A NON-TECHNICAL GUIDE TO NATURAL LANGUAGE PROCESSING AND ITS APPLICATIONS

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ABSTRACT

In this ever-changing world, Artificial Intelligence (AI) is a constantly evolving field of Computer Science and Natural Language Processing (NLP) is a branch of AI which is extensively concerned with the ability of a computer to seamlessly understand human text and speech like a real human could. This could revolutionize the way we interact with computers and robots. This paper will explore some of the potential applications of NLP, including text summarization, sentiment analysis, chatbots, Question Answering Systems
, and virtual assistants. We will also discuss how the use of NLP can help elevate businesses to the next level.

INTRODUCTION

Computer scientists have long been on the quest of building a true AI machine, a human-like machine that thinks and behaves humanly. For that, the system must be able to process the information handed to it and communicate it in a manner understandable to us. This gave birth to many fields of research in computer science including cognitive computing and natural language processing. Cognitive computing is a field of study aimed at giving computers the ability to think while natural language processing works towards giving the computers the ability to speak. This paper is primarily focused on Natural Language Processing (NLP).
Natural Language Processing (NLP) is an interdisciplinary field combining computer science and linguistics that strives toward making computers understand human languages. Although computers do understand high-level programming languages, they tend to have small vocabularies and follow highly structured conventions and are quite different from human languages – natural languages.

Natural languages contain large, diverse vocabularies, words with several different meanings, speakers with different accents, and all sorts of interesting wordplay. People also make linguistic faux pas when writing and speaking, like slurring words together, leaving out key details so things are ambiguous, and mispronouncing things. But, for the most part, humans can roll right through these challenges. The skillful use of language is a major part of what makes us human.

And for this reason, the desire for computers to understand and speak our language has been around since they were first conceived.

HOW NLP WORKS

To have a simple understanding of how the NLP works without getting into the gory technical details, we can picture it as a black box whose gears are turned by machine learning models. [Machine Learning models are computer models that are trained on large amounts of existing data for it to discover patterns in data, which comes in handy with performing tasks like classification on new unknown data.]

Any language has about nine fundamental parts of speech.: nouns, pronouns, articles,

verbs, adjectives, adverbs, prepositions, conjunctions, and interjections. Different permutations and combinations of these makeup all the different statements of a given language each of which conveys a different message. By training machine learning models like Recurrent Neural Networks (particularly used in this field), the model learns the patterns between the parts of speech. This forms the knowledge base for the system.

When a new sentence is handed to the NLP system the system breaks it into bite-sized chunks called tokens identifies the parts of speech and uses its knowledge to uncover the meaning of the sentence

APPLICATIONS OF NLP

After understanding what NLP is and how it works it is important to know, where and how it is used.

NLP has numerous applications that are put to use in different sectors of society like business, manufacturing, healthcare, and even defense. We have listed some of the applications below.

Text Summarization

Text summarization is the process of extracting the most important and relevant information from a piece of text. Text summarization is a very important aspect of NLP because it allows computers to extract and summarize important information from a large block of text. Since computers store information in digital form, they do not easily understand language. This is why summarization is important in NLP. Computers have a hard time skimming a text and extracting the important information because they do not understand the language as we do. And this is where NLP comes into play. Consider a situation where you have a large block of text. You want to extract the most important information from this text so that you can skim through the summary quickly. In such situations, you will be grateful for NLP because it will make computers capable of the same thing you do. In fact, summarization has many different applications. You can use it to read a newspaper article and get the gist of it. You can also use it to make a synopsis of a novel or a movie, or use it to search for information.

Sentiment Analysis

Sentiment analysis is a type of sentiment analysis, which is the process of analyzing people's opinions and sentiments about a particular product or service. This analysis is usually done by looking at reviews, comments, social media posts, etc. It is a way of measuring people's attitudes towards a brand, product, service, or topic. For instance, if there was a new product that was being launched in the market, a sentiment analysis would tell you how people felt about that product. Did they like it? Were there any negative comments about it? The reason sentiment analysis is an important part of NLP is because it allows computers to understand people's opinions and feelings towards something. This is a crucial aspect of NLP and is an essential step towards creating AI. For example, if you are a marketing executive and you want to know what people think about your product, a sentiment analysis tool can help you figure that out. All you have to do is input the text and the sentiment analysis tool will tell you what people's sentiments are towards your product.

Question Answering Systems

Question answering systems are used to answer questions. These systems are designed and trained to answer specific questions. An example of a question answering system is an FAQ section on a website. FAQs are designed to answer common questions that customers have about a product or service. A question answering system can also be used in classrooms. Students can ask questions and the question answering system will provide them with answers. These systems are an important part of NLP because they allow computers to understand human language and answer questions.

Virtual Assistants

Virtual assistants are computer programs designed to help you with tasks and everyday activities. Virtual assistants are designed to understand human language and respond accordingly. An example of a virtual assistant is Siri, Amazon's Alexa, and Google Assistant. These virtual assistants are designed to help you with different tasks and activities. For example, you can use Siri to set reminders, check your calendar, send text messages, play music, and more. Virtual assistants are an important part of NLP because they allow computers to understand human language and respond to requests. Additionally, they are designed to be helpful, friendly, and personable.

Chatbots

Chatbots are computer programs designed to simulate conversations with humans through conversational language. Like virtual assistants, a chatbot is programmed to understand human language and respond accordingly. A common use of chatbots is in customer service. Companies have started to use chatbots to respond to their customers and help them with any issues or questions they have. In fact, many companies have used NLP and artificial intelligence to create chatbots. They have programmed the chatbots to understand human language and respond accordingly.

NLP IN THE WORLD OF BUSINESS

We have acknowledged some of the applications of NLP, but in order to truly appreciate these applications, we need to have a sense of how these come together and benefit in the real-world scenario. We try to explain this with the example of the world of businesses

In the heavily competitive world of business, you need to jump at every single opportunity to stay ahead of your competition. Leveraging some of the NLP techniques can boost your business and provide the much-needed competitive advantage to outperform your competitors.

Allows you to understand your customers better

One of the key reasons many businesses fail is failing to listen to their customers. Extract customer feedback about your services or products through polls and surveys on social media platforms. NLP techniques such as text summarization and Sentiment analysis of customer feedback allow you to unlock a deeper understanding of your customers. It educates you about the opinions customers have about your products and services, and what expectations they hold against you as a business.

Chatbots and communication systems can provide an improved customer experience on your platform. During the process of onboarding customers to your platform, one of the biggest limiting factors for many customers is having to learn the ropes of the new platform. The use of chatbots and communication systems allows customers to get their jobs done without having any technical knowledge about the platform. The customer can just place their queries and requests by typing or talking to the UI. This greatly improves customer acquisition.

Helps in targeted marketing

The data generated by chatbots and communication systems can also help in understanding customer behavioral patterns and helps you in the process of customer segmentation. Dividing up your customer base into groups based on common characteristics can help in marketing to your customer based on their specific requirements. Using the past data about the customers, you can predict what the customer might need in the future and offer recommendations to the customer. This gives your customers a tailored experience specific to their likes and dislikes. This not only improves the effectiveness of your marketing but also saves your company a ton of money.

Helps in ad campaigns

NLP combined with cognitive systems can help write very powerful and influential ad campaigns based on your target customers and the nature of service you are providing. Many state of the art pre-trained language models available today have been trained on massive amounts of data scraped from the internet and books have immense knowledge in literature and are capable of generating creative and very persuasive lines for your ad campaigns. Stronger ad campaigns can help reach new customer bases and expand your business to newer territories.

Technical language processing

Running a business comes with handling an unimaginable amount of documentation like contracts, agreements, sales reports, maintenance reports, and so on and so forth. All these are filled with numbers and technical information which takes a lot of time and expertise just to comprehend. Misinterpreted information from contracts, failing to properly understand the metrics in reports, or neglecting maintenance reports can bring major setbacks to the firm or even land the company in big lawsuits. Technical Language Processing is a relatively new subfield of NLP aimed at processing raw technical information and spitting it out in a form tangible to the naïve user. Systems integrated with this technology can be used to keep track of deadlines and set reminders for maintenance and security checks.

CONCLUSION

Natural language processing is a crucial part of artificial intelligence. Artificial intelligence is a computer program designed to learn and solve problems like humans. A computer program can solve problems only if it can understand language and parse out information. That is why NLP is crucial to AI. NLP is like a bridge between computers and human languages that has many applications that have been explored in this paper. We also have shed some light on how rewarding NLP applications can be if integrated with business workflow.

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