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Enriching Clinical Conversations Through AI

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Objective: The interaction between physicians and patients, are one of the richest sources of information and knowledge. However, the use of medical terminologies in these conversations often leads to a lack of proper understanding by the patient. As a result, many patients feel more comfortable in pursuing information from the internet, where they can control the amount of information and its depth. This information, is often not correctly contextualized, and over-simplified, leading to incorrect self-diagnosis and creating a distrust between the physician and patient. It is therefore, pertinent, to formalize the clinical encounters and provide additional information to the patients, through the use of Artificial Intelligence (AI), which the patients can control in their own time.

Methods: Transformer based language models, provide the ability to encode any text into a vector form. Using transfer learning, vector representations of unseen text is compared with a pre-built set of embedding vectors, containing appropriate medically aligned information. This comparison is useful to determine the medical concepts associated with the unseen text and to create descriptive reports, containing contextual explanations. Through the use of concept dictionaries, such as Unified Modeling Language System (UMLS), and medical knowledge bases such as Mayo Clinic, NHS Choices, MedlinePlus, Cochrane, and UpToDate, more detailed and contextual information can be provided to the patient.

Results: We have retrained DistilBERT on medically aligned portions of clinical conversations, and used it to create a small set of sequences, which represent the clinical conversations between physicians and guardians of patients, in a pediatric outpatient department. Together with concept identification from UMLS and sequence classification, we were able to correctly identify clinical concepts inside informal text with an accuracy of 70%.

Conclusions: We have retrained DistilBERT on medically aligned portions of clinical conversations, and used it to create a small set of sequences, which represent the clinical conversations between physicians and guardians of patients, in a pediatric outpatient department. Together with concept identification from UMLS and sequence classification, we were able to correctly identify clinical concepts inside informal text with an accuracy of 70%.

Keyword: Clinical Text Mining, Concept Extraction, Artificial Intelligence