

Natural Language Processing (NLP) in Finance



Today's global economy runs on data. Companies who want to compete successfully need tools to capture, organize, and analyze information faster and more accurately than ever before.

In finance, where business-critical data doesn't always take the form of convenient numerical tables, a timely and efficient method for sifting through the mountains of unstructured text to extract and leverage insights is more important than ever.

Natural Language Processing (NLP), powered by machine learning, is one way companies are spinning the straw of unstructured textual data into the gold of actionable insights.

By understanding how today's leading companies are employing natural language processing in finance, organizations can develop and implement their own solutions.

The Importance of Natural Language Processing in Finance

While technologies such as robotic process automation and advanced analytics get plenty of attention and ink in discussions surrounding digital transformation, other data science technologies powered by artificial intelligence are of major importance in both the finance department of your business and the financial industry as a whole.

Natural Language Processing is one of the most important, as it helps professionals tackle the biggest challenge of dealing with Big Data: managing the sheer glut of information flowing into and through a business at any given moment.

In addition to spend data flowing from procurement, financial organizations must also receive and process research reports, transcripts from earnings calls and minutes from virtual meetings, stock market and financial industry intelligence, competitor data, and more.

Much of this data is unstructured, or not readily accessible in digital format. In fact, the International Data Corporation predicts that, by 2025, a full 80% (or more) of company data will be unstructured.

Both major financial institutions such as banks and investment firms, as well as financial professionals at other organizations, are drawn to NLP because it uses powerful machine learning algorithms designed for parsing and converting human language to a format computers can easily understand and use.

Parsing human language for context and meaning is an incredibly complex and difficult task for even advanced artificial intelligence solutions. Literal meanings aside, algorithms processing text or audio must also contend with idiom, homophones and homonyms, tone (including irony and sarcasm), dialect, and more.

Humans need years to master these intricacies, but NLP applications have the power to process unstructured data hundreds of thousands of times faster than humans, whether it's text or audio.

With help from human trainers, NLP techniques such as named entity recognition (NEM), and high volumes of exposure, accuracy rates improve over time because the algorithm uses deep learning and neural networks (interconnected machine learning algorithms that mimic the human brain) to enhance its knowledge base and performance with every iteration.

The “data firehose” of modern commerce is simply too much for humans to handle. NLP can accurately process text data and audio at volumes and rates far beyond human capabilities, improving its efficiency over time.

Key Benefits of Natural Language Processing

As their importance grows and their usage becomes more widespread, NLP solutions are providing immediate and demonstrable value to businesses in six key areas:

- The adage “time is money” has never been truer, and the sooner insights can be harvested from financial data, the more valuable they are in making informed decisions and strategic plans. NLP has speed that can’t be matched by even the most ambitious human staffer, and automation means unstructured data is captured and converted to a usable format in hours rather than days or weeks.
- The “data firehose” of modern commerce is simply too much for humans to handle. NLP can accurately process text data and audio at volumes and rates far beyond human capabilities, improving its efficiency over time. It can also, with help from chatbots, provide a better customer service experience for clients, or provide internal stakeholders with real-time, plain-language search capabilities that still consider all of those linguistic complexities when serving up answers or suggestions.
- As with robotic process automation, eliminating human error is as big a priority for NLP applications as improving speed and efficiency. NLP doesn’t need breaks, uses multiple contingencies to verify data accuracy, and incorporates corrections into future iterations to further reduce any errors.
- NLP uses machine learning to add context to the data it processes. This

metadata can enhance not only response accuracy in searches, but help users refine their data sets during analysis. For example, a user might ask to see all sections of an earnings call transcript where the participants were discussing sustainability, or request a specific section of a financial report mentioning supply chain impact of a particular sourcing decision.

- It might be the hobgoblin of small minds, but when it comes to data processing and management, consistency is king. NLP solutions follow strict protocols and contingencies to ensure steady and consistent performance, without the risk of different interpretations from different human readers or listeners.
- **Risk Management.** With pattern recognition and iterative analytics, NLP applications can help companies combat fraud, theft, and money laundering by identifying suspicious activity concealed in unstructured data.

How Companies Are Already Using NLP

Given its wide range of capabilities, it's not surprising that NLP already has several successful use cases in finance.

1. Financial Sentiment Analysis

Successful stock market investments require informed investors. And while quarterly financial statements provide a black-and-white glimpse of a company's performance, they don't provide a complete picture of a company's position within the marketplace.

NLP applications can analyze not only financial data, but social media streams, financial news, and reports from financial markets to harvest business intelligence.

They use an advanced form of *sentiment analysis*—i.e., analysis performed to determine whether information is positive or negative—known as *financial sentiment analysis*, which considers not only the inherent positivity of a piece of information, but how the information will affect the stock market and the price of specific stocks.

For example, a CEO being terminated is generally a negative event (producing

negative sentiment), but if their replacement has a track record for rebuilding troubled companies, the net effect might be positive for the company's stock price.

NLP also enhances a company's ability to generate value from factoring environmental, social, and governance (ESG) information into their investment decisions.

By incorporating these non-financial factors into their analysis, companies can better identify opportunities for growth and innovation or intercede to reduce risks created by ethical or environmental concerns.

Companies like Bloomberg and DataMinr are already providing financial sentiment analysis services to their clients, while those looking for an open-source machine learning model are turning to FinBERT on github to evaluate financial sentiment.

2. Risk Management

For financial institutions, risk is a part of nearly every business process. In assessing credit risk, the traditional solution relied on credit reports and ratings.

But with nearly half the world avoiding or unable to access financial services due to poverty, financial institutions need a more nuanced and useful way to assess credit risk so they can provide finance to those who request it while still protecting their own interests.

NLP applications can analyze a wide range of data contained within loan documents, as well as more esoteric information such as the emotional state of the borrower and lender during the loan process and signs of a persistent and entrepreneurial mindset within the language used in applications.

3. Capturing and Analyzing Audio Data

In addition to parsing text, natural language processing can, when paired with speech recognition technologies, capture data from quarterly earnings calls, customer feedback calls, seminars, webinars, and more.

Once captured, the data can be analyzed in a variety of dimensions to yield useful

insights that go beyond the financial data.

Metadata related to tone and context can provide additional insights on the ways in which a company's reputation, stock price, or competitive strength will be affected by the calls or events captured.

4. Internal Process Optimization

Ideally, artificial intelligence makes it easier for humans to apply the organic version to more complex tasks.

Natural language processing helps companies collect and manage the data their human employees need to perform higher-value, more strategic tasks.

Deloitte, for example, has incorporated NLP into its Audit Command Language to improve contract compliance. JP Morgan not only implemented NLP in their contract management, but built custom machine learning algorithms to create NLP applications that gauge financial sentiment and offer investment advice to customers accordingly.

In accounting and procurement, NLP can improve the ability of a centralized data management solution to collect and integrate data from a variety of sources.

This not only aids in standardization and collaboration, but provides a richer data set that yields higher-quality insights, improving financial planning, risk assessment and management, and strategic decision-making at the enterprise level.

In addition, incorporating NLP provides internal stakeholders with a more intuitive tool for searching and analyzing information they need to create reports, budgets, and forecasts.

And chatbots can further streamline the guided buying process, speeding processing to improve value and savings across the procure-to-pay lifecycle.

NLP Turns Unstructured Data into

Strategic Decisions

Like many other digital transformation technologies, natural language processing hasn't yet reached its full potential.

But given its ability to reduce risk, improve operational efficiency, and drive innovation with insights harvested from unstructured data, it's certainly off to a promising start.

Companies who invest in NLP solutions today are setting the stage for better data management, process optimization, and competitive performance in the years to come.

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