



# PRODUCT RECOMMENDATIONS USING NLP

## Abstract

Digitisation of the retail industry and e-commerce marketplaces have opened up a world of possibilities for modern businesses and allowed customers access to brands worldwide without geographical restrictions. With the vast amount of data generated with each interaction between customers and online retailers, brands cannot afford to ignore that treasure trove of insights and drive their strategies for profitable and sustainable competitive advantage. Natural Language Processing (NLP) is one of the techniques that has made it possible for brands to navigate petabytes of unstructured data, understand the customers' purchase behaviour, and make personalised smart product recommendations to boost their sales.



## Introduction

E-commerce and online retail have opened up a world of opportunities to businesses around the globe, allowing them to connect with a wider customer base via more cost and time-efficient channels. Customers are also delighted to have a wide variety of choices delivered at home via their devices. With the global e-commerce market reaching [USD 5.7 trillion](#) in 2022 and [20.8%](#) of all the sales coming from online purchases by 2023, having an omnichannel e-commerce presence is no longer a luxury but a necessity for modern businesses.

As e-commerce sales are rapidly growing, companies have gained increased access to data on customers' interactions with their brands, what drives their purchase behaviour, and how the brands can influence the customers' purchase decisions. For example, Walmart - the global retail giant - collects [2.5 petabytes](#) of data every hour from [1 million](#) customers worldwide. Although unstructured, this

data is a treasure of insights that can drive the company's strategic decisions.

One of the insights hidden in this data is the purchase history or preferences of the customers, which the brands can use to establish the customers' purchase behaviour and map their purchase journey. Once you have insights into your customers' individual purchase behaviour and preferences, you can make personalised product recommendations for every customer. In fact, product recommendations are a critical aspect of any retailer's e-commerce strategy. Smart recommendations help customers find relevant products, and a product recommendation at the right time can influence both planned and impulse purchases.

54% of online retailers have observed that product recommendations are the key driver of average order value. The shoppers that click on recommended products are 4.5x more likely to complete

the purchase. Even without the sale, product recommendations promote higher engagement rates, resulting in returning customers. As a result, [89%](#) of digital businesses are investing in tools that can allow them to personalise their product recommendations. Most customers are more likely to engage with the brands that recognise and remember them and offer relevant, personalised recommendations and offers.

But how can brands leverage the vast amounts of data they collect and get on with this trend of personalised product recommendations? Natural Language Processing (NLP) algorithms can help them analyse and understand large quantities of unstructured data and recommend products to each customer. Thereby helping boost sales and profits with personalised smart product recommendations.

## What is Natural Language Processing (NLP)

Natural language processing is an AI-based solution that helps computers understand, analyse, and take action on commands triggered by human language. It is a powerful machine-learning tool that helps computers understand human speech and written text. Over the past two years, NLP – and language-based AI – has redefined what technology can do and

disproved the notion that AI is only better at data-driven decision-making and human intervention is crucial for any cognitive or creative task. From simple analytical tasks – like document classification or sentiment analysis – to more complex tasks – like summarising reports or answering questions – language models in NLP are taking over many tasks previously dubbed

outside the realm of technology. The potential applications of NLP are endless, extending across diverse industry domains and applications. Language-based AI and NLP tools are here to stay and are rapidly finding their place in the day-to-day operations of different industries.

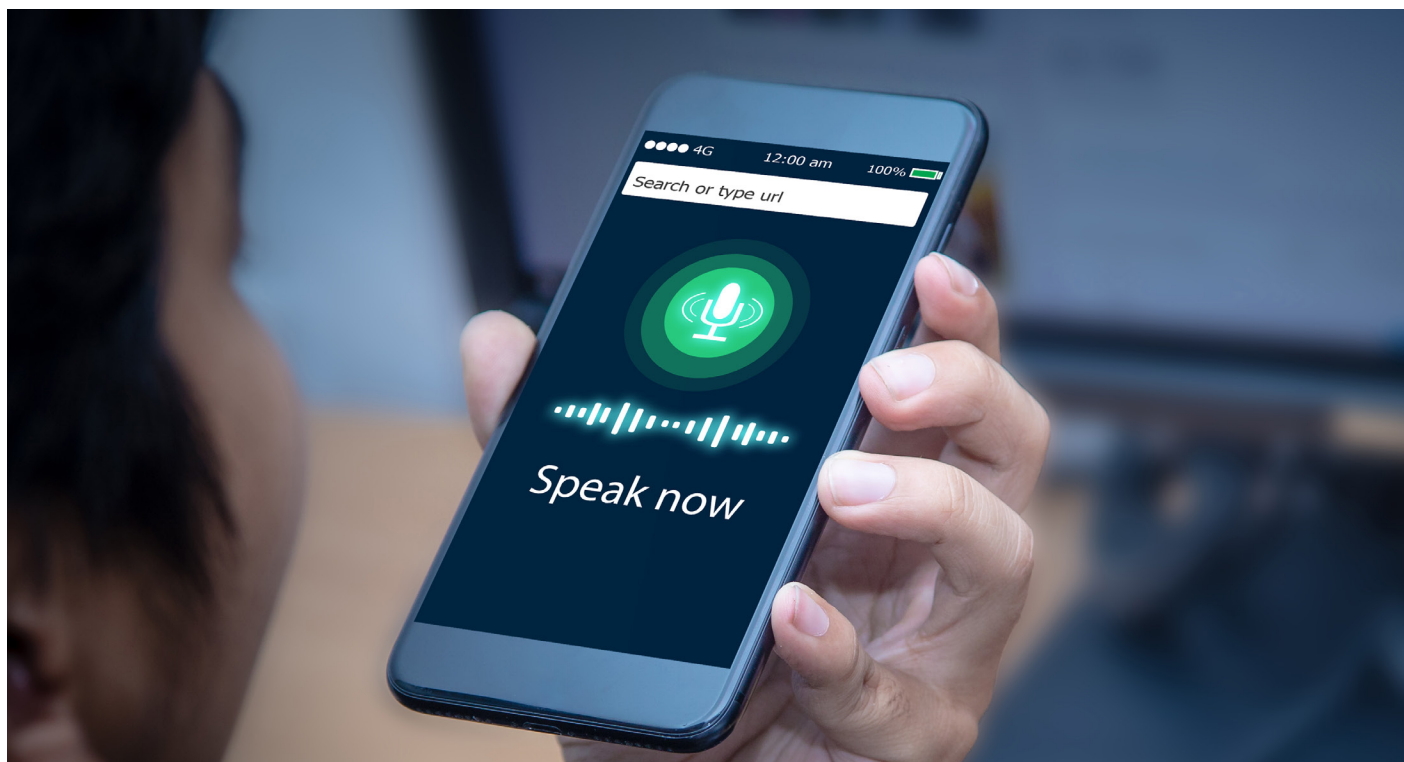
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## Elements of NLP

NLP, the driving force behind tools like virtual assistants, speech recognition, sentiment analysis, and machine translation, has two integral elements – syntax and semantics, that facilitate understanding the natural language. While syntax helps break up sentences and uses words and grammar rules to understand a text, semantics extracts the actual meaning. Syntactic analysis, or

syntax analysis, focuses on the analysis of natural language with formal grammar rules. It assigns a semantic structure to the text by applying grammatical rules to a group of words and does not focus on individual words. Semantic analysis, on the other hand, tries to mimic how we (humans) understand what someone has said based on our knowledge of language and instincts. It uses word categorisation

tools, word meaning databases, and context to understand the intent. That is how a computer understands human requirements. However, as we use many non-verbal cues, intuition, and past experiences to understand language, semantic analysis is one of the toughest aspects of NLP and is not yet foolproof.





## NLP in retail and e-commerce

In today's technology-driven world, integrating a human touch into the internet experience is a crucial element in developing an engaging customer experience. Integrating NLP into the online shopping experience is an attempt to provide a better and more humanised experience to customers. All shoppers expect search engines on e-commerce sites to understand exactly what they want and make the perfect recommendations. Naturally, the phrase, or even an idea, used to search for a product will differ vastly among shoppers. Hence, the search requires speed and scale, which is impossible for humans to tackle without help. A poor search engine and navigation can turn away shoppers very fast.

Every organisation, however, collects and stores copious amounts of data. It includes search phrases, feedback, suggestions, tracking details, product reviews, social media posts, emails, and more. This is a lot of unstructured data. And NLP can help identify what phrases and words users generally use to search for a particular product and help customise the search results. The NLP algorithms can transform a huge amount of data into machine language, augmenting human capabilities and giving organisations a competitive edge in terms of speed and quality. With applications for sentiment analysis and information discovery, voice recognition, and automated customer service centres (with self-serve options for basic tasks), retailers can add a human touch to the e-commerce shopping experience.



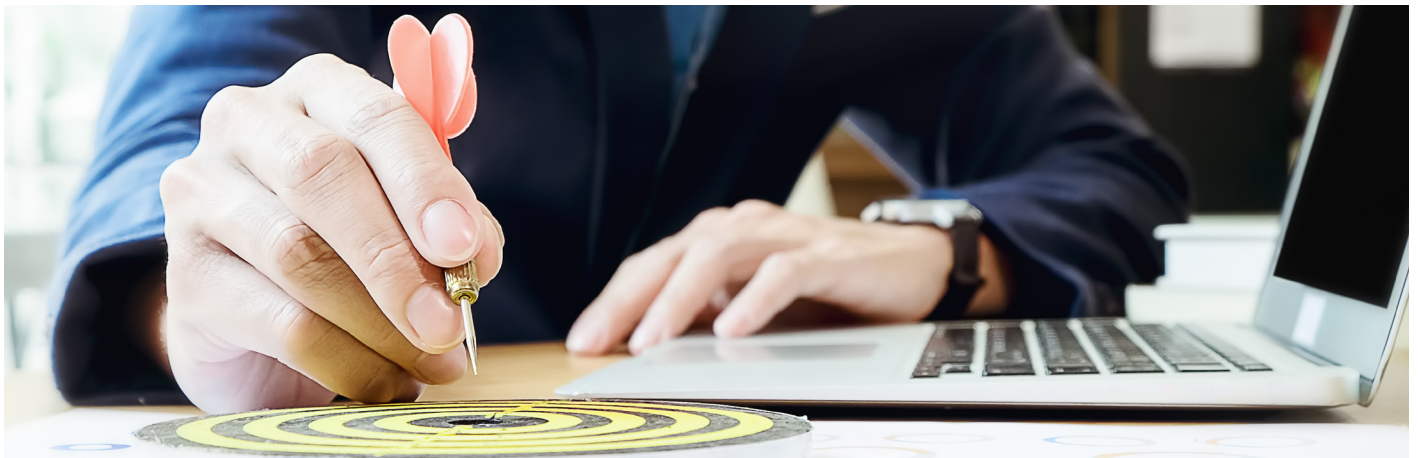
## Semantics-based search

One of the major applications of NLP in online retail, which also ties into understanding customer purchase behaviour and making personalised recommendations, is a semantic-based search. As opposed to the text-based search function, the semantic-based search focuses on interpreting the intent behind the search and recognising the “meaning” of the search query instead of searching solely for a matching string. As a result, customers can find the products they are

looking for based on the “meaning” of their search keywords instead of only getting results that exactly match their search string.

Compared to sites with text-based search bars, those with semantics-based search bars have much lower cart abandonment rates. It works because such a search is intuitive, and shoppers find relevant products even when using unique search phrases. Semantic-based search can quickly find products deep in the website’s

catalogue. This helps sense exactly what the customer wants, more or less like a sentient machine. This not only contributes to a more humanised experience for the customers but also allows the company to understand the individual customer’s purchase behaviour and journey better to improve the semantic-based search function and make more personalised suggestions.



## Smart product recommendations

Building on the semantic-based search functionality, NLP can also help online retailers provide personalised smart product recommendations that can keep customers engaged and interested. Suitable recommendations can keep customers interested long enough to make a purchase decision or stimulate an impulse purchase. A study shows that product recommendations account for [31%](#) of e-commerce revenue and can reduce cart abandonment by [4.35%](#).

But smart product recommendations cannot come solely from search keywords. Retailers have to leverage NLP algorithms to enrich product recommendations based on factors like search history, previous purchases, context and many

more. Recommendation strategies like the “Recommended for you” section based on individual purchase history or the “Frequently Bought Together” section to increase order value can promote impulse purchases.

Personalised email lists to segregate the target audience – based on products they have shown interest in, highlighting the popular items and rating-based recommendations are some of the strategies that allow online retailers to club similar shoppers together and give smart recommendations to different customer segments. Focusing on items in a customer’s wish list and suggesting accessories and upgrades to the products customers are buying - or have bought

in the past - are also great ways to not only engage with customers but create a personal connection with them via personalised product recommendations.

AI-powered techniques and NLP algorithms have made such personalised smart recommendations possible, which play a critical role in keeping customers interested and engaged with the brand. It’s no surprise that NLP is widely used by businesses to make product recommendations. In a fast-paced world, time-pressed shoppers want to purchase quickly. Businesses must get it right the first time or face the risk of losing customers.

## Conclusion

As online retail and e-commerce are revolutionising the retail industry, customers expect a human touch to their online shopping experience. With the huge amounts of data companies have on their customers, insights about customers' purchase behaviour and preferences are

at the fingertips of the brands. Natural language processing has made it possible for brands to make sense of petabytes of unstructured data and go beyond just text-based search and recommendation functions. Semantics-based search has allowed online retailers to look at

customers' search and purchase history, demographic, context and much more. Personal recommendations not only add a human touch to their purchase experience but also increase their order value and profits.

\* For organizations on the digital transformation journey, agility is key in responding to a rapidly changing technology and business landscape. Now more than ever, it is crucial to deliver and exceed on organizational expectations with a robust digital mindset backed by innovation. Enabling businesses to sense, learn, respond, and evolve like a living organism, will be imperative for business excellence going forward. A comprehensive, yet modular suite of services is doing exactly that. Equipping **organizations with intuitive decision-making** automatically at scale, actionable insights based on real-time solutions, anytime/anywhere experience, and in-depth data visibility across functions leading to hyper-productivity, [Live Enterprise](#) is building connected organizations that are innovating collaboratively for the future.

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