

Group work on Medical IR

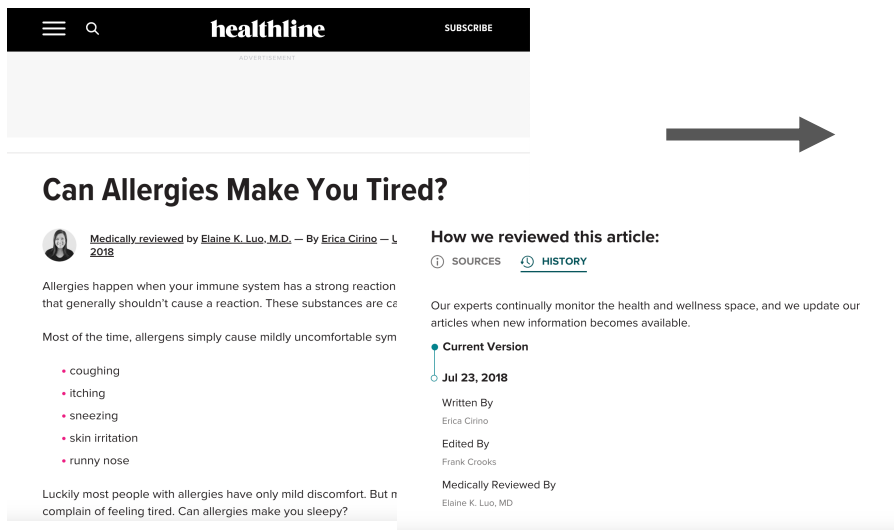
Georgios Peikos, Wojciech Kusa, Annisa Maulida Ningtyas



Agenda

- Introduction of Information Extraction
- Information Extraction Related Task
- Health Ontology
- MedCAT – Medical Concept Annotation Tool

From unstructured to structured form



The screenshot shows a Healthline article page. At the top is a black navigation bar with a menu icon, a search icon, the 'healthline' logo, and a 'SUBSCRIBE' button. Below the navigation bar is a large grey placeholder for an image. The article title 'Can Allergies Make You Tired?' is displayed in bold. Below the title is a small profile picture of Elaine K. Luo, followed by the text 'Medically reviewed by Elaine K. Luo, M.D. — By Erica Cirino — Jul 23, 2018'. The main text begins with 'Allergies happen when your immune system has a strong reaction that generally shouldn't cause a reaction. These substances are called allergens. Most of the time, allergens simply cause mildly uncomfortable symptoms.' This is followed by a bulleted list of symptoms: coughing, itching, sneezing, skin irritation, and runny nose. The text continues with 'Luckily most people with allergies have only mild discomfort. But not everyone. Some people complain of feeling tired. Can allergies make you sleepy?'. To the right of the main text is a sidebar titled 'How we reviewed this article:' containing links for 'SOURCES' and 'HISTORY'. Below this is a section 'Current Version' dated 'Jul 23, 2018', listing the author 'Erica Cirino', the editor 'Frank Crooks', and the medical reviewer 'Elaine K. Luo, MD'.

healthline SUBSCRIBE

Can Allergies Make You Tired?

Medically reviewed by Elaine K. Luo, M.D. — By Erica Cirino — Jul 23, 2018

Allergies happen when your immune system has a strong reaction that generally shouldn't cause a reaction. These substances are called allergens. Most of the time, allergens simply cause mildly uncomfortable symptoms.

- coughing
- itching
- sneezing
- skin irritation
- runny nose

Luckily most people with allergies have only mild discomfort. But not everyone. Some people complain of feeling tired. Can allergies make you sleepy?

How we reviewed this article:

[SOURCES](#) [HISTORY](#)

Our experts continually monitor the health and wellness space, and we update our articles when new information becomes available.

Current Version

Jul 23, 2018

Written By
Erica Cirino

Edited By
Frank Crooks

Medically Reviewed By
Elaine K. Luo, MD

- Allergies could makes fatigue
- Author: Erica Cirino
- Reviewer: Elaine K. Luo MD

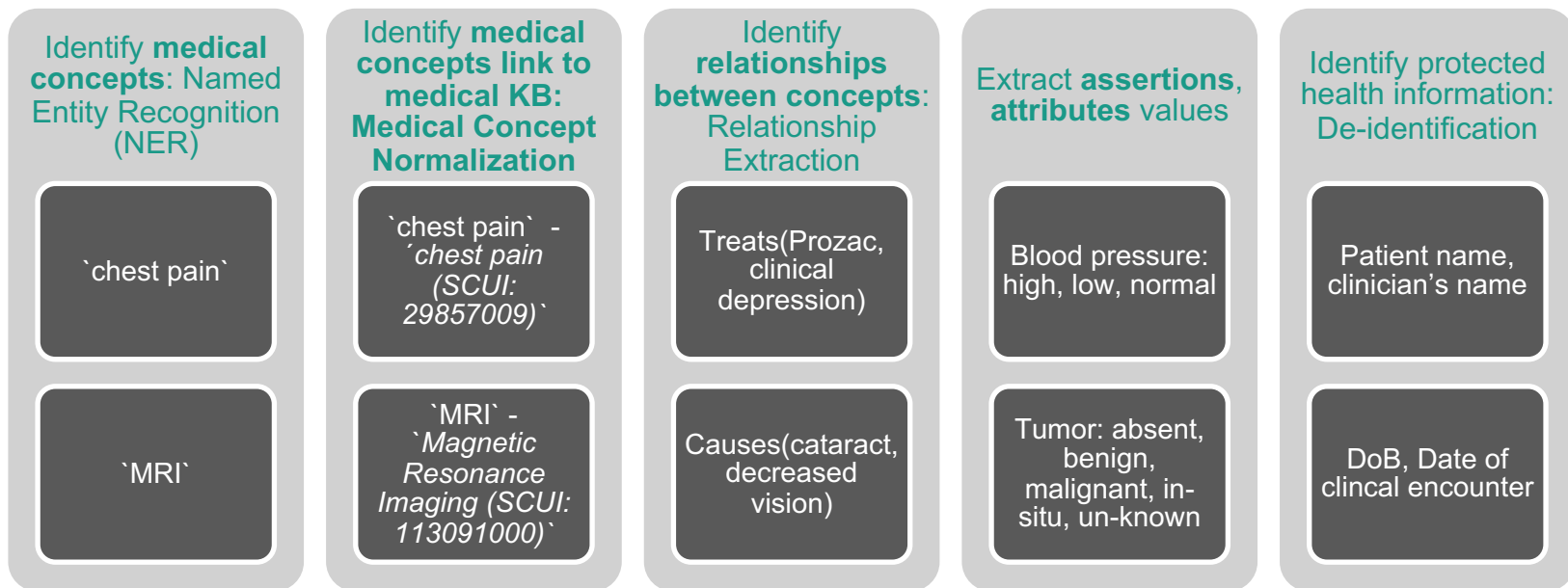


What is Information Extraction?

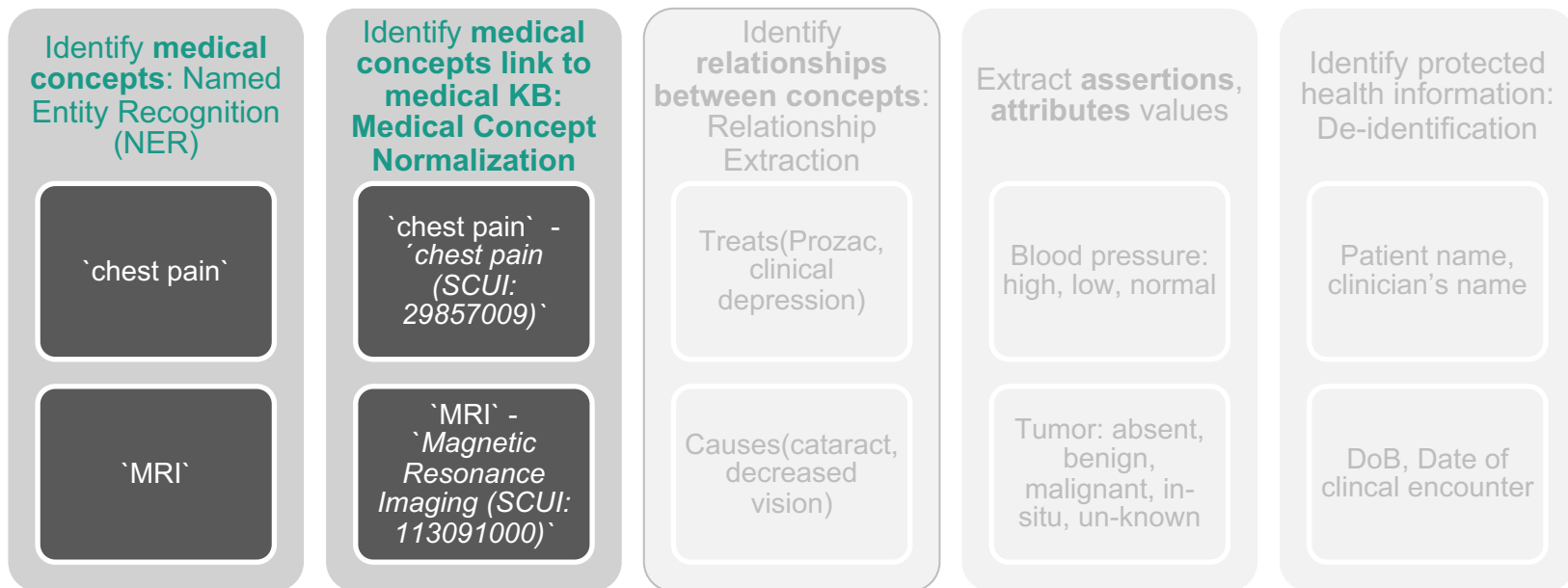
Information Extraction – *identify and extract instances of fields of interest from unstructured or semi-structured text and convert to structured representation*

- Field of interest could be **named entities**, relations, or events
- Known by many others name - *named entity extraction, knowledge base population, attribute extraction, ..*

Information Extraction Related Tasks



Information Extraction Related Tasks





An Example: Find all medical concepts

The patient is a 63-year-old female with a three-year history of **bilateral hand numbness** and **occasional weakness**.

Within the past year, these symptoms have progressively gotten worse, to encompass also her feet.

She had a workup by her **neurologist** and an **MRI** revealed a **C5-6 disc herniation** with cord compression and a **T2 signal change** at the level



Relevant entities in medical record

Disease: symptoms, problems, signs, conditions

Treatment: medication, surgery, procedure, follow-up

Test: blood work, lab work

Anatomical sites: body parts, regions,

Chemical agent: drugs, substance, ..

.....



Health Ontology – SNOMED CT

- SNOMED CT is a clinical terminology
 - Systematized Nomenclature of Medicine (Clinical Terms)
 - Collection of names and words
 - Relevant to the field of medicine
 - Organised in a structured and logically consistent manner
- Standardized, multilingual vocabulary of clinical terminology used for electronic exchange of clinical health information

More ‘like’ a thesaurus than just a coding scheme

SNOMED CT Content

Clinical Findings

- Disease and deformity – scar
- Symptoms – difficulty breathing
- Social – finding of walking aid use
- Examination findings – tachycardia



Causes of Disease

- Forces – pressure change
- Events – road traffic accident
- Organisms – herpes simplex virus



Procedures

- Laboratory
- Therapy
- Clinical Investigation
- Surgical procedure



SNOMED CT Content

Anatomy

- Normal – knee joint
- Abnormal – ganglion cyst
- Lesions – bony callus
- Vital signs – blood pressure



Observations

- Body product observable – colour of urine
- Values - present



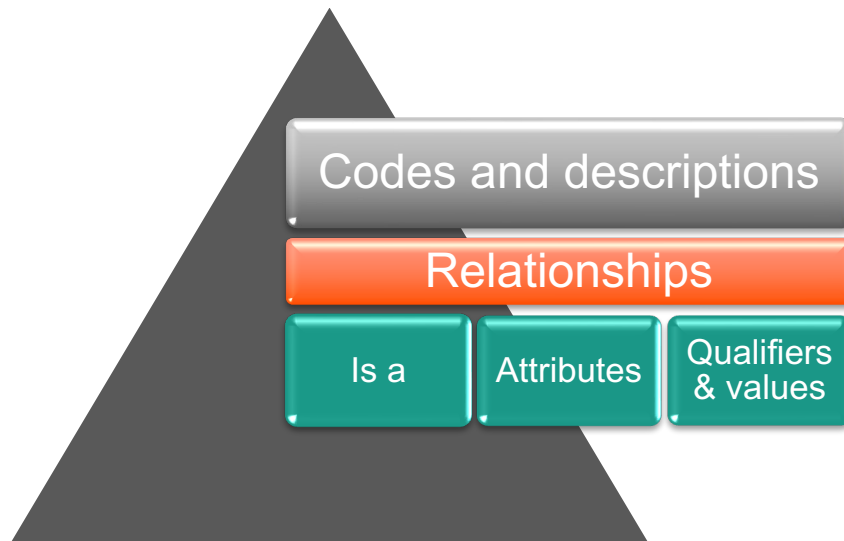
Products

- Drugs – paracetamol
- Substances – latex
- Devices – bedpan

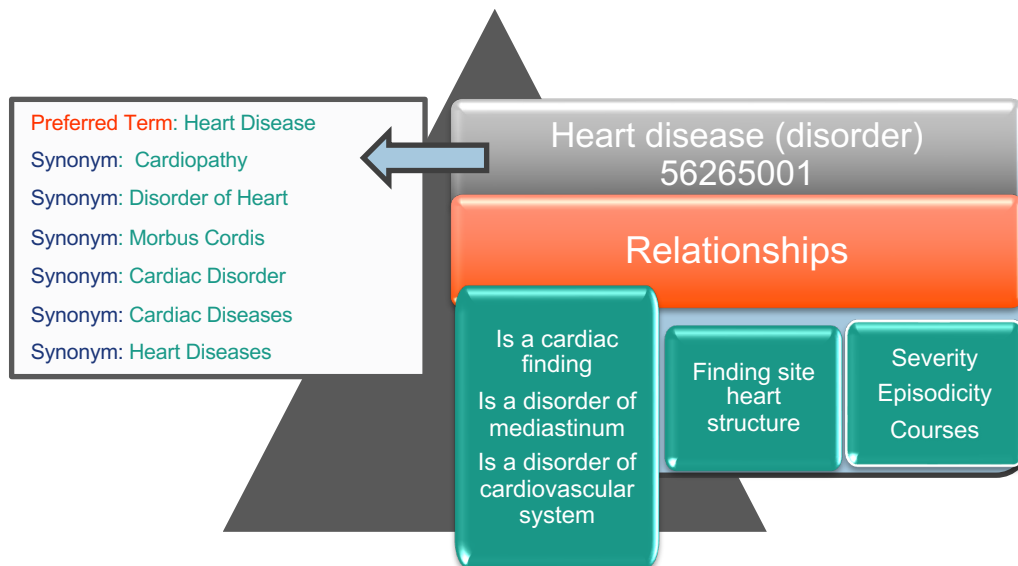




A Concept in SNOMED CT



A Concept in SNOMED CT





SNOMED-CT Browser tool

<https://browser.ihtsdotools.org/?perspective=full&conceptId1=404684003&edition=MAIN/2021-07-31&release=&languages=en>

IE Techniques - NER

A patient was prescribed Magnesium hydroxide 400mg/5ml suspension PO of total 30ml bid for the next 5 days



A patient was prescribed **Magnesium hydroxide DRUG** **400mg/5ml STRENGTH** **suspension FORM**
PO ROUTE of total **30ml DOSAGE** **bid FREQUENCY** **for the next 5 days DURATION** .



Medical NER Tools

- Spacy¹
- Scispacy²
- METAMAP³
- **MedCAT⁴**
- ...

¹<https://github.com/explosion/spaCy>

²<https://allenai.github.io/scispacy/>

³<https://lhncbc.nlm.nih.gov/ii/tools/MetaMap.html>

⁴<https://github.com/CogStack/MedCAT>

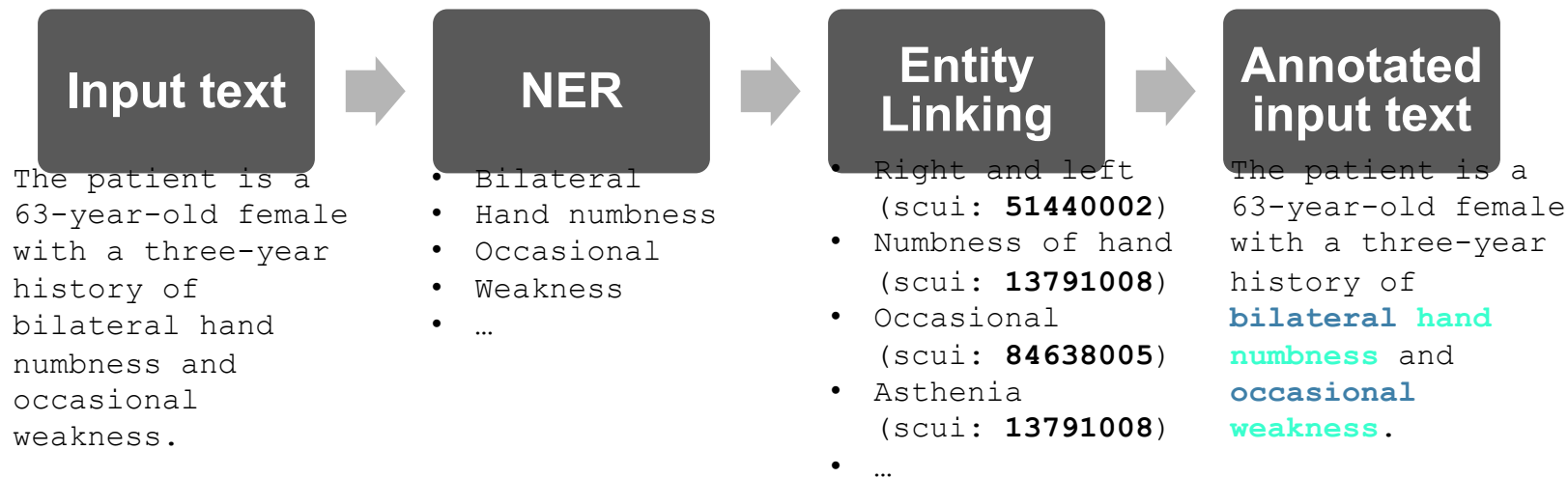


MedCAT - Medical Concept Annotation Tool

- An open-source NER and Linking (NER+L) and an annotation tool and online learning training interface.
- Use to extract information from Electronic Health Records (EHRs) and link it to biomedical ontologies like SNOMED-CT and UMLS.



MedCAT Workflow





MedCAT Demo

<https://medcat.rosalind.kcl.ac.uk/>



Reference

- The content of this slides are taking from coursera course: **'Information Extraction from Free Text Data in Health'**