

Extracting Semantics in a Clinical Scenario

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- Retrieving most relevant patient cases based on the clinical profile of the current patient
 - Evidence-based Medicine (EBM)
 - Implicit and complex query based on the clinical profile: Sign, Symptom, Laboratory tests, Health history

- Taxonomy of clinical texts
 - Patient records
 - Case studies
 - Summarisations

- Exploiting full articles rather than only abstracts
- Identifying text segments which define clinical profile of a patient
 - Mark-up tags for describing the diagnostic and treatment procedure
 - Supervised learning

The Mark-up Tag Set (1)

Tag	Example	Percentage
Sign	“his finger was swollen, tense and tender.”	18.7%
Symptom	“she also complained of right upper quadrant pain, which radiated to her right lower quadrant and upper back.”	2.8%
Medical test	“Her BP was 100/75 mmHg, HR was 110 bpm”	3.4%
Diagnostic test	“Cerebrospinal fluid examination was negative”	8.1%
Diagnosis	“The diagnosis of Echinococcus granulosus infection was confirmed”	4.2%
Treatment	“He was placed on triple antibiotics therapy.”	9.0%

table 1: Marked-up Text for Diagnostic and Treatment Procedure

The Mark-up Tag Set (2)

Tag	Example	Percentage
Referral	“The patient was referred to the pediatric surgery department”	0.4%
Patient health profile	“this healthy , well-nourished , normotensive postmenopausal woman”	3.2%
Patient demographics	“A 49 year old woman”	2.8%
Causation	“due to a malassezia furfur infection on the skin”	1.3%
Exceptionality	“Our case is the first male patient reported with SSc and IPH. ”	1.4%
Case recommendations	“Conservative treatment should be given unless there are complications.”	3.3%
Exclusion	“She has no history of smoking.”	0.6%

table 2: Marked-up Text for Genre Specific Semantics

Patient Case Report Corpus

- BioMed Central
<http://www.biomedcentral.com>
- Genre
Journal papers on single patient case report.
- Statistics

documents	75
total sentences	5,117
total tokens	112,382
sentences with tags	2,319
tokens per sentence	22

The Callisto Annotation Tool

Callisto - c.aif.xml
File Edit Format Tools Help

Hypertensive crisis associated with high dose soy isoflavone supplementation in a post-menopausal woman : a case report [ISRCTN98074661]

abstract

Background

Isoflavones are gaining popularity as alternatives to hormone replacement therapy . However , few guidelines exist to inform the public as to an appropriate dose . This case involves a postmenopausal woman who experienced a hypertensive crisis while consuming a high-dose isoflavone supplement as part of a research protocol .

Case Presentation

The participant was part of a placebo-controlled crossover trial to investigate the potential synergism of the antioxidant activity of soy isoflavones and vitamin C . Upon entry into the study , this healthy , well-nourished , normotensive postmenopausal woman (51 years old) , consumed the first of four randomly assigned treatments (500 mg vitamin C plus 5 mg / kg body weight soy isoflavones) . During this treatment , the participant 's systolic blood pressure spiked to a recorded 226 / 117 mmHg , necessitating medical intervention and discontinuation of study participation . Two plausible mechanisms for this hypertensive crisis are discussed .

<input type="checkbox"/> Causation	<input type="checkbox"/> Symptom	<input type="checkbox"/> Exclusion	<input type="checkbox"/> Referral	<input type="checkbox"/> Case_category	<input type="checkbox"/> Sign	<input type="checkbox"/> Patient_demographics	<input type="checkbox"/> Patient_health_profile
<input type="checkbox"/> Diagnosis	<input type="checkbox"/> Treatment	<input type="checkbox"/> Case_circumstances	<input type="checkbox"/> Diagnostic_test	<input type="checkbox"/> Exceptionality	<input type="checkbox"/> Case_recommendations	<input type="checkbox"/> Medical_test	

Text

A diagnosis of acute cholecystitis in a patient with situs inversus totalis was made following clinical examination and radiological investigation :
Chest X-Ray confirmed the clinical and electrocardiograph diagnosis of dextrocardia
The diagnosis of acute cholecystitis and situs inversus was made :
A diagnosis of acute pancreatitis was made
a clinical diagnosis of cholangitis was made
an acute painless right peroneal neuropathy
a diagnosis of a p-ANCA systemic vasculitis
Histopathology showed it to be Dukes C , poorly differentiated adenocarcinoma of the sigmoid colon
have rickets
orthopedical examination confirmed the diagnosis of rickets

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yitao@pc-g43-18:~/nlp_tools/Callisto

Callisto

Tue May 23 12:43 PM

Sentence Classification Task

Tag	Accuracy	Precision	Recall	F_1
Sign	83.9	59.0	50.1	54.2
Symptom	97.8	67.8	45.8	54.7
Diagnostic test	93.7	66.6	46.8	55.0
Medical test	97.9	80.4	51.6	62.9
Treatment	93.2	67.6	44.7	53.8
Diagnosis	96.3	62.5	33.8	43.8
Patient demographics	99.0	91.6	73.1	81.3
Patient health profile	96.8	53.0	24.1	33.2

table 3: Sentence Classification Result for Some Semantic Tags

- Annotating more data by inviting domain experts
- Improving the sentence classification system, adding more domain and linguistic features
- How to define a complex query based on the clinical profile of a patient?

Thank you!