Cognizant

Case Study: Life Sciences

Machine learning insights improve patient journey

Machine learning with natural language processing helps a biotechnology company better serve the patients who use its products.

For a biotechnology giant, patient support is at the center of its business. Now, natural language processing (NLP) is enabling the company to expand that support in ways it hopes will lead to better patient outcomes.

The challenge

A biotech company's patient services division focuses on how to assist individuals in the complex process of gaining access to their medicine. The division managers document their interactions with payers, patients and providers, and take extensive notes.

Except anecdotally, however, the notes have not been mined for insight. The billion-dollar company needed a way to sift through the notes' free-text format to isolate trends and patterns, and learn more about how to improve customer care and patient outcomes.

At a glance

To improve the patient journey, a global biotechnology company sought to analyze the free-text notes taken by its patient services division. By applying machine learning to natural language processing, we helped our client gain insight into what motivates patients to start, discontinue and switch their use of medications.

Outcomes

- Uncovered 30 meaningful insights and 9 recommendations
- Partnered with stakeholders to create taxonomies and ontologies
- Employed predictive modeling to identify patient types, the brands patients were more sensitive to and factors such as co-pay assistance

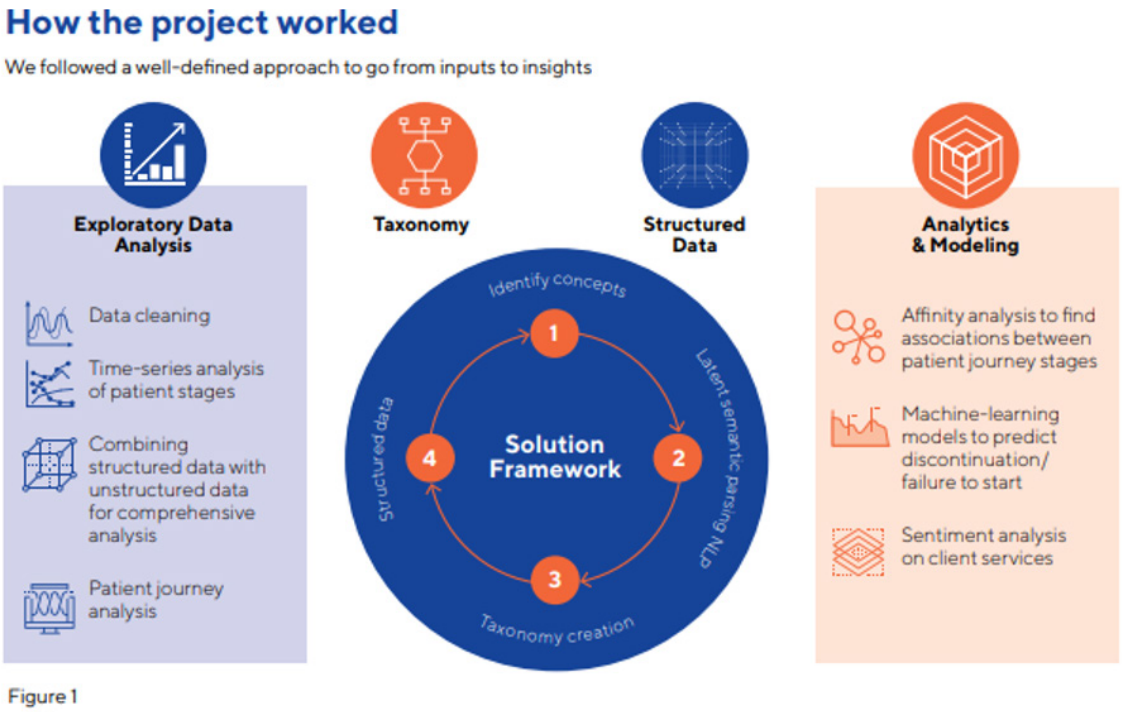

Figure 1

Getting to the heart of patient conversations

The company also wanted to extract meaning from everyday language and words by analyzing the data located in the call notes. This data could answer key questions for the company, such as how do patient experiences differ by group and subgroup, and which factors influence patients to continue treatment.

The approach

During a five-month partnership, Cognizant applied machine learning and NLP to years of call notes the company had collected. Using sentiment analysis and predictive modeling, we helped the company gain a better understanding of the factors that influence patients to start and continue therapy. The project also generated key insights into its customer-service processes and led to new KPIs, workflow improvements and coaching opportunities for improved patient engagement.

Breaking new ground

The NLP project covered important new ground. For instance, while the project's upside was significant, it was also uncertain: There were no guarantees what patterns might be found in the unstructured data. It was also the first time the company collaborated across the organization on a project.

By gaining support from internal stakeholders, including legal and privacy departments, the company ensured the project RFP addressed all concerns. This preparation helped build support for and embed integrity in the project.

The detailed RFP sought predictive modeling of unstructured and structured data, and technology improvements such as cloud enhancements.

After reviewing the written RFP submissions, the company invited several respondents to make presentations.

A journey of collaboration

To establish a solid foundation, our team spent two months working closely with the company's stakeholders, developing hypotheses and performing data validation.

In a series of workshops, we collaborated with our client to better understand products and disease states by identifying the word phrases that occured most frequently in the free-text notes. Using that information, we built the custom taxonomies and ontologies required to inform the NLP engine. We then identified two dozen data hypotheses to explore.

Protection of patients' privacy was key. The company stripped all personally identifiable information—names and other detail—from the data it shared with us for data mining.

To perform the data mining, our team used open-source languages R and Python, the go-to toolsets for data scientists, and IBM SPSS business modeling software. With R and Python, the team converted the ontology into a format that enables NLP to probe call notes and classify conversations by topics such as billing, side effects and locating nearby physicians.

Over the next three months, we continued a close collaboration, advancing the project with monthly steering committee meetings and regular check-ins to match milestones. When the project wrapped up, we delivered 138 pages of analytical insights, including nine key recommendations.

Business outcomes

We communicated the project findings to client stakeholders and senior leadership—a step that was as important as the insights delivered. Our team created a 40-page narrative that clarified the complex techniques used to make them more understandable and actionable. The pilot results have helped the company double down on its mission to improve patient outcomes, and there is greater insight into the patient journey and the information needed to grow the business.

Important business outcomes and patient benefits include:

- **Improved patient support.** Predictive modeling identified patient types, the brands patients are more sensitive to and factors such as co-pay assistance.
- **Correlation of more complete notes with higher shipments.** Patient notes that documented actions, reactions and follow-up correlated with more frequent shipments of product—a finding that reinforces the importance of establishing close connections with patients as a motivator for continuing therapy.
- **Development of new KPIs.** The project highlights how customer experience is affected by the time spent at each point in the patient journey, such as initiation of therapy and confirmation of co-pay assistance. It identifies tipping points in the patient journey that could lead patients to discontinue therapy.

Looking ahead

Connecting the NLP pilot to the overall strategic goals helped ensure the project's overall success. The company is now implementing the project recommendations throughout the organization and showcasing the value of new techniques to enhance patient engagement.

Next steps include developing more complete documentation of patient interaction and coaching managers in capturing more thorough notes. The company also hopes to explore how NLP might benefit other functions, such as sales and marketing. Together, the partnership demonstrated how using NLP at scale and speed can support more complete interpretation of patient sentiment and greater correlation with patient satisfaction.

About Cognizant

Cognizant (Nasdaq-100: CTSH) is one of the world's leading professional services companies, transforming clients' business, operating and technology models for the digital era. Our unique industry-based, consultative approach helps clients envision, build and run more innovative and efficient businesses. Headquartered in the U.S., Cognizant is ranked 185 on the Fortune 500 and is consistently listed among the most admired companies in the world. Learn how Cognizant helps clients lead with digital at www.cognizant.com or follow us @Cognizant.

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