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Part of Tietoevry Create

DARNYTSIA

Achieving over 95% Accuracy in 18-month Sales Forecasts for Darnytsia_

Multi-Category Sales Prediction for a Pharma Giant

Industry: **Pharmaceuticals** **Location:** **Ukraine** **Employees:** **1,000+**

Client Background

Website:
https: www.darnytsia.ua

"Darnytsia" is the largest Ukraine-based pharmaceutical company with a rich history spanning over 90 years. Renowned for its leading position in the domestic market, the company consistently demonstrates excellence in production volume and industry rankings. Darnytsia is also recognized for its successful digital transformation and innovations in the pharmaceutical field.

Executive Summary_

Goals

Our client aimed to improve business productivity and resource planning with accurate multidimensional sales predictions for an 18-month period.

Solution

Implemented an ML-based sales forecasting solution with 95% or higher accuracy across four dimensions ('Total Market', 'Drug Categories', 'Top 10 Drug Producers', and 'Competitive Drug Groups').

Benefits

Optimized resource planning, drug supply & logistics, reduced operational costs, faster decision-making, enhanced customer service, higher competitiveness, and stronger position on the market.

Services delivered

Innovation Services, Intelligent Business, AI/ML services, Predictive Analytics, BI & Data Analytics, and Advanced Analytics.

Business Challenge_

After a successfully delivered data analytics bot project and other solutions and services, Infopulse was contacted by Darnytsia to develop **a sales forecasting solution** to generate accurate sales predictions. The project involved a range of severe challenges:

- **Highly volatile market:** Darnytsia operates on the Ukrainian market, which is extremely volatile due to war against russia, economic instability, and unpredictable population migrations from region to region or abroad.
- **Pharmaceutical business specificity:** In a very short timeframe, we had to understand the business specifics to select suitable data models and consider all the factors that affect drug sales.
- **Short Deadline:** The solution had to be delivered in less than a week, as the company wanted to present it to the board of directors.

Infopulse decided to take these risks and implement the requested solution.

Solution & Business Value_

Solution

Infopulse team developed **a sales forecasting solution that generates sales predictions for an 18-month period** with an error margin of less than 5%.

The business gains brought to Darnytsia include:

- **Better sales planning:** 95% or higher accuracy in sales helps minimize stockout risks.
- **Better production and supply planning:** understanding the required product volumes for sales helps adequately adjust the production and resources.
- **Enhanced cost-efficiency** of operations and logistics.
- **Enhanced level of service:** significantly lower risks of underproduction or stockout.
- **Faster time-to-insights** for efficient decision-making for proactive business strategy development.

Client Quote

“Initially, we just wanted to test the idea of automating our sales forecasting using AI. We clearly understood that the Ukrainian market is almost impossible to predict. However, this pilot project surpassed all our expectations. The Infopulse team managed to deliver the solution that produces predictions with a maximum of 5% of total error. This is an incredible outcome of our collaboration and a result of Infopulse’s in-depth understanding of the market, our industry specifics, and our company operations”.

- Serhii Kolchyk,
Head of Analytics & Digital Innovation,
Darnytsia Pharmaceutical Company

Technical Details

The project had an extremely tight deadline – only a couple of days for the initial scope of the project. We started with processing data received from Darnytsia to merge available drug tables and sales data for the modeling process.

In parallel, we were doing research to select models and solutions that effectively work with sales predictions. Two potential methods were selected for modeling:

- **Temporal Fusion Transformer (TFT)** — a very sophisticated Deep Learning model for time series forecasting. It works pretty well with big and complex time series for different categories.
- **Prophet model** — a forecasting model for time series data implemented in R and Python. It is one of the open-source tools by Facebook widely used by businesses to predict the market, based on more low-level methods (autocorrelations, classic time series forecasting theory) compared to TFT. Nevertheless, it is powerful enough to produce accurate market predictions in certain cases.

We needed to correctly put the data into the chosen models, obtain the forecast, and evaluate the accuracy. Thus, we cut the last 12 months of the available history data and treated them as an evaluation period.

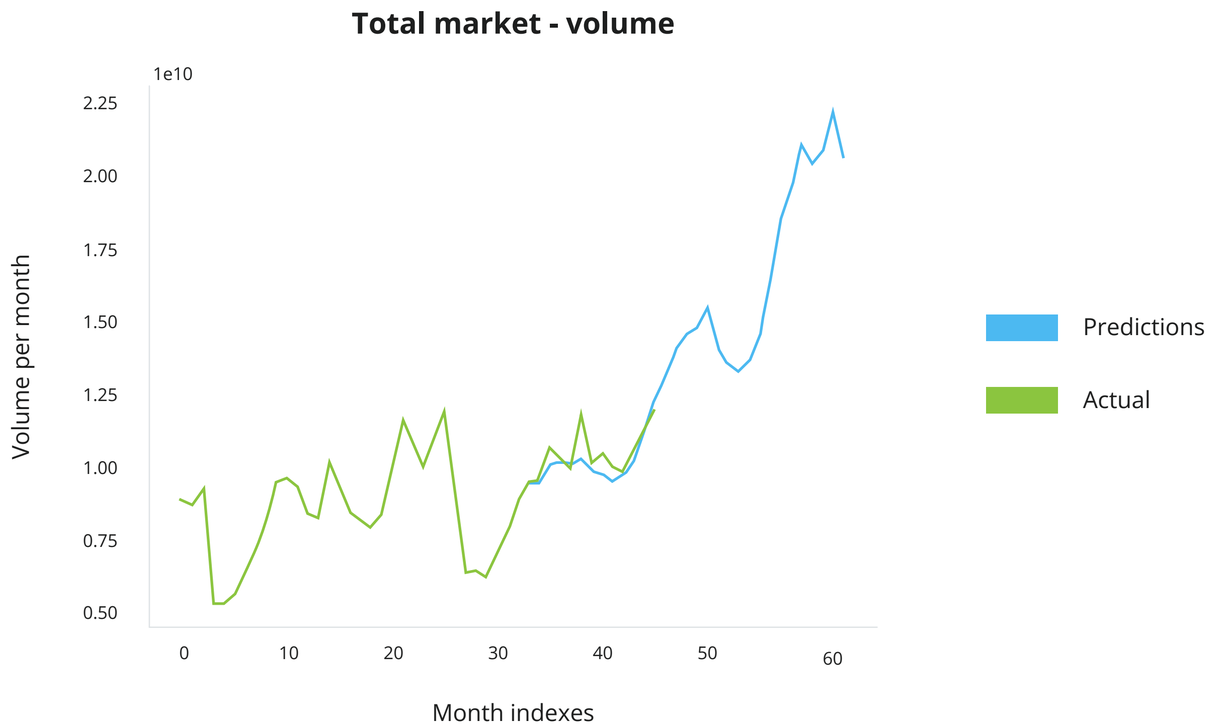
Next, we worked on improving the models. After testing numerous approaches, we selected **three improvements that helped maximize the accuracy** of sales predictions:

- **Hierarchical forecasting:** We predict the behavior of the high-level drug group by forecasting low-level subcategories and summarizing the results into a high-level group prediction.
- **Switching from absolute mode to relative:** On an absolute scale, we just had the volume of drugs sold in a particular month. On a relative scale, we switched to comparing the difference to the previous month. We got the base level of sales and then applied the growth rate month by month. By applying relative valuations, we managed to address migrations and other seasonal changes typical for the target market.
- **Switching from the average volume per month to an average volume per day for each month:** As each month has a different number of days, predicting the average daily volume gave an additional decrease in total error for the forecast.

We also implemented specific holiday indicators in time series to indicate events and special months the model needs to treat differently.

By implementing these improvements, we finally got the results of less than 5% total error for 18-month predictions.

Total Market Prediction Results by Prophet



Upon testing both models, the Prophet model was selected as more suitable considering the deadline. In addition, Prophet showed slightly better accuracy (4-5% total errors compared to 6-7% total errors in TFT) yet TFT was significantly more complex in handling and adjustment. The time series didn't require such complexity of processing, and there was no reason to invest additional effort in using TFT.

As agreed, initially we created predictions for two of the four required dimensions — 'Total Market' and 'Top 10 Drug Producers'. Over the following week, we implemented 18-month predictions for 'Drug Categories' (15 categories in total) and 'Groups of Competitive Drugs'.

Technologies & Tools_

TFT model

Prophet model

Python

Azure ML Studio

Azure SQL

About Infopulse

Infopulse, part of the leading Nordic digital services company Tietoevry Create, is an international vendor of services in the areas of Intelligent Business, Smart Insights, Advanced Data Analytics, and AI-driven automation. Our services cover digital transformation and data-driven solutions for business management to reach operational excellence and drive growth with the aim of technology. Infopulse is trusted by many established brands, such as Darnytsia, Delta Medical, Healthcare Institution of North Iceland, Allianz Bank, Credit Agricole, ING Bank, OTP Bank, Santander, BICS, Bosch, LMT, Microsoft, Metinvest, Offshore Norge, Delta Wilmar, OLX, SAP, UkrSibbank BNP Paribas Group, VEON, Vodafone, Zeppelin, and others.

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