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DOCTOR — DISEASE

A machine learning based solution to predict syphilis and diabetes diagnoses from medical records

Highlights

- Identification and cleaning of mistakes in medical notes.
- XGBoost classification model with 88% of F1-score to distinguish between syphilis and diabetes diagnoses based on medical notes and patient info.
- Web app build for users to load notes and obtain prediction and insights.

Background

"1 in 5 patients who read a note reported finding a mistake and 40% perceived the mistake as serious".

We address this issue analyzing Electronic Health Records (EHR) provided by IQVIA to identify and clean mistakes, extract relevant information and predict syphilis and diabetes diagnoses.

Data and challenges

Highly imbalanced anonymized data of patients diagnosed with **syphilis** and **diabetes** in Colombia.

Patients info
9,306 patients
82% males
77% mestizos
96% urban pop
60% ABO missing

Laboratory tests
189,643 entries
178 unique tests
Time series
Sep/01 - Mar/22

Medical notes
140,227 EHR
81% syphilis - 6 types
19% diabetes - 3 types

Methodology and results

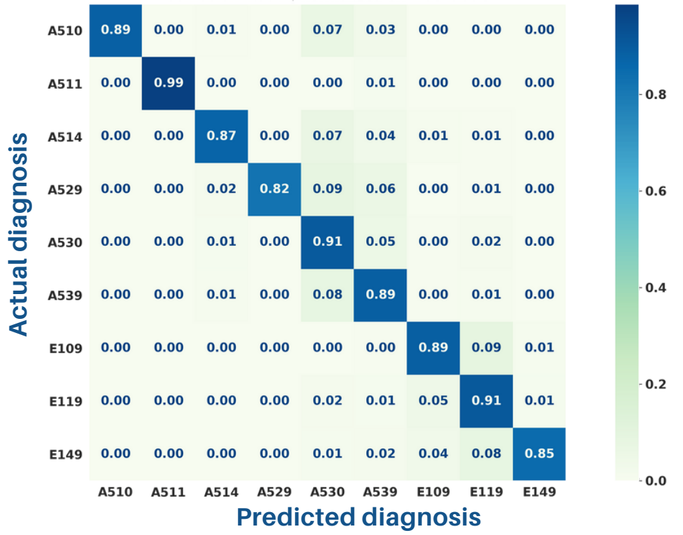
1 Feature Engineering
Find average and maximum differences between laboratory tests dates, and find most performed lab test for each patient.

2 Data Preprocessing
Normalize and scale numerical data, one-hot encode categories, and remove stop words, tokenize, and TDF-IF transform text.

3 Model training and selection
80-20% train-test split. Train different traditional machine learning classifiers and deep learning models.

4 Optimize final model: XGBoost
Oversampling, feature selection using Elastic Net, and hyperparameter tuning using 5-fold CV.

Confusion matrix, normalized on True labels



A5: Syphilis (10 Primary genital, 11 Primary anal, 14 Other secondary, 29 Late, 30 Latent, 39 Unspecified)
E1: Diabetes (09 Type 1, 19 Type 2, 49 Unspecified)

88%
of accuracy and F1 Score

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