

THE POWER OF AI — DELL TECHNOLOGIES PERSPECTIVE SERIES

Leveraging Natural Language Processing in the Enterprise

From chatbots to document analysis programs, enterprises are driving more efficient processes with natural language processing applications driven by high performance computing systems.

ABSTRACT

With natural language processing technologies, organizations can build automated artificial intelligence systems that interact with customers, employees and partners in natural ways, using spoken or written language. Forward-looking businesses are seizing the opportunity, incorporating NLP into a wide range of their processes, for both customer-facing and internal operations.

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NLP IS EVERYWHERE

While the term “natural language processing” may be unknown to most people outside of the tech world, virtually everyone benefits from the concept on a daily basis, even a minute-by-minute basis. When we use digital voice assistants like Amazon’s Alexa, Apple’s Siri, Google’s Assistant or Microsoft’s Cortana, we are interacting with an application that uses natural language processing, or NLP. The same holds true when we call a business or a technical support desk and speak to an automated voice system to ask a question or to request assistance. That’s NLP at work. Today, NLP is everywhere, enriching our lives in countless ways.

So, what is NLP? In a few words, natural language processing is a form of artificial intelligence that allows a computer application to understand human language, either spoken or written. The concept of NLP encompasses coding, understanding, interpreting and manipulating human language. NLP applications use computers to translate languages, convert voice to text and text to voice and, among many use cases, create human-like conversational agents to help customers, employees and others deal with issues, questions and concerns.

In recent years, the field of NLP has been transformed by the increased speed and accuracy that is possible with today’s hardware and the shift from statistical machine learning methods to the use of neural networks and deep learning. With these new approaches, it is now possible to build automated systems that can interact with people more naturally than ever before. And businesses are seizing the opportunity, incorporating NLP into a wide range of their processes, for both customer-facing and internal operations.

VIRTUALLY UNLIMITED USE CASES

The use cases for natural language processing in the enterprise are virtually unlimited, from automating customer service and help desk functions to analyzing and translating spoken or written language. Let’s look at a few examples of the ways in which organizations are putting NLP to work to streamline processes, improve customer service, enhance patient care and gain other business benefits.

RETAIL

In the retail world, AI-driven chatbots that leverage NLP are now just about everywhere — and they are multiplying rapidly. A recent study by Juniper Research found that the global number of successful retail chatbot interactions will reach 22 billion by 2023, up from an estimated 2.6 billion in 2019.¹

For retailers, chatbots are now one of the keys to automating and streamlining customer interactions. They help shoppers get the information and answers they need quickly and efficiently. As Juniper Research notes, chatbots help retailers deliver high-quality user experiences in a low-resource way, boosting customer retention and satisfaction while reducing operating costs.

HEALTHCARE

For healthcare providers, NLP systems can be one of the keys to automating burdensome manual processes, including the transcription of spoken or written notes from clinical staff members. NLP can also be used for “text mining,” or searching through documents to quickly find information related to patients and their care, the content of clinical studies and more.

¹ Juniper Research, “[Chatbot Interactions in Retail To Reach 22 Billion By 2023, As AI Offers Compelling New Engagement Solutions](#),” May 8, 2019.

As Gartner notes, NLP technology can turn text or audio speech into encoded, structured information that “may be used simply to classify a document, as in ‘this report describes a laparoscopic cholecystectomy,’ or it may be used to identify findings, procedures, medications, allergies and participants.”²

An Accenture report points out that AI-based technologies leveraging NLP, such as voice-to-text transcription, can improve administrative workflows for nurses and other clinical staff and eliminate time-consuming non-patient care activities, such as writing chart notes, filling prescriptions and ordering tests. Accenture estimates that these applications could save the industry \$18 billion annually.³

In another potential use case, NLP could help accelerate the process of reviewing the enormous amounts of information generated by drug studies. In the conventional approach, doctors read through the studies and examine data points to look for correlations with findings from other studies. A trained AI application with NLP capabilities could greatly accelerate this manually intensive and very expensive process by searching through documents to identify key content and correlations between different data points.

BANKING

Chatbots are making widespread inroads into the banking and financial services industry. A study from Juniper Research found that the operational cost savings from using chatbots in banking will reach \$7.3 billion globally by 2023, up from an estimated \$209 million in 2019. This represents time saved for banks in 2023 of 862 million hours, equivalent to nearly half a million working years, the firm says.⁴

“Chatbots in banking allow heavily automated customer service, in a highly scalable way,” notes a Juniper Research author. “This type of deployment can be crucial in digital transformation, allowing established banks to better compete with challenger banks.”

The same NLP-driven technologies can be used to streamline and accelerate internal banking processes. For example, Lloyds Bank in the UK created a chatbot to help staff easily navigate the organization’s vast knowledge base.⁵

UNIVERSAL USE CASE EXAMPLES

TECHNICAL SUPPORT

The typical technical-support help desk fields many questions and requests from users that could be addressed with NLP systems. In some cases, an NLP application might be able to address a caller’s problem in its entirety. In others, it might simply gather the information it needs to direct the caller to the right technical support personnel. In still others, an NLP application might gather key information for agents to streamline and accelerate the support process.

As a report by the consulting firm Accenture notes, “NLP enables improved understanding of user queries and enterprise content. This ensures that every user is connected to the most relevant, helpful resources which would otherwise remain hidden within vast quantities of data.”⁶

In one such use case, technical support agents at Dell leverage a Digital Resolution tool that gives them recommendations for the best troubleshooting steps to suggest to customers who call in to report issues with Dell products. This easy-to-use tool helps agents diagnose problems quickly and accurately without having to navigate through a lot of information. Dell has more than 3,000 technical support agents using the tool, servicing

2 Gartner, “[IT Glossary: Natural Language Processing](#),” accessed August 24, 2019.

3 Accenture, “[Emerging federal use cases](#),” May 1, 2019.

4 Juniper Research, “[Bank Cost Savings Via Chatbots To Reach \\$7.3 Billion By 2023. As Automated Customer Experience Evolves](#),” February 20, 2019.

5 Dell Technologies, “[To Bot or Not? The Rise of AI Chatbots in Business](#),” September 19, 2017.

6 Accenture, “[Top Natural Language Processing Applications in Business](#),” 2019.

more than 10,000 customers per day. The use of this tool has led to an approximately 10 percent reduction in call times, which allows agents to field more calls.

GLOBAL CUSTOMER SERVICE

For a global enterprise, or even a small company with aspirations to offer its products globally, it wouldn't be practical or cost-effective to create chatbots in dozens of languages. The development and maintenance of all those distinct chatbots would require heavy financial investments and the resources of dedicated teams around the world. In a blog exploring different approaches to NLP applications, Dell Technologies data scientist Lucas Wilson, Ph.D., talks about a better way forward — using NLP to create a fully automated global support call center.

With today's new and emerging technologies, organizations have the opportunity to create and maintain a single chatbot in a single language and add AI-driven translation capabilities at the edge, Wilson explains. In this new world, when a customer calls the support desk with a query, he or she can ask a question in any supported language. On the backend, the automated support system translates the customer's words and formulates a response. The system then translates the response back into the customer's language and uses text-to-voice capabilities to reply to the customer.

"The benefits here are obvious," Wilson writes. "With this level of automation in place, a global support center could handle far more requests than would be possible with today's systems, and a company could automate more support functions without building and maintaining chatbots in multiple languages. And instead of having armies of customer support agents all over the world, a company could maintain a single global support center with armies of servers around the world."⁷

DOCUMENT ANALYSIS

Organizations of all sizes are drowning in a sea of documents. From text files and email messages to scanned paper documents, PDF files and digital images, these documents have business information that needs to be searched, classified and analyzed. Today, organizations are using NLP and machine learning approaches to gain control over — and insights into — the information in these documents.

An Accenture report refers to this need as "intelligent document analysis." The report notes: "Intelligent document analysis uses AI techniques including NLP, entity extraction, semantic understanding, and machine learning to analyze content, extract meaning, and reliably aid process automation and decision making. These applications can identify specific items of information in documents — like date, order number and policy number — so they can be categorized and analyzed."⁸

THE ENGINES AND TOOLS THAT MAKE IT ALL HAPPEN

While some NLP applications can require massive amounts of processing power from HPC systems, it doesn't take a supercomputer to develop or run them. Many off-the-shelf HPC solutions are now available for training and running NLP applications.

For example, [Validated Designs for AI](#) deliver pre-validated solutions and architectures for the development of AI-driven applications, including NLP systems, providing an optimized solution stack that simplifies the entire workflow, including all the hardware, software and services needed to help organizations get AI solutions up and running quickly.

7 Lucas Wilson, Dell Technologies, "[Natural Language Processing Could Be Key to Your Company's Digital Transformation](#)," June 5, 2019.

8 Accenture, "[Top Natural Language Processing Applications in Business](#)," 2019.

9 *VentureBeat*, "[Facebook Messenger hits 100,000 bots](#)," April 18, 2017.

10 Mordor Intelligence, "Natural Language Processing (NLP) Market — Growth, Trends, COVID-19 Impact, and Forecasts (2021 - 2026)," accessed October 18, 2021.



The rapid rise of NLP

- Within a year of opening its Messenger platform to conversational agents, Facebook had more than 100,000 different chatbots deployed on the platform.⁹
- Mordor Intelligence predicts that the global NLP market will grow at a compound annual growth rate of nearly 27 percent through 2026. The drivers for this growth include the increasing use of NLP in healthcare centers and call centers, rising demand for advanced text analytics, and growing machine-to-machine technology.¹⁰

The backend development technologies for NLP applications are also becoming more accessible. That's the case with the resources made available via the [Intel AI Lab](#). In 2018, the lab introduced an open-source library for NLP developers, called [NLP Architect](#). This resource, available through a [GitHub repository](#), allows users to explore state-of-the-art deep learning topologies and techniques for NLP and natural language understanding (NLU), a closely related application. The NLP Architect provides an ideal platform for research and collaboration.¹¹

Here's another tool. [Spark NLP](#) from healthcare AI company John Snow Labs, an Intel partner, provides state-of-the-art natural language understanding at scale in easy-to-use Python, Java and Scala libraries. Spark NLP leverages research from Intel's NLP Architect and uses [Intel® Math Kernel Library](#) (Intel® MKL) and [Intel® optimization for TensorFlow](#) to deliver unmatched performance from the latest Intel® Xeon® Scalable Processors.¹² In one example use case, Roche, the world's leading company for in-vitro diagnostics, uses Spark NLP for Healthcare to extract clinical facts from pathology and radiology reports.¹³

These are just a few examples of the many resources available to organizations that are building and running NLP applications. The engines and tools for these applications are now more accessible than ever before.

KEY TAKEAWAYS

Natural language processing is now around us, and it is helping organizations automate processes, improve customer service and reduce operational costs. And NLP systems are getting easier to build and deploy, thanks to pre-validated Dell EMC [Ready Solutions for AI](#) that are optimized for AI applications and to new development resources like the NLP Architect from the Intel AI Lab.

The bottom line: Natural language processing has come of age, and organizations now have what they need to develop and deploy NLP applications for a growing range of use cases.

TO LEARN MORE

- For a fuller look at NLP systems, see the article "[Natural Language Processing Could Be Key to Your Company's Digital Transformation](#)" by Dell Technologies data scientist Lucas Wilson, Ph.D.
- For an inside look at how Dell Technologies is using machine learning and NLP to streamline the technical support process, see the [blog by Dell Technologies data scientist Randi Ludwig](#).
- To explore new HPC solutions for powering AI-driven applications, visit [Dell Technologies AI Solutions](#).

¹¹ Intel, "[Introducing NLP Architect by Intel AI Lab](#)," May 23, 2018.

¹² Intel AI Builders, "[John Snow Labs](#)," accessed September 7, 2019.

¹³ John Snow Labs, "[NLP Case Studies](#)," accessed September 7, 2019.

To learn more, visit DellTechnologies.com/AI.