INDUSTRY
Retail / supermarket / grocery

BUSINESS NEED
A large supermarket chain needed advanced data tools to help their supply chain and inventory stock their stores with the right products at the right times.

SOLUTION
Pythian data experts built a replenishment pipeline (along with a contingency pipeline) in order to speed up data collection, ingestion and analysis, along with a machine learning model to help predict replenishment needs.

TECHNOLOGIES
Google Cloud, BigQuery, Pub/Sub, Cloud Functions, and Cloud Composer; Apache Airflow; Jupyter Notebooks, TensorFlow 2.0, TensorBoard, Cloud Build and Container Registry.

RESULT
The client transformed its supply replenishment process from one that took store managers five to six hours each every day to one requiring just 15 minutes, with the expectation that the machine learning model will improve efficiency even further as it ingests and learns from the data.

PYTHIAN SOLVES INVENTORY OPTIMIZATION AND SUPPLY CHAIN ISSUES FOR A MAJOR SUPERMARKET CHAIN

BUSINESS NEED

Keeping well-stocked shelves is more difficult than you might think for large grocery chains, which typically retail thousands of different items–not to mention having to deal with suppliers and manage retail locations spread across large geographic areas. To keep inventories up-to-date in such a fast-moving business requires careful planning and, maybe most important, the right data processes. For one major supermarket chain, achieving the proper requisitioning of supplies for next-day or future sales took each retail store manager upwards of five to six hours per day of inventory-taking and manual form-filling–not ideal for optimal productivity. The company badly needed a set of efficient data tools to not only stock stores with the right products at the right times, but also an automated system that could accurately predict future sales and replenishment needs based on location, time of year, and other crucial factors.

SOLUTION

Rather than investing in an intricate, expensive and needlessly complex demand forecasting product that would provide far more than was needed (or would ever be used), the client turned to the data experts at Pythian for a more tailored approach. After assessing the company's sales and replenishment needs and carefully considering approaches, Pythian tackled the problem from two angles:

- **First, Pythian created the infrastructure necessary to complete a semi-automated, data-consistent set of predictive model testing against the client's real, historical data.** This involved building a data replenishment pipeline running on Google Cloud (GC) AI Platform and orchestrated by Cloud Composer service along with Apache Airflow and custom Python scripts. The pipeline allowed the client to instantly see what was sold the previous day across all stores, so they could then analyze and trend that data over time to determine how much of a certain product is historically sold at certain times of year–and stock shelves accordingly.

- **Pythian also built a contingency pipeline** running on AI Platform and Cloud Composer. This runs alongside the replenishment pipeline to provide a failsafe for when real-time data from stores isn't submitted on time–allowing the client to refer to historically accurate data to predict replenishment.
- **Second, Pythian put its data scientists to work building a machine learning model** in TensorFlow, one that could ingest all that data and learn from it to more accurately predict sales and replenishment needs (as opposed to having head office simply manually viewing it for historical trends).
- Pythian then worked collaboratively with the client team to **evaluate four predictive models** against the company's historical data to see which model was the best fit for the company's predictive needs.
- The Pythian team **implemented the chosen model** to run daily predictions against the client's sales data. The model continually adjusts itself to reflect real inventory needs. The outputs of the predictive model support the client's analytics team, enabling them to deliver reports to Supply Chain stakeholders (including store managers) through the company's ERP system.

RESULT

As a result of Pythian's machine learning training and prediction pipelines, the client was able to transform an aggravating and time-consuming supply replenishment process–one that took store managers five to six hours each, every day–and condense it to a 15-minute task. And although the machine learning model put in place hasn't been online long enough to achieve quantifiable benefits, the time saving alone is benefitting individual store managers. The client's goal is to keep high service levels by eliminating out-of-stock occurrences and to minimize operational and stock costs. This will make inventory replenishment more accurate and efficient, enabling store managers to focus on providing value-added services to their customers.

Google-certified Pythian experts used BigQuery as the fully-managed cloud data warehouse, TensorFlow 2.0 for Python-based machine learning model development and TensorBoard for assessing training and testing performance.

ABOUT PYTHIAN

Founded in 1997, Pythian is a global IT services company that helps organizations transform how they compete and win by helping them turn data into valuable insights, predictions and products. From cloud automation to machine learning, Pythian designs, implements and supports customized solutions to the toughest data challenges.

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