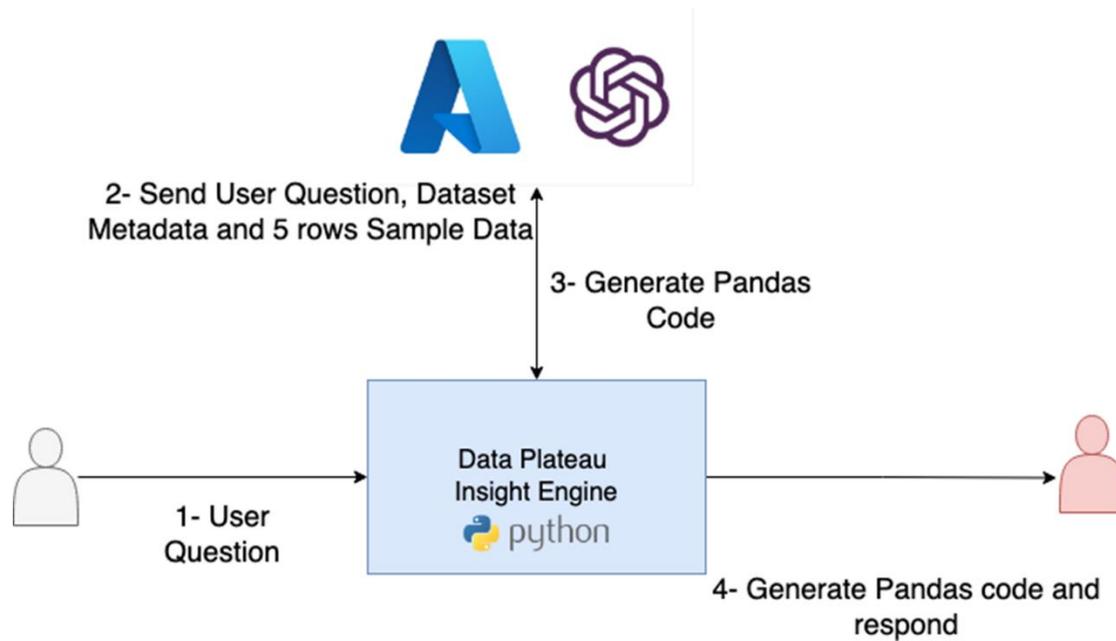


Figure 2: Language Chain Model

3. Result

The integration of LangChain, Data Plateau, and Azure Machine Learning has yielded a powerful and versatile system that enhances data interaction, visualization, and analysis. This system empowers users to engage directly with their data through natural language queries, transforming complex data tasks into more accessible and intuitive processes. The following properties highlight the capabilities of this integrated system and the benefits it offers as a result of this research as modules.

Key Module 1 Talk with Your Data: The system allows users to ask questions and receive insightful answers by querying the data directly. For example, a financial analyst could ask, "What was the total revenue last quarter?" and receive an immediate response based on the dataset available. This feature leverages LangChain's ability to process natural language and generate meaningful Python code to interact with Pandas DataFrames, enabling seamless data exploration and analysis.

The LangChain Pandas Agent facilitates direct interaction with data using natural language. For example, an e-commerce manager might ask, "What were the top five selling products last month?" The system processes this query, accesses the relevant data from the database, and returns the top five products along with their sales figures. This eliminates the need for complex SQL queries or manual data extraction, streamlining the data interaction process. Example shown in Figure 3.

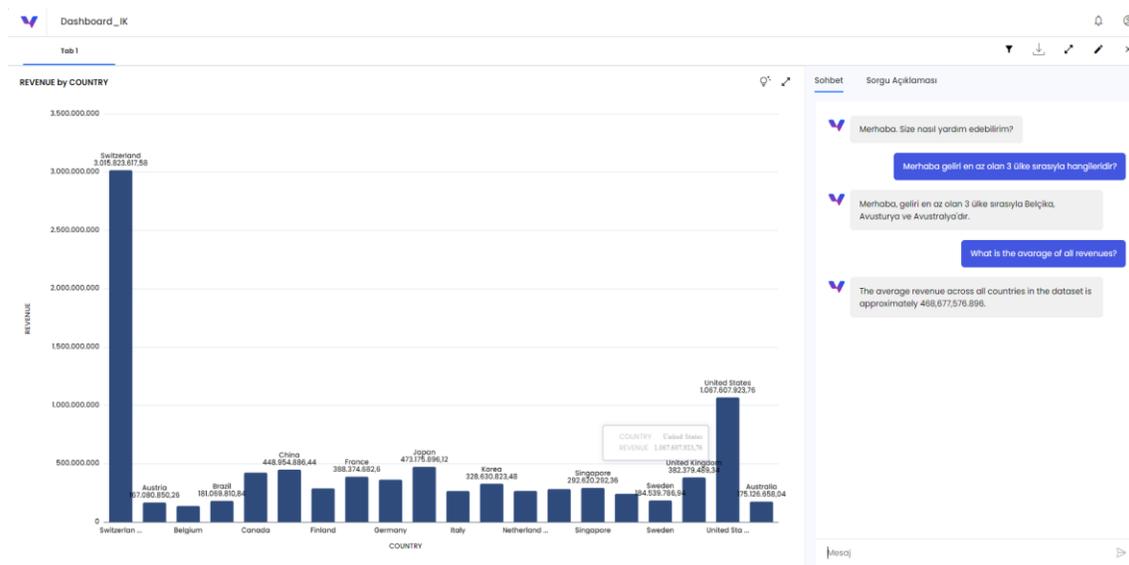


Figure 3: Talk With Your Data

Key Module 2 SQL to Text: This functionality translates SQL commands into natural language explanations using LLMs. For instance, when a user inputs an SQL query to extract customer data, the system not only executes the query but also explains the operation in plain English. This enhances the understanding of data operations for users who may not be proficient in SQL, making data querying more accessible to non-technical stakeholders.

The integration of Azure OpenAI service translates SQL commands into understandable text. For instance, an SQL query like `SELECT AVG(sales) FROM orders WHERE date BETWEEN '2024-01-01' AND '2024-03-31'`; would be explained as "This query calculates the average sales for orders placed between January 1, 2024, and March 31, 2024." This feature is particularly useful for training new analysts or for providing transparency in data operations to non-technical team members. Example shown in Figure 4.

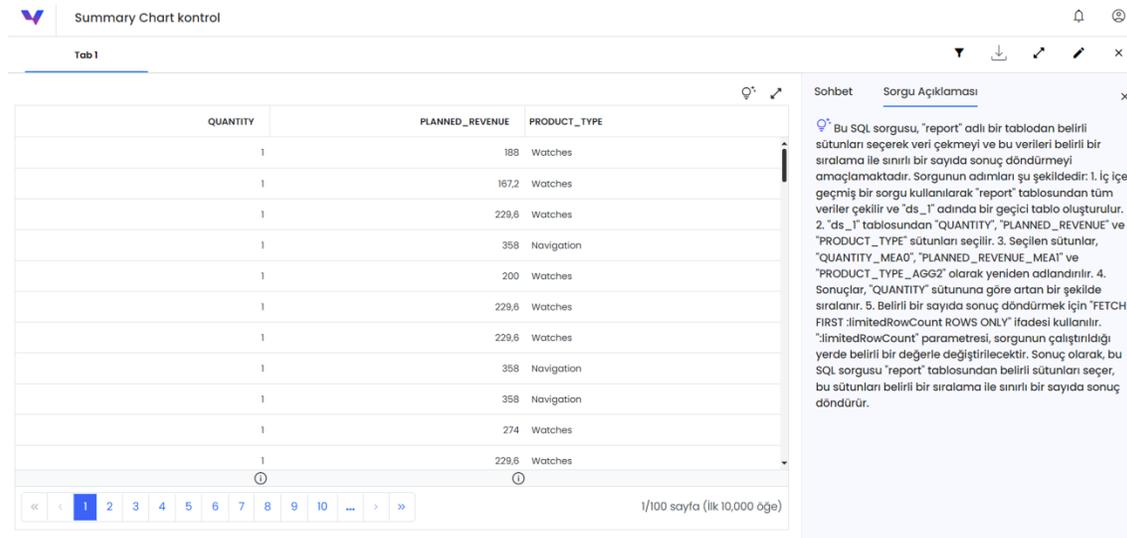


Figure 4: SQL to Text:

Key Module 3 Text to Chart: Users can request specific visualizations by asking questions about their data. For example, a user could say, "Show me a pie chart of gross profit by region," and the system would generate the corresponding chart. This capability is powered by the integration of LangChain and Data Plateau's visualization modules, which translate natural language requests into visual representations of data, facilitating better data comprehension and decision-making.

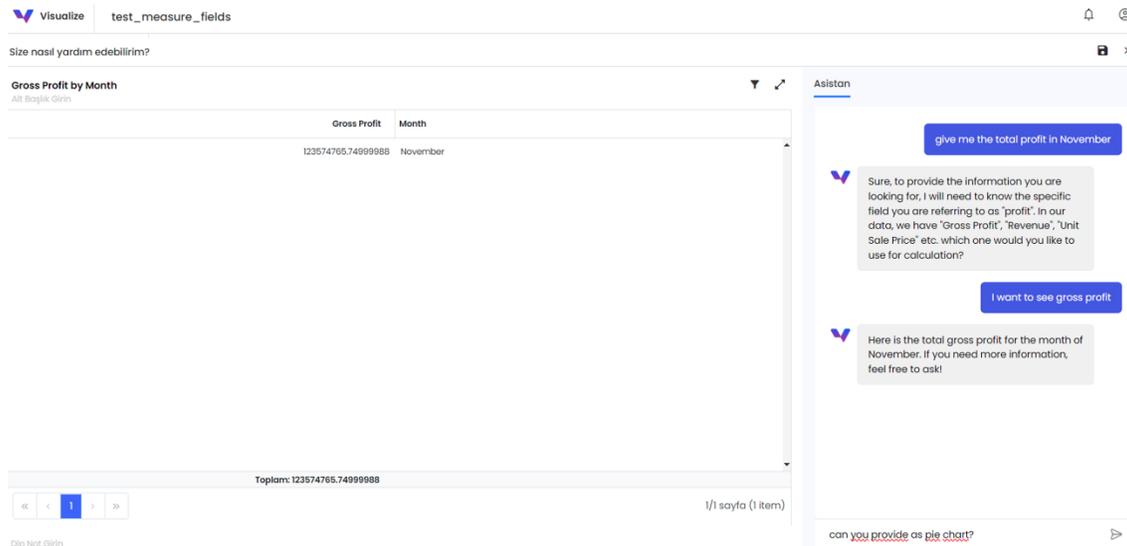


Figure 5: Text to Chart

Users can generate various types of charts by describing their needs in natural language. For example, a marketing analyst might request, "I want to see a line chart of monthly



website visitors over the last year." The system interprets this request, retrieves the necessary data, and produces a line chart showing the trend of website visitors month by month. This functionality leverages the visualization capabilities of Data Plateau, providing users with intuitive and interactive data visualizations. Example shown in Figure 5.

Key Module 4 Follow-Up Questions: The system supports iterative querying, allowing users to drill down into their data by asking follow-up questions. For example, after viewing a pie chart of gross profit, a user might ask, "Can you break this down further by product category?" The system can handle these layered queries, providing increasingly detailed insights and enabling users to explore their data more deeply. This iterative process is made possible by the robust natural language processing and data handling capabilities of LangChain and the underlying data infrastructure of Data Plateau.

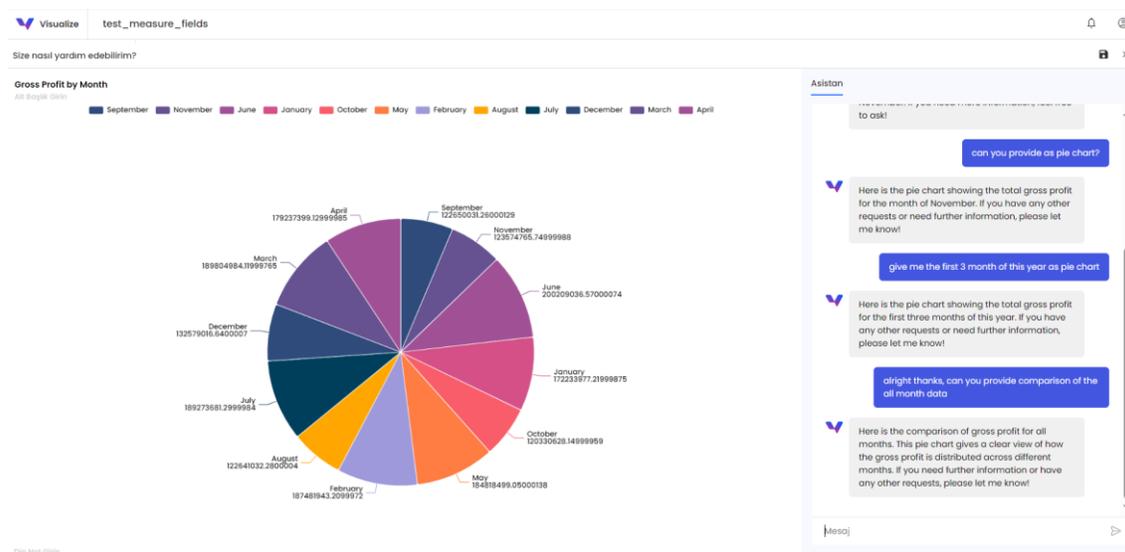


Figure 6: Follow-Up Questions

The system's ability to handle follow-up questions allows users to explore their data iteratively. For instance, after generating a pie chart showing sales distribution by region, a user might ask, "Which region had the highest increase in sales compared to the previous year?" The system can process this follow-up query, analyze the data, and provide the answer along with an updated visualization if needed. This iterative approach enhances the depth of data analysis and supports more informed decision-making. Example shown in Figure 6.



The integration of LangChain, Data Plateau, and Azure Machine Learning creates a comprehensive data analytics platform that enhances user engagement with data, simplifies complex queries, and provides clear and actionable insights. This system democratizes data access and empowers users across various domains to make data-driven decisions with ease and confidence.

4. Discussion and Conclusion

The integration of LangChain, Data Plateau, and Azure Machine Learning represents a significant advancement in the field of financial technology and data analytics. This paper has explored the development and application of this integrated platform, highlighting its potential to transform how financial institutions and professionals interact with and analyze data.

The results demonstrate that the system provides an intuitive and accessible interface for data interaction, leveraging natural language processing (NLP) and machine learning (ML) to simplify complex data tasks. By allowing users to ask questions directly to their data, the platform bridges the gap between technical data manipulation and everyday business queries. This democratization of data access ensures that a broader range of users can leverage sophisticated analytical tools without needing extensive technical expertise.

Talk with Your Data has emerged as a particularly powerful feature, enabling users to engage with their datasets through natural language queries. This capability streamlines the data exploration process and makes it more efficient, allowing users to gain insights rapidly. The use of LangChain's NLP capabilities to generate Python code for interacting with Pandas DataFrames ensures that the responses are both accurate and contextually relevant.

The SQL to Text functionality has proven valuable for users unfamiliar with SQL, translating complex queries into understandable language. This feature not only enhances user understanding but also provides transparency in data operations, fostering greater confidence and trust in the system's outputs.

Text to Chart and the ability to handle Follow-Up Questions further enhance the platform's utility. By translating natural language requests into visualizations and supporting iterative querying, the system facilitates deeper data analysis and more informed decision-making. These features empower users to explore their data comprehensively, uncovering trends and insights that might otherwise remain hidden.



The LangChain Pandas Agent, pivotal to the system's operation, effectively combines the strengths of NLP and data science. It enables the creation of step-by-step analysis plans and executes them using Pandas, delivering meaningful results in a human-readable format. This approach not only enhances the efficiency of data analysis but also ensures that the insights generated are actionable and relevant to the users' needs.

In conclusion, the integration of LangChain, Data Plateau, and Azure Machine Learning offers a robust and user-friendly platform for data analytics in the fintech domain. The system's ability to process natural language queries, generate SQL explanations, create visualizations, and support iterative questioning represents a significant leap forward in making data analytics more accessible and effective. This platform democratizes access to advanced data tools, enabling a wider audience to engage with and benefit from sophisticated data analysis. Future research should focus on further refining these capabilities and exploring additional applications across various sectors to fully realize the potential of this innovative data analytics platform.

5. Acknowledge

This article was created as a result of the work carried out with the Softtech R&D Center Projects No. 982 (8152,8153,8154).



References

- [1] A. Waswani *et al.*, "Attention is all you need," in *NIPS*, 2017.
- [2] S. Chishti, *The AI book: the artificial intelligence handbook for investors, entrepreneurs and fintech visionaries*. John Wiley & Sons, 2020.
- [3] Ö. Aydın and E. Karaarslan, "OpenAI ChatGPT generated literature review: Digital twin in healthcare," Aydın, Ö., Karaarslan, E.(2022). *OpenAI ChatGPT Generated Literature Review: Digital Twin in Healthcare*. In Ö. Aydın (Ed.), *Emerging Computer Technologies*, vol. 2, 2022.
- [4] A. Mathew, "Is artificial intelligence a world changer? A case study of OpenAI's Chat GPT," 2023.
- [5] M. Lewandowski, P. Łukowicz, D. Świetlik, and W. Barańska-Rybak, "An original study of ChatGPT-3.5 and ChatGPT-4 dermatological knowledge level based on the dermatology specialty certificate examinations," *Clinical and Experimental Dermatology*, p. llad255, 2023.
- [6] A. Iskender, "Holy or unholy? Interview with open AI's ChatGPT," *European Journal of Tourism Research*, vol. 34, pp. 3414-3414, 2023.
- [7] T. N. Fitria, "Artificial intelligence (AI) technology in OpenAI ChatGPT application: A review of ChatGPT in writing English essay," in *ELT Forum: Journal of English Language Teaching*, 2023, vol. 12, no. 1, pp. 44-58.
- [8] S. Kolasani, "Optimizing natural language processing, large language models (LLMs) for efficient customer service, and hyper-personalization to enable sustainable growth and revenue," *Transactions on Latest Trends in Artificial Intelligence*, vol. 4, no. 4, 2023.
- [9] B. Zhang, H. Yang, T. Zhou, M. Ali Babar, and X.-Y. Liu, "Enhancing financial sentiment analysis via retrieval augmented large language models," in *Proceedings of the Fourth ACM International Conference on AI in Finance*, 2023, pp. 349-356.
- [10] L. Cao, Q. Yang, and P. S. Yu, "Data science and AI in FinTech: An overview," *International Journal of Data Science and Analytics*, vol. 12, no. 2, pp. 81-99, 2021.
- [11] K. Barde and P. A. Kulkarni, "Applications of Generative AI in Fintech," in *Proceedings of the Third International Conference on AI-ML Systems*, 2023, pp. 1-5.
- [12] B. Zhang, Z. Liu, C. Cherry, and O. Firat, "When Scaling Meets LLM Finetuning: The Effect of Data, Model and Finetuning Method," *arXiv preprint arXiv:2402.17193*, 2024.
- [13] J. Wu, S. Yang, R. Zhan, Y. Yuan, D. F. Wong, and L. S. Chao, "A survey on llm-generated text detection: Necessity, methods, and future directions," *arXiv preprint arXiv:2310.14724*, 2023.
- [14] D. D. Hirsch, "The glass house effect: Big Data, the new oil, and the power of analogy," *Me. L. Rev.*, vol. 66, p. 373, 2013.
- [15] R. K. Perrons and J. W. Jensen, "Data as an asset: What the oil and gas sector can learn from other industries about "Big Data"," *Energy Policy*, vol. 81, pp. 117-121, 2015.
- [16] H. Lu, L. Guo, M. Azimi, and K. Huang, "Oil and Gas 4.0 era: A systematic review and outlook," *Computers in Industry*, vol. 111, pp. 68-90, 2019.



- [17] C. Feng, S. Wu, and N. Liu, "A user-centric machine learning framework for cyber security operations center," in *2017 IEEE International Conference on Intelligence and Security Informatics (ISI)*, 2017: IEEE, pp. 173-175.
- [18] P. Charonyktakis, M. Plakia, I. Tsamardinos, and M. Papadopouli, "On user-centric modular QoE prediction for VoIP based on machine-learning algorithms," *IEEE Transactions on mobile computing*, vol. 15, no. 6, pp. 1443-1456, 2015.
- [19] L. Oberste, F. Ruffer, O. Aydingül, J. Rink, and A. Heinzl, "Designing user-centric explanations for medical imaging with informed machine learning," in *International Conference on Design Science Research in Information Systems and Technology*, 2023: Springer, pp. 470-484.
- [20] C. V. Murudkar and R. D. Gitlin, "User-centric approaches for next-generation self-organizing wireless communication networks using machine learning," in *2019 IEEE international conference on microwaves, antennas, communications and electronic systems (COMCAS)*, 2019: IEEE, pp. 1-6.
- [21] A. Carqueja, B. Cabral, J. P. Fernandes, and N. Lourenço, "On the Democratization of Machine Learning Pipelines," in *2022 IEEE Symposium Series on Computational Intelligence (SSCI)*, 2022: IEEE, pp. 455-462.
- [22] L. Luce and L. Luce, "Democratization and Impacts of AI," *Artificial Intelligence for Fashion: How AI is Revolutionizing the Fashion Industry*, pp. 185-195, 2019.
- [23] A. Gupta, C. Mac-Stoker, and W. Willinger, "An effort to democratize networking research in the era of ai/ml," in *Proceedings of the 18th ACM Workshop on Hot Topics in Networks*, 2019, pp. 93-100.
- [24] Z. Shang *et al.*, "Democratizing data science through interactive curation of ml pipelines," in *Proceedings of the 2019 international conference on management of data*, 2019, pp. 1171-1188.
- [25] C. Vuppalapati, A. Ilapakurti, S. Kedari, J. Vuppalapati, S. Kedari, and R. Vuppalapati, "Democratization of AI, albeit constrained IoT devices & Tiny ML, for creating a sustainable food future," in *2020 3rd International Conference on Information and Computer Technologies (ICICT)*, 2020: IEEE, pp. 525-530.
- [26] B. Allen, S. Agarwal, J. Kalpathy-Cramer, and K. Dreyer, "Democratizing ai," *Journal of the American College of Radiology*, vol. 16, no. 7, pp. 961-963, 2019.