Event ordering based on explainable multi-label text classification

IXA Group

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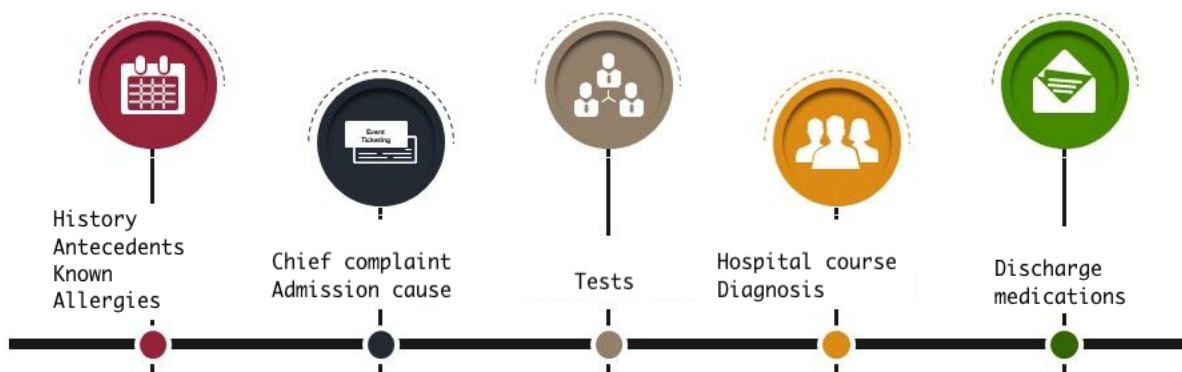
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1 Description

This research project is devoted to Medical Decision Support systems and explores explainable artificial intelligence techniques.

Clinical notes contain information about the patient and by law it is mandatory to encode them following the International Classification of Diseases (ICD). The experts usually do this work manually and it requires a lot of effort and time. In the last few years automatic systems for codifying medical documents are emerging and the last proposals are based on multi-label classification and deep learning techniques. One step ahead will be to understand the decision made by the deep learning system and to locate which parts of the notes are triggering the code, decision, proposed by the system.

The aim of this project is to cope with medical terms or words that are relevant to each ICD code so that can lead to better understanding of the nature of codes. Once the relevant words for each ICD have been located, many post processes can be carried out such as chronological ordering of codes.

History
Antecedents
Known
Allergies

Chief complaint
Admission cause

Tests

Hospital course
Diagnosis

Discharge
medications

Learning outcomes: the student will acquire background in medical text mining reinforcing the following areas:

- deep learning applied to explainable textual classification

- chronological event ordering

- relatedness and confidence metrics for artificial intelligence in text classification

2 Goals

The student will apply deep learning techniques and relatedness metrics in order to build a prototype able to identify relevant words that explain the adoption of a decision. Moreover, once the trigger words are located chronological event ordering can be carried out. The key objectives are:

- Localise which part of the input text motivates a prediction.

- Design a prototype for linking relevant words and codes and order chronologically the codes.

- Implementation and evaluation of the prototype.

3 Requirements

- Good programming skills.

- It is recommended to take the Deep Learning course.

- The master dissertation can be written in English, Spanish or Basque.

4 Framework

Python

5 Task and plan

- Two months: study literature, python specific libraries.

- Two second months: development a prototype.

- Last month: write down the thesis.