

Automated Extraction of Medical Risk Factors for Life Insurance Underwriting

NLP Summit

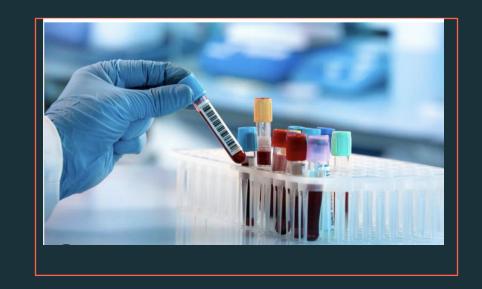


Life Insurance trends

Life underwriting is process of deciding which life insurance applicants to accept, how to group them, how to charge them appropriate premiums for their risk class. Usually done with mortality studies

Accelerated Underwriting leverages new data and analytics to assess the applicants' risk quickly and determine who needs to get blood and urine tests

These risk factors are usually provided inside free-text documents. New insurance-specific NLP models can automatically extract material medical history and risk factors from such documents



Business Outcomes Leveraging NLP can reduce the underwriting decision time from 2-12 weeks down to no more than 48 hours.

Life Insurance Data Pipeline

Analysis of NLP data is critical is in the life sciences space where mining clinical notes (written and audio) and PDF pathology reports in a timely manner can help save lives, increase Straight Through Process and price accurately

Basic Profile

Age Gender Weight/Height Smoker (Y/N)



Personal History

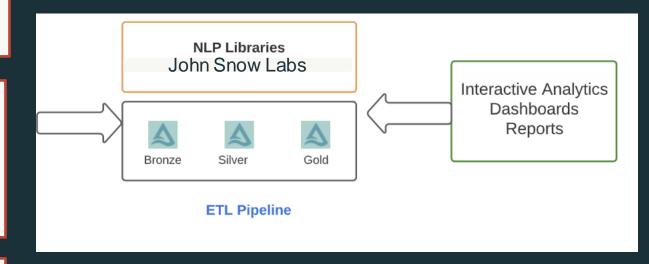
Prescription History (RxNorm)
Actions of Rx (Action Mapper)
Family Health History (ICD + Assertion)
Criminal History *
Driving History *

Lifestyle

Medical Records (ICD 10)
Profession
Marital Status
Smoking History
Alcohol
Substance

Diseases

High blood pressure
Asthma and breathing problems
Heart disease
Cancer
Anxiety/ Depression
Diabetes
Kidney disease





Spark NLP for Healthcare



Scalable



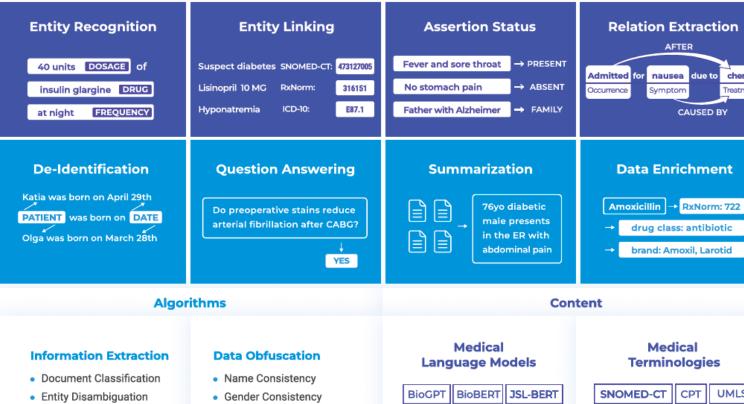


Private





Tunable



- Contextual Parsing
- Patient Risk Scoring
- Age Group Consistency
- Format Consistency



T5 |

Flan-T5

GloVe-Med

Terminologies

chemo

Treatment

CAUSED BY



Clinical Grammar

- Deep Sentence Detector
- Medical Spell Checking
- Medical Part of Speech
- Terminology Mapping

Trainable & Tunable

Zero-Shot Learning

- Entities by Prompt
- · Relations by Prompt
- · Classification by Prompt
- Relative Data Extraction

1,000+ Pretrained Models

Clinical Text

Signs, Symptoms, Treatments, Findings, Procedures, Drugs, Tests, Labs, Vitals, Sections, Adverse Effects, Risk Factors, Anatomy, Social Determinants, Vaccines, Demographics, Sensitive Data

Biomedical Text

Clinical Trial Design, Protocols, Objectives, Results; Research Summary & Outcomes; Organs, Cell Lines, Organisms, Tissues, Genes, Variants, Expressions, Chemicals, Phenotypes, Proteins, Pathogens



Scalable



Fast Inference

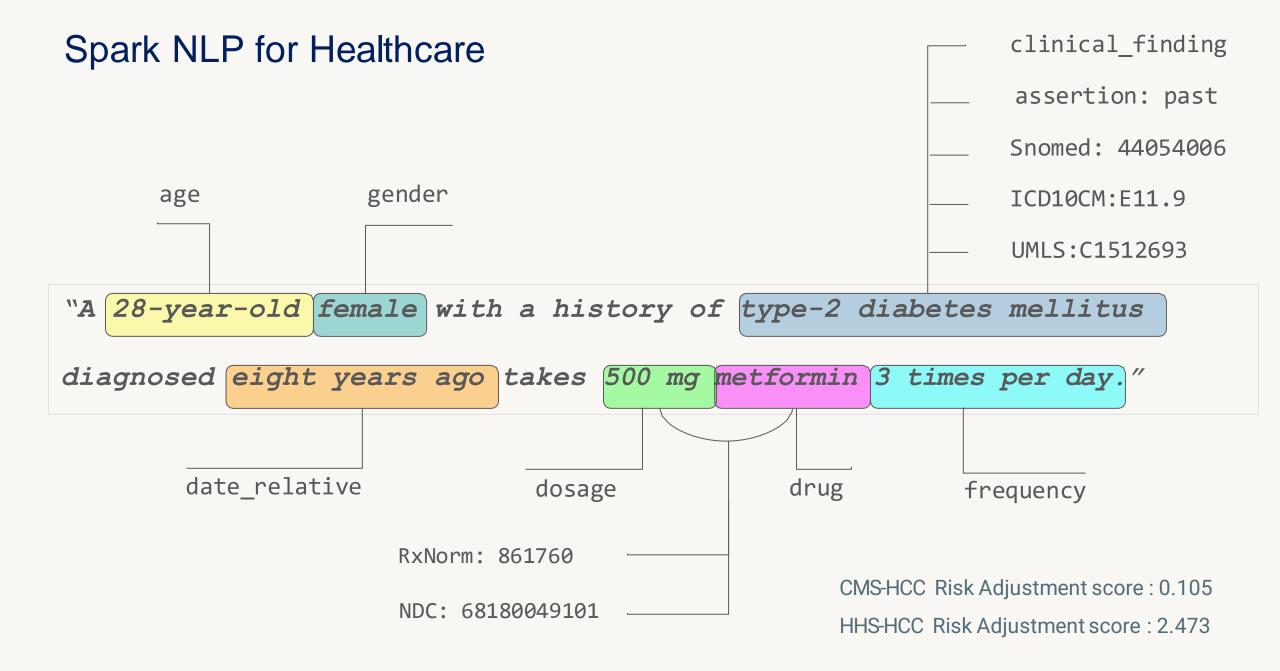


Hardware Optimized





Community



Extracting Medical Risk Factors With Spark NLP

Basic Profile		Diseases	
∘ ✓ Age	NER	Asthma and breathing problems	NER
∘ ✓ Gender		Heart disease, including heart attacks and angina	
∘ ✓ Weight		High cholesterol	
○ ✓ Height		High blood pressure	
Race/Ethnicity		Hypertension	
○ ✓ Disability		○ ✓ Cancer	
Personal History		Strokes, including mini-strokes and brain haemorrage	
○ ✓ Medical records (ICD-10-CM)	Entity Resolver	Anxiety	
Prescription history (RxNorm)	ChunkMapper	Depression	
 Actions of prescriptions (Action Mapper) 	Churikiviappei	○ ✓ Diabetes	
 Family health history (ICD-10-CM + Assertion) 	Assertion	○ ✓ Obesity	
 Criminal history (Excluded - receive from authorities) 		○ ✓ Epilepsy	
 Driving history (Excluded - receive from authorities) 		Cerebral palsy and other neurological conditions	
Lifestyle		Kidney diseases	
Profession	NED.		
Marital status	NER		
○ ✓ Housing	Assertion		
∘ ✓ Smoking			
∘ ✓ Alcohol			
○ ✓ Substance			

Spark NLP Pipeline

Extracting Medical Risk Factors With Spark NLP

