

Argumentation-Driven explainable artificial intelligence for digital medicine (ANTIDOTE)

<https://univ-cotedazur.eu/antidote>

CALL CHIST-ERA 2019 - XAI

Coordinators:

Elena Cabrio, Serena Villata



Elena Cabrio, Serena Villata,
Project Coordinators

Argument Mining and Generation (+ Medical school)

Bernardo Magnini

Dialogues, conversational agents

Rodrigo Agerri

*Information Extraction,
Medical text mining
(+ Medical school)*

Marie Francine Moens

Machine Learning for NLP

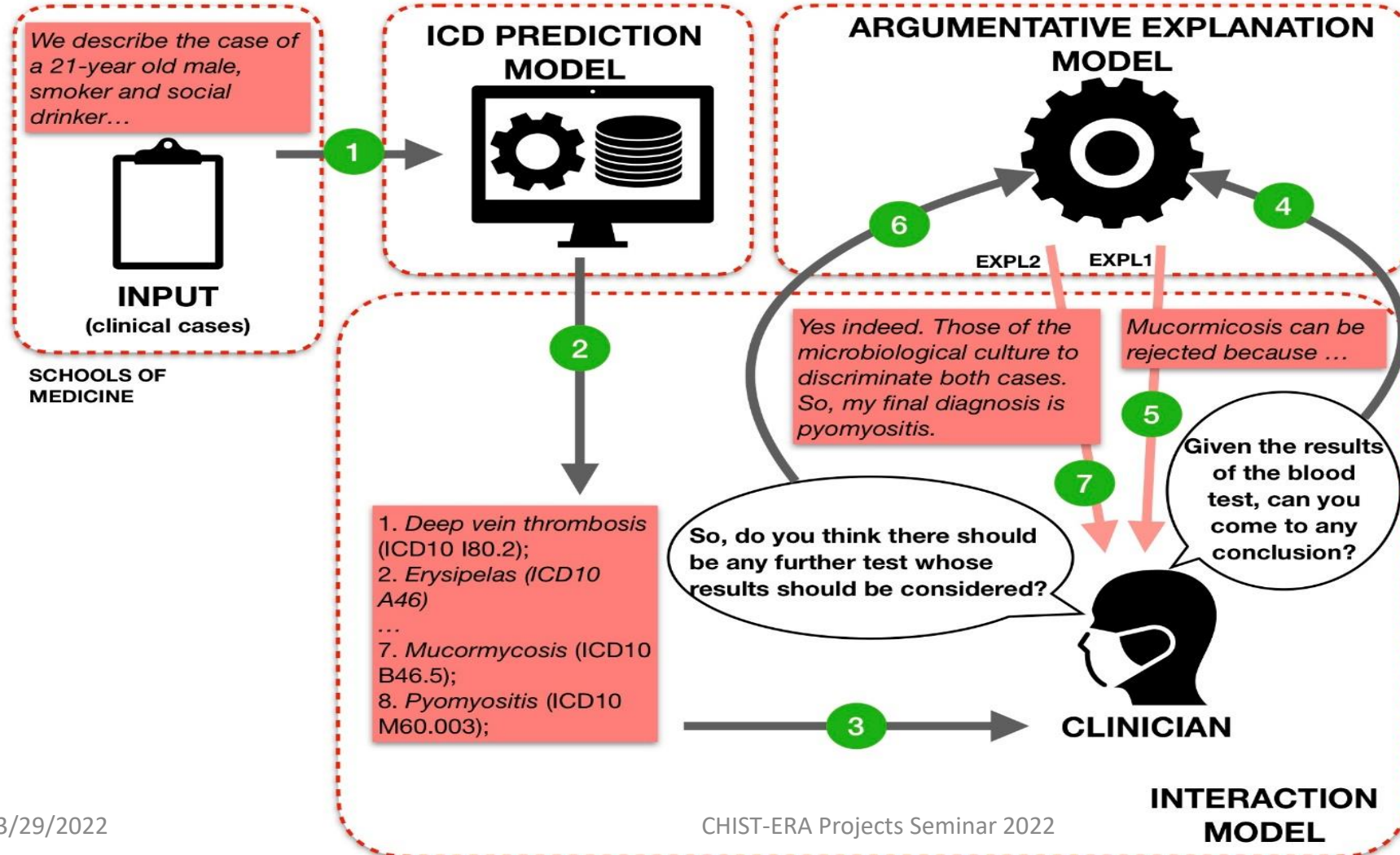
Marcin Lewiński

Argumentation theory



- in neural architectures the correlation between internal states of the network and the justification of the network classification outcome is not well studied;
- high quality explanations are crucially based on argumentation mechanisms (e.g., provide supporting examples and rejected alternatives);
- in real settings, providing explanations is inherently an interactive process involving the system and the user.
- **Focus: medical domain**, where the need for **high quality explanations for clinical cases deliberation** is more critical than in other domains

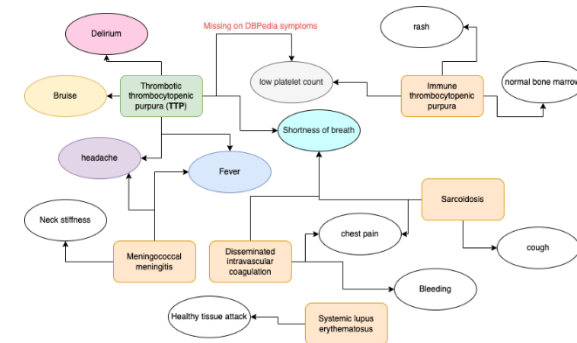
General objective: providing a **unified computational framework for jointly learning clinical predictions and the associated argumentative justifications**, fostering a natural interaction with clinicians through explanatory dialogues.



- Collection, cleaning and structuring of **available medical resources** of diagnosis and explanations
- **Analytic statements** as argument-based explanation patterns
- **Extractive explanatory argument generation**

Clinical case: *[a 37-year-old woman is brought to the emergency department because of intermittent chest pain for 3 days]. [The pain is worse with inspiration], and she feels [she cannot take deep breaths]. [She has not had shortness of breath, palpitations, or nausea]. [She had an upper respiratory tract infection 10 days ago] and [took an over-the-counter cough suppressant and decongestant and acetaminophen]. [Her temperature is 37.2°C (98.9°F)], [pulse is 90/min], and [blood pressure is 122/70 mm Hg]. [The lungs are clear to auscultation]. [S1 and S2 are normal]. [A rub is heard during systole]. [There is no peripheral edema]. [An **ECG shows** normal sinus rhythm and diffuse], [**upwardly concave ST-segment elevation**] and [PR-segment depression in leads II, III, and a VF].*

Diagnosis: the patient is showing a pericarditis **because** *[a rub is heard during systole]* and the ECG shows *[concave ST-segment elevation]*.

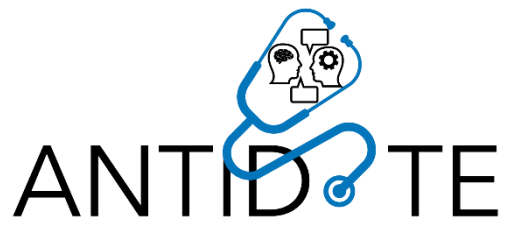


ANTIDOTE Y1: activities implemented

- PhD and Postdoc students hired by all partners
- Project meetings:
 - Kick-off meeting (23/04/2021, virtual)
 - Physical meeting (26-27 October 2021, in Nice, FR)
- Progress/Deliverables:



		Year 1				Year 2				Year 3			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
WP1	Management												
Task 1.1	Administrative, financial and consortium management	D1.1											
Task 1.2	Undertake scientific management												
Task 1.3	Liaise with Project Board and CHIST-ERA				D1.2				D1.2				D1.3
Task 1.4	Undertake risk assessment and corrective actions												
WP2	Methodology and Design												
Task 2.1	Requirements for the clinical case scenario		D2.1		D2.1								
Task 2.2	Definition of the overall methodology and design of the project												
Task 2.3	Data collection and annotation				D2.3		D2.4		D2.65				
Task 2.4	Location and maintenance of the resources, tools and documents used or produced		D2.2										
WP3	ML for predicting clinical outcomes												
Task 3.1	Baseline model for ICD coding												
Task 3.2	Multitask model for ICD coding and argumentation component labeling				D3.1								
Task 3.3	Integrating external knowledge								D3.2				
Task 3.4	Graph neural network for joint ICD coding and argumentation component labeling								D3.3				D3.3
WP4	Explanatory argumentation in natural language												
Task 4.1	Definition of the argumentative patterns for effective explanations				D4.1		D4.2						
Task 4.2	Explanatory argument generation							D4.3			D4.3		
Task 4.3	Explanatory dialogue								D4.4				D4.4
WP5	Evaluation												
Task 5.1	Evaluate the quality of the prediction and the plausible alternative diagnoses				D5.1				D5.2				D5.4
Task 5.2	Evaluate the quality of the evidence in favor of the right diagnosis and against the discarded ones				D5.1				D5.2				D5.4
Task 5.3	Evaluate the explanatory arguments								D5.2				D5.4
Task 5.4	Evaluate the explanatory dialogue quality								D5.2				D5.4
WP6	Dissemination and exploitation												
Task 6.1	Technical resource sharing	D6.1											
Task 6.2	Scientific Dissemination				D6.2				D6.2				D6.2
Task 6.3	Exploitation												D6.3
Task 6.4	ANTIDOTE workshop								D6.4				D6.4
Milestones		MS1				MS2				MS3			



Argumentation-Driven explainable artificial intelligence for digital medicine (ANTIDOTE)

<https://univ-cotedazur.eu/antidote>

CALL CHIST-ERA 2019 - XAI

Coordinators:

Elena Cabrio, Serena Villata

