

Natural Language Processing in Medical Science and Healthcare

Indu Bala*

School of Mathematical Science, The University of Adelaide, Adelaide, SA, Australia

***Corresponding Author:** Indu Bala, School of Mathematical Science, The University of Adelaide, Adelaide, SA, Australia.

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Introduction

Natural Language Processing (NLP) is a branch of Machine Learning (ML) that primarily aims to reduce the distance between human and machine capabilities. We focus on designing and building applications and systems in a way that allows an easy intersection between computers and natural languages developed for human use. NLP has been used in several areas within artificial intelligence (AI) and data processing application such as social media, translation, summarization, and medical applications. In fact, in the last decades, it has been exhaustively used in current technology to support spam email privacy, personal voice assistants language, translation application, and big data management. Although the medical field is one of the richest in terms of big unstructured data it has not been well invested so far. The analysis of medical data such as patient reports, doctor notes, patient demography details, lab test results, and previous medical history can be effectively examined through NLP. It can improve the treatment and patient service within a reasonable cost and time. NLP helps to train a machine to convert unstructured data into structured and can suggest a decision in the diagnosis process [1].

Doctors spend a lot of time inputting how and what happens to their patients into notes. These case notes are stored as free text in the Electronic Health Record Systems (EHRs). A considerable volume of patient data is inputted into EHRs on daily basis. Out of that, only 20% of data are structured and the rests are unstructured and therefore go largely unutilized. Since the extraction and mining of large unstructured data are challenging and resource-intensive. Without NLP technology the data is not in a usable format for modern computer-based algorithms to extract [2].

However there are no limits to how NLP can support the healthcare system, there are few primary cases are discussed:

- **Refining Clinical Records and Documentation:** Rather than wasting valuable time manually reviewing complex electronic health records (EHR), NLP uses speech-to-text dictation and formulated data entry to extract critical data from EHR at the point of care. This way not only enables doctors to focus on providing patients with essential care but also ensures the clinical records are accurate and kept up to date.
- **Improving Clinical Trials:** Using NLP techniques, healthcare providers can automatically review massive quantities of unstructured clinical and patient data and based on that can identify eligible candidates for clinical trials. This way not only patients access experimental care but could improve their condition and their lives. This way we can also accelerate and supports innovation in the medical field [3].
- **Supporting Clinical Decisions:** NLP makes it fast efficient and easy for doctors and physicians to access health-related information exactly when they need it, enabling them to make more informed decisions at the point of care.
- **Review Management and Sentimental Analysis:** NLP can also help healthcare organization to manage online reviews. It required gathering and evaluating thousands of reviews on healthcare by NLP techniques. They can even rapidly examine human sentiments along with the context of their usage. This helps to understand the patient attitude and helps to decide on further treatments [4].

- **Root Cause Analysis:** This exciting benefit of NLP is predictive analysis; Based on the available data of patients, predictions can be made that may give the solution to prevent health problems. In the same way, NLP systems are used to assess unstructured responses and know the root cause of patients' difficulties or poor outcomes.

Conclusion

NLP can bring value to any business wanting to leverage unstructured data, improving decision-making and accelerating and smoothening the business processes. The advantage of deploying NLP brings other areas of interest indeed. NLP prediction and decision-making can be eased but the healthcare industry needs to improve its data capacities before deploying NLP tools. The tools have an enormous ability to enhance care delivery and streamline work considerably. Thus, NLP and other ML tools will be the key to supervising clinical decision support and patient health explanation.

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