Customer value

Enterprise Intelligence and Decision Science - Overview

Agenda

- Executive summary

- Enterprise Intelligence and Decision Science (note)

- Project solution - AWS services

- Deliverables

- Next steps

Execute Summary

- This project demonstrates one example how to identify customer value. By analyzing customer behavior and preferences, organizations can gain valuable insights that inform strategic decision-making and improve customer satisfaction.

- The solution combines the power of Decision Science with Apache Spark and AWS services to provide a comprehensive understanding of customer data. The presentation offers an overview of the solution's benefits and practical guidance on implementation. With this solution, organizations can make data-driven decisions that drive customer value and positively impact their business.

- In addition to benefiting general managers, this solution can also be valuable for users who interact with customers on a daily basis. By utilizing the insights gained from this solution, users can better understand their customers' needs and preferences, which can lead to more effective communication and improved customer experiences.

- Next slides are going to present Enterprise Intelligence and Decision Science in practice.

Enterprise Intelligence and Decision Science

- **Enterprise Intelligence** is the process of gathering, analyzing, and disseminating data and insights throughout an organization to inform decision-making and improve business outcomes. By providing a comprehensive understanding of organizational data, Enterprise Intelligence enables leaders to make better informed decisions.

- In a project context, Enterprise Intelligence involves utilizing tools and techniques to collect, process, and analyze data in a way that provides actionable insights. This often involves using technologies such as big data, data lake, data warehouse, business intelligence software, machine learning models, and data visualization tools to help teams identify patterns, trends, and opportunities.

- By leveraging Enterprise Intelligence, organizations can gain a competitive advantage by making data-driven decisions that positively impact their business. This can include optimizing business processes, improving customer satisfaction, increasing revenue, and reducing costs. Additionally, Enterprise Intelligence can help organizations stay ahead of industry trends and identify potential risks, allowing them to adapt quickly and effectively to changing market conditions.

- Overall, Enterprise Intelligence is a critical component of modern business strategy, providing organizations with the tools and insights they need to stay competitive and drive success.

Note: The Harvard Business Review defines **Decision Science** as "a discipline that focuses on the application of science to business decisions." It combines various fields, including statistics, computer science, mathematics, psychology, and economics, with the aim of helping organizations make more informed and effective decisions. The application of Decision Science involves the collection and analysis of data, the use of mathematical models and algorithms to predict future outcomes, and the use of data visualization techniques to communicate insights in a clear and concise manner. With the growing availability of data and advances in technology, Decision Science has become an increasingly important tool for decision-making in businesses.

Project solution

- The AWS architecture used in this project provides practical examples of how to define customer value using services such as EMR Serverless, EMR Cluster (Jupyter Notebooks), and Athena Spark Job. By generating augmented data, performing business-level aggregation, and building a machine learning model to cluster customers based on revenue (monetary value), organizations can gain valuable insights.

- This solution allows information to flow smoothly, providing Enterprise Intelligence as an example. The solution is easy to demonstrate and helps to illustrate the context of how to achieve success.

- By using this solution, organizations can define processes, improve communication, and even develop a churn project based on the customer's spending variation over time using the FRM model (frequency, recency, and monetary value).

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Customer Value

CLV stands for "Customer Lifetime Value". It refers to the amount of money that a customer is expected to spend on a company's products or services over the entire duration of their relationship with the company.

Calculating the CLV of a customer is important because it helps companies understand the long-term value of each customer and make decisions about how much they are willing to spend to acquire and retain customers. By understanding the CLV, companies can also prioritize their resources towards acquiring and retaining high-value customers, and develop strategies to improve customer loyalty and retention.

CLV (Customer Lifetime Value) is a metric used to estimate the total value a customer will bring to a business over their entire lifetime. In this example, it is calculated by multiplying the average value of a purchase, the number of purchases made per year, and the average length of the customer relationship. CLV helps businesses determine how much they should invest in acquiring and retaining customers.

FRM (Frequency, Recency, and Monetary Value) is a method used to segment customers based on their purchase behavior. It is a commonly used approach in marketing, sales and customer analytics. Here's how it works:

Frequency: This represents how often a customer makes a purchase. Customers who make frequent purchases are more valuable to a business than those who make infrequent purchases.

Recency: This represents how recently a customer has made a purchase. Customers who have made a purchase more recently are more likely to make another purchase than those who have not made a purchase in a long time.

Monetary Value: This represents how much a customer spends on each purchase. Customers who spend more per purchase are more valuable to a business than those who spend less.

Using these three factors (FRM), businesses can segment their customers into groups based on their purchase behavior. For example, customers who make frequent purchases, have made a purchase recently, and spend a lot per purchase would be considered high-value customers.
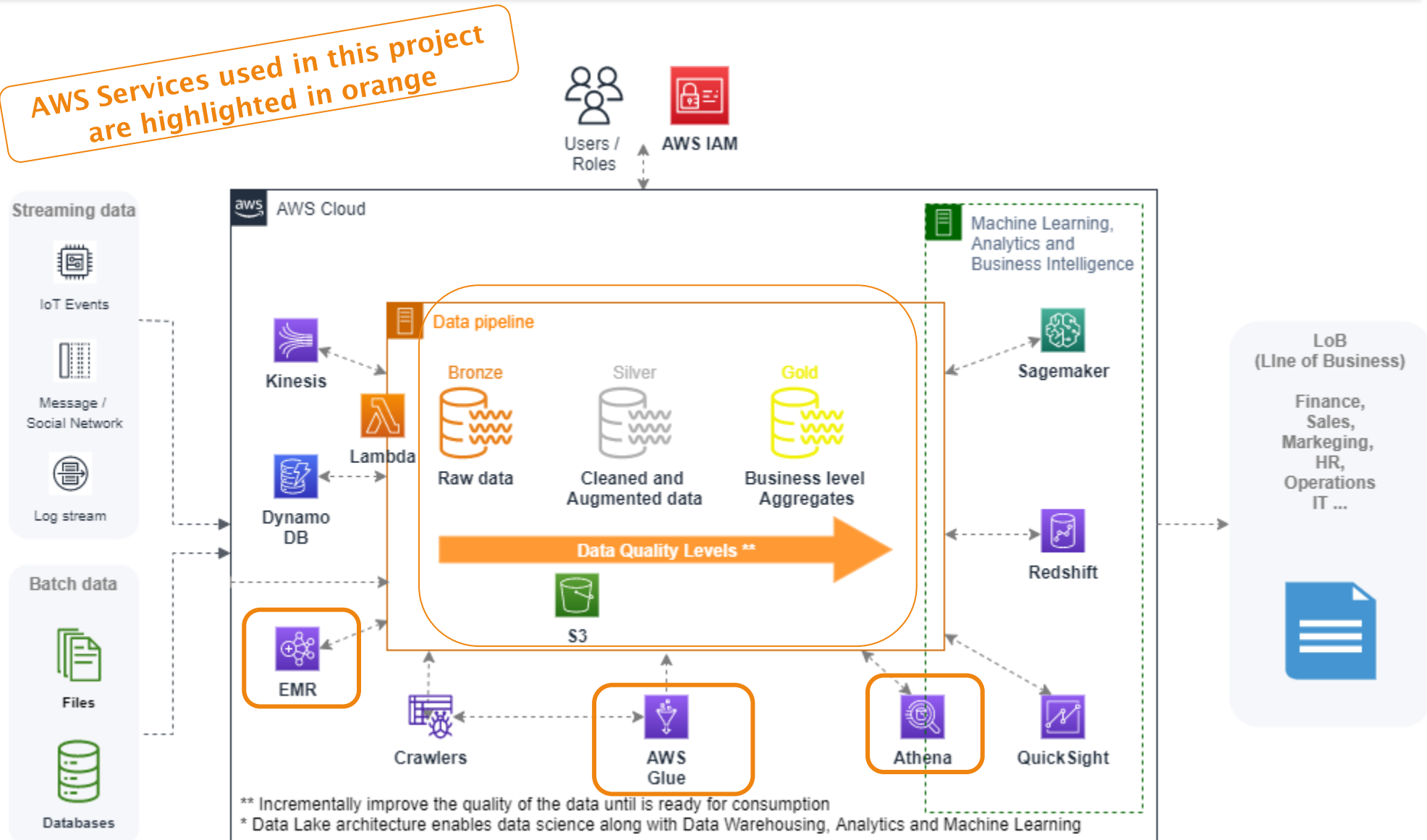
Let´s come back to CLV using FRM (Frequency, Recency, and Monetary Value) to present the solution

- CLV formula : $(monetary\_value / frequency) * (1 - ((recency\_dt + 1) / 365)) / (1 + discount\_rate = 0.1 = 10\%)$

Note: All code and documents are available under bin/, HTML viewer and doc/ directories

Project solution

Deliverables

- This project provides an end-to-end Python EMR Serverless execution script, various Python notebooks with EMR Cluster execution examples, an Athena Spark Job Notebook, and a sample dataset in the Parquet format (a standard dataset format used in big data) for testing and execution in the cloud or on-premise.

- One machine learning model used in this project involves building a cluster of customers using SAP Predictive Analytics Expert and integrating it with Spark. This allows for the application of advanced analytics techniques to customer data, which can then inform strategic decision-making and improve business outcomes. By leveraging the power of SAP Predictive Analytics Expert and Spark, organizations can gain valuable insights into customer behavior and preferences, which can help drive customer value and positively impact their business.

- All the code and documents with MIT license as defined in the root repository of this project are available in their respective directories bin/ and doc/. Additionally, the information is also available in HTML and PDF formats as some browsers may not support/navigate the notebooks correctly. However, note that the PDF and HTML formats have lower quality compared to the notebooks.

- Next slide shows the result with a quick report Customer value vs Monetary value using ML for clustering

Customer value

Customer value_clv vs Monetary value (FRM -frequency, recency, monetary value)

avg_monetary_value=1,662.65
avg_clv=544.45
percent_of_customers=10.23
cluster_number=2
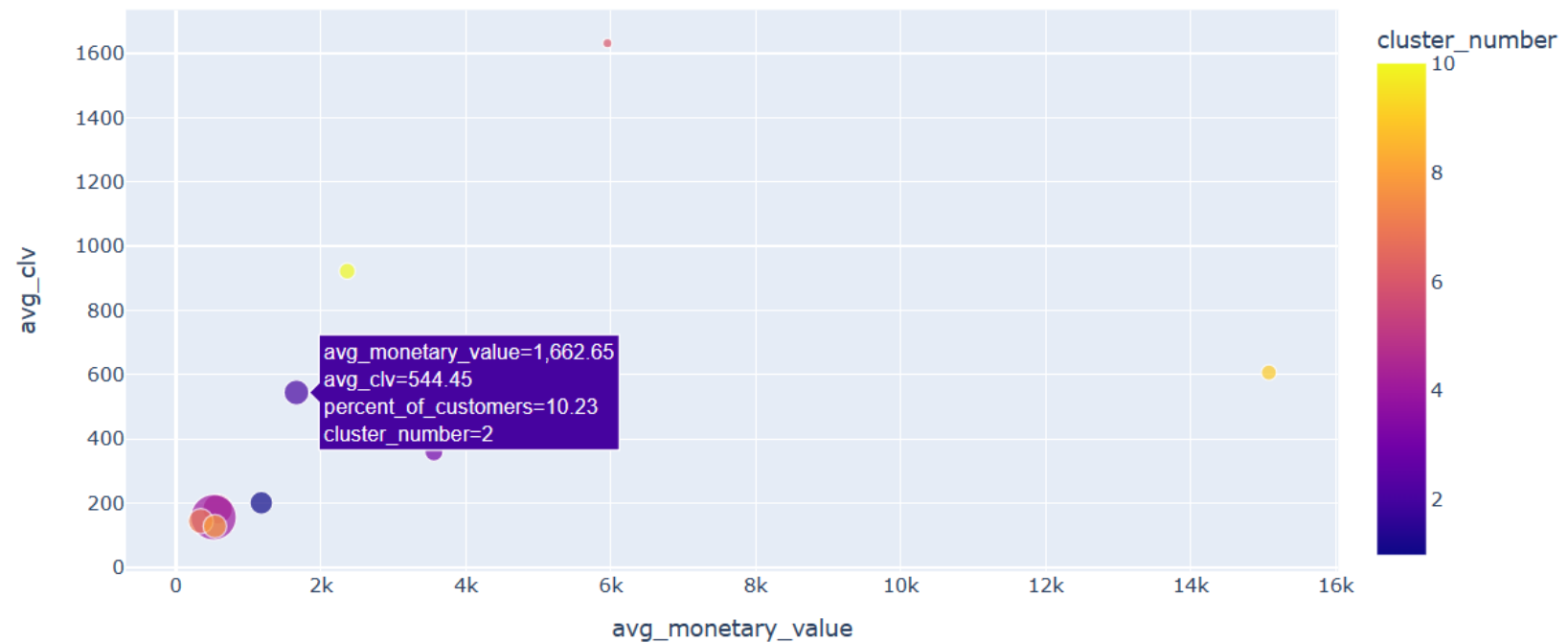
Model - *monetary_value_SAP_PAE_sdf_clv_recency_*

Predictive Power (KI) = 0.838
Prediction Confidence (KR) = 0.958

Note: All code and documents are available under bin/, HTML viewer and doc/ directories

Next steps

- The company can also improve its own customer value calculation formula (this is just a simple example).

- In the root directory of this project (and below) another example with one more complex solution to calculate Customer Lifetime Value (CLV) based on present value (PV), future value (FV), and customer lifetime, which is a more advanced approach to estimating CLV. Detailed information on how to implement this solution is also provided.

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Note that this is a simple example and there are many other factors that can affect CLV, such as customer acquisition cost, customer retention rate, and discount rates. This example should be considered as a starting point and further analysis may be required to accurately estimate CLV. **One more complex solution to calculate Customer Lifetime Value (CLV) based on present value (PV), future value (FV), and customer lifetime is a more advanced approach** to estimating CLV. The formula for this approach is as follows:

CLV = [(average revenue per customer * customer lifetime) - customer acquisition cost] / (1 + discount rate - retention rate)

Where:

- Average revenue per customer: the average amount of revenue generated by a customer per purchase
- Customer lifetime: the expected time that a customer will remain active and continue to make purchases
- Customer acquisition cost: the cost associated with acquiring a new customer
- Discount rate: the rate used to discount future cash flows to their present value
- Retention rate: the percentage of customers that continue to make purchases over a given time period

To calculate CLV using this formula, you will need to estimate the inputs for each variable based on your business and customer data.

- The entire solution presented can be integrated into the data warehousing and business intelligence environment, with reports and dashboards made available to specific business areas such as marketing and sales.

- In the DW/BI environment, additional information, such as customer segmentation, can provide further insights. In this case, new machine learning models will need to be created and integrated into the solution.

- This project example can become a recurring business flow, with monthly, quarterly, and even daily execution if integrated with a recommendation system, encompassing an integrated sales and customer support solution.

- **Taking it a step further**, a business plan can be defined with performance planning involving the marketing, sales, and finance departments, highlighting the improvements achieved and the financial value generated for the company using the powerful **Six Sigma methodology**. The standard methodology used to improve existing processes is called DMAIC, which stands for Define, Measure, Analyze, Improve, and Control. Finally, it is important to calculate the revenue impact after the **implementation of the end-to-end Enterprise Intelligence as presented in the executive summary.**