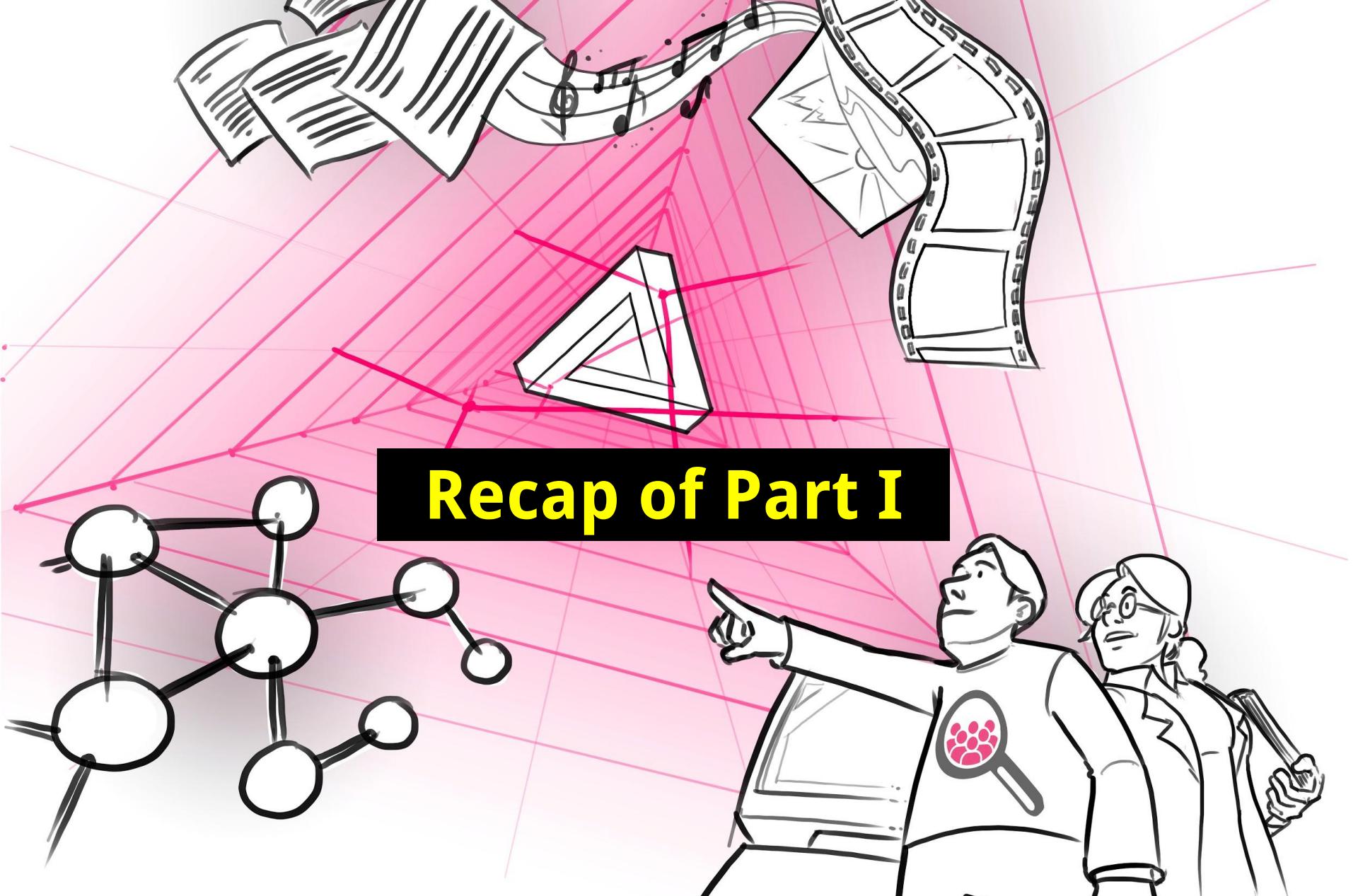


CROWDTRUTH TUTORIAL

Part II: Building CrowdTruth Vectors Task Design & Metrics

Lora Aroyo, Anca Dumitache, Oana Inel, Chris Welty



Recap of Part I



DISRUPTING THE COMFORT ZONE

One truth: knowledge acquisition assumes one correct interpretation for every example

All examples are created equal: one is not more important than another, they are all either true or false

Disagreement bad: when people disagree, they don't understand the problem

Experts rule: knowledge is captured from domain experts

One is enough: knowledge by a single expert is sufficient

Detailed explanations help: if examples cause disagreement - add instructions

Once done, forever valid: knowledge is not updated; new data not aligned with old

CROWD TASK



Medical Relation Extraction

powered by
CrowdTruth 
The framework for crowdsourcing ground truth data

1

In the following sentence:

Sentence: _____

Among 56 subjects reporting to a clinic with symptoms of **malaria**, 53 (95%) had ordinarily effective levels of **chloroquine** in blood.

2

Is **chloroquine** related to **malaria**? Choose all that apply.

Treats

Diagnosed By

Causes

Location

✓ Manifestation

Contraindicates

✓ Associated With

Is A

Part Of

✓ Symptom

✓ Other

None

SYMPOTM: Deviation from normal function indicating the presence of disease or abnormality, e.g. pain is a symptom of a broken arm.

WORKER VECTOR FOR A SENTENCE

Among 56 subjects reporting to a clinic with symptoms of **MALARIA** 53 (95%) had ordinarily effective levels of **CHLOROQUINE** in blood.



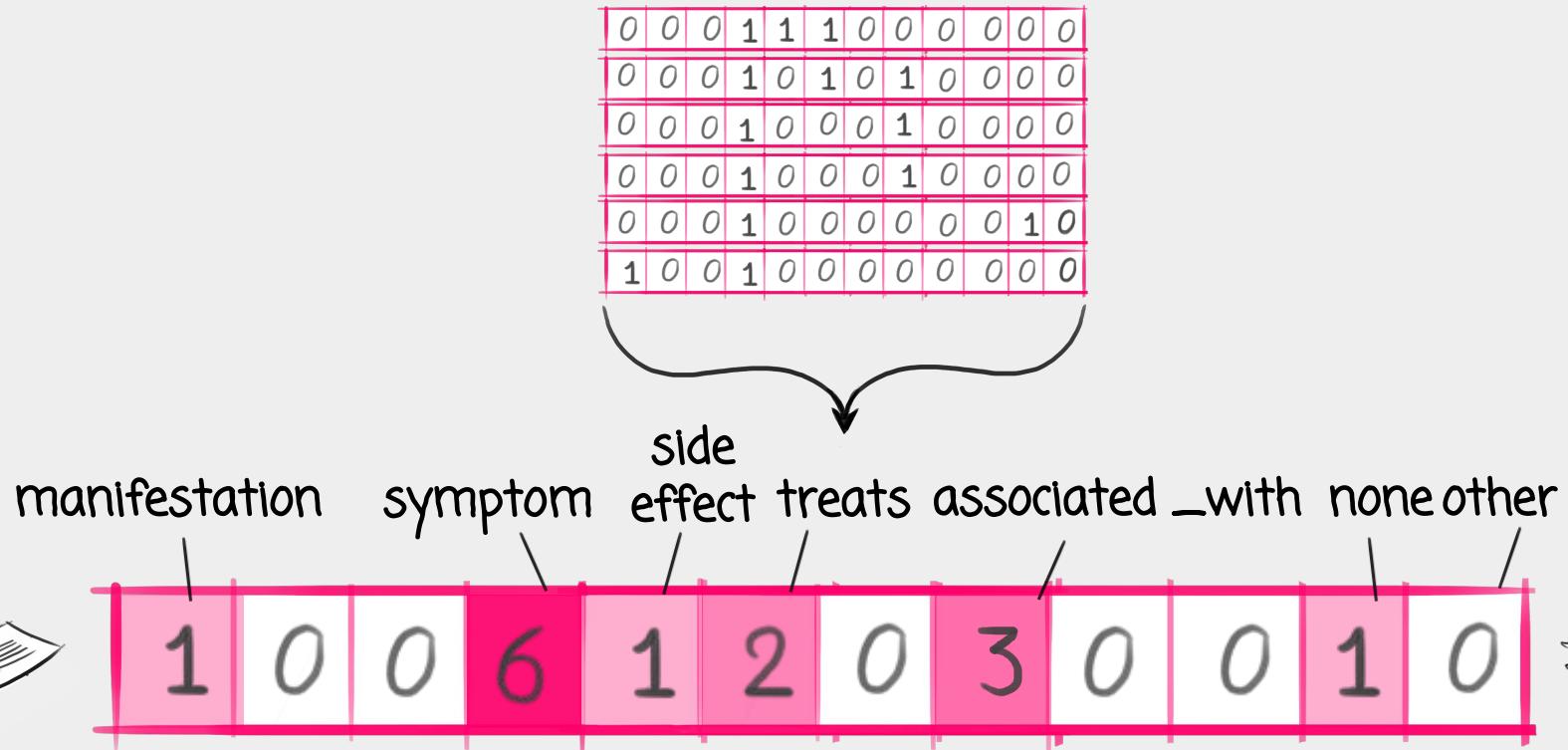
MANY WORKERS FOR THE SAME SENTENCE

Among 56 subjects reporting to a clinic with symptoms of **MALARIA** 53 (95%) had ordinarily effective levels of **CHLOROQUINE** in blood.

	symptom		treats		associated _with	other					
	0	0	0	1	1	1	0	0	0	0	0
	0	0	0	1	0	1	0	1	0	0	0
	0	0	0	1	0	0	0	1	0	0	0
	0	0	0	1	0	0	0	1	0	0	0
	0	0	0	1	0	0	0	0	0	0	1
	1	0	0	1	0	0	0	0	0	0	0

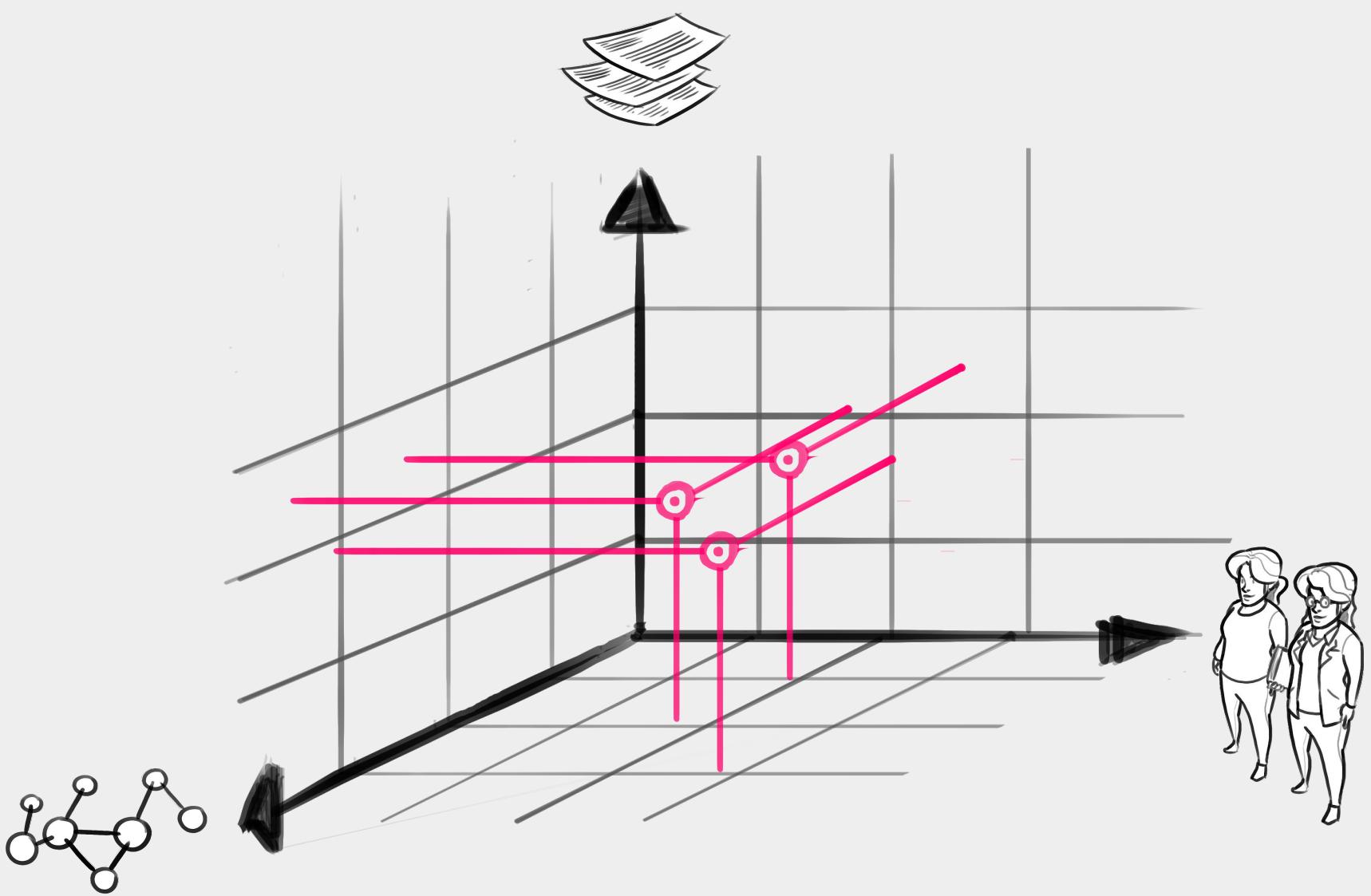
ALL WORKER VECTORS AGGREGATED IN A SENTENCE VECTOR

Among 56 subjects reporting to a clinic with symptoms of **MALARIA** 53 (95%) had ordinarily effective levels of **CHLOROQUINE** in blood.



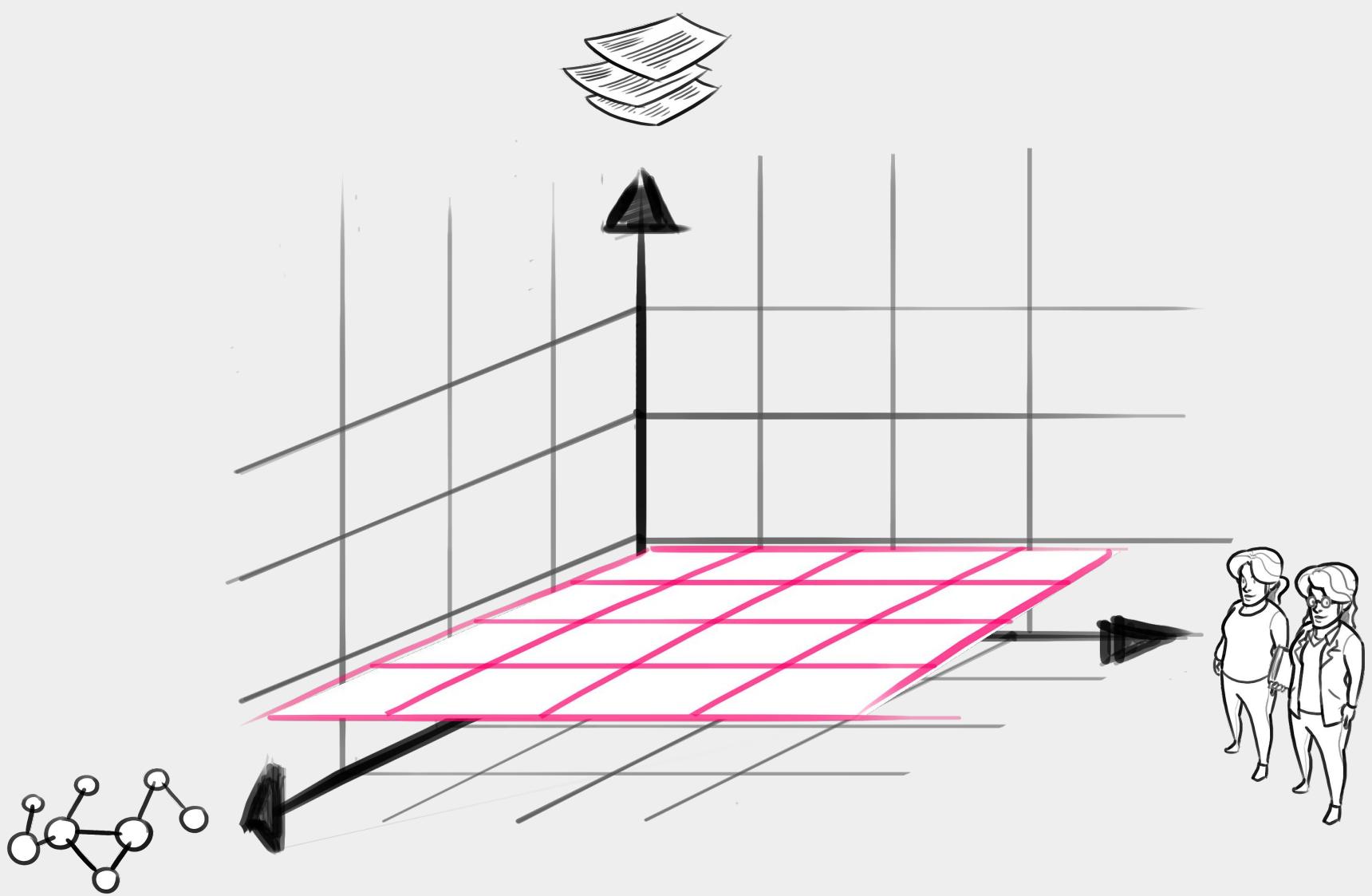
SENTENCE VECTORS FOR DIFFERENT SENTENCES





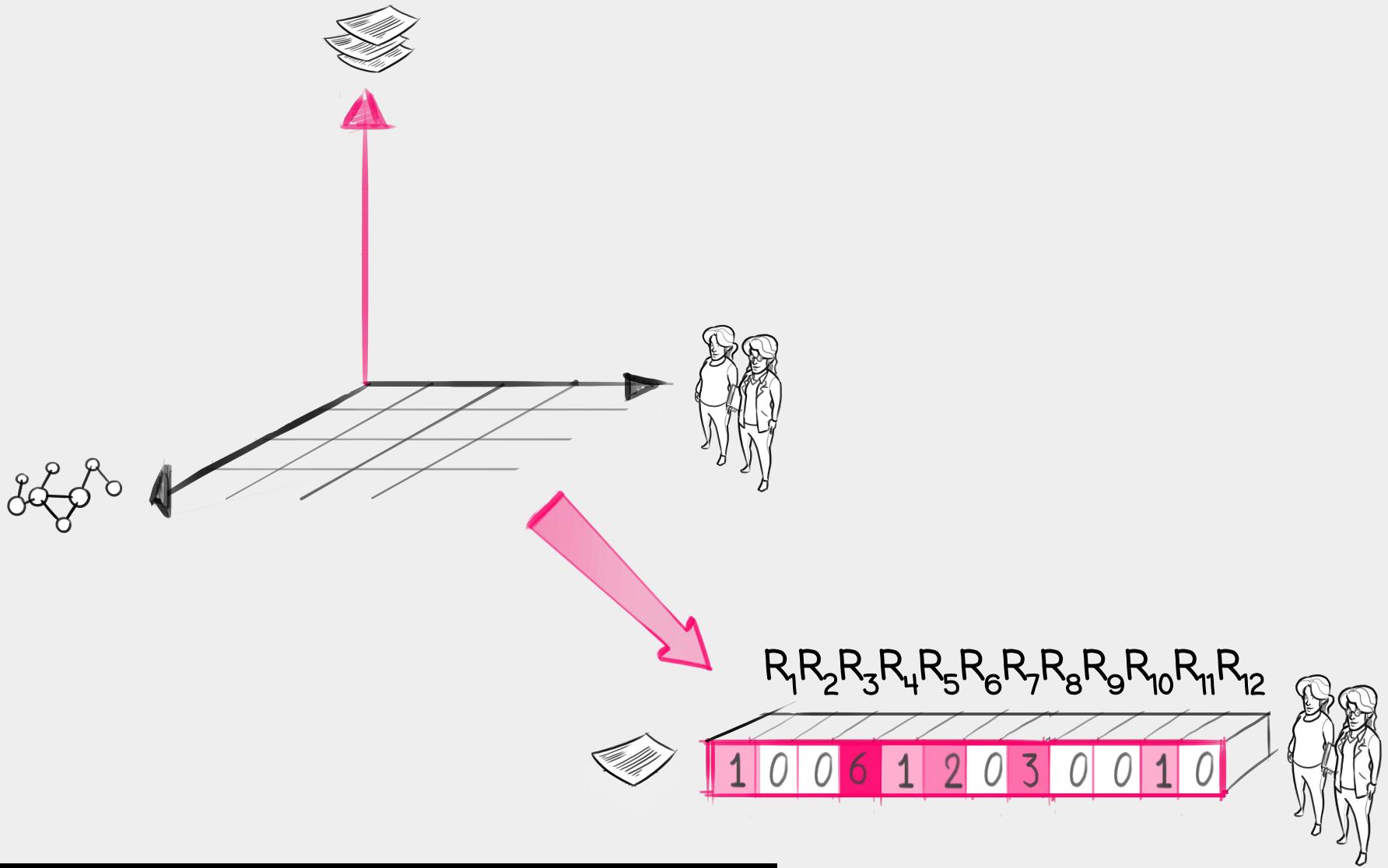
HYPER-DIMENSIONAL SPACE

Worker votes



HYPER-DIMENSIONAL SPACE

Sentence Slice



HYPER-DIMENSIONAL SPACE

Sentence plane into a sentence vector



**What are we going to
practice in Part II?**

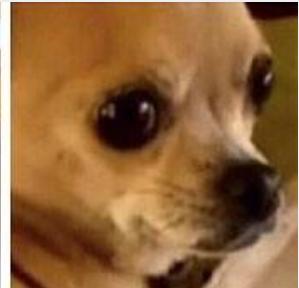
CLOSED TASK

OBAMA is the 44th president of the USA .

- Obama **born in** USA
- Obama **employed by** USA
- Obama **died in** USA
- none**

COMPARING TASK DESIGNS FOR DIFFERENT TASK TYPES

OPEN TASK



Type: **chihuahua, dog, muffin**

CLOSED TASK

OBAMA is the 44th president of the USA.

- Obama born in USA
- Obama employed by USA
- Obama died in USA
- none

	born in	employed by	died in	none
Worker Vector #1	1	1	0	0
Worker Vector #2	1	0	0	0
Worker Vector #3	0	1	0	0



Media Unit Vector	2	2	0	0
-------------------	---	---	---	---

BUILDING VECTORS
FOR THESE DIFFERENT
TASK TYPES

chihuahua
dog
muffin

Worker Vector #1	1	1	0
Worker Vector #2	1	0	0
Worker Vector #3	0	1	1



Media Unit Vector	2	2	1
-------------------	---	---	---

Type:

chihuahua, dog, muffin



CROWD TASKS

Describe The People In The Video

- Watch the video in full at least once.



OPEN ENDED

- Enter tags relevant to the people that appear in the video:
 - Click ADD+ or press Enter to add your tag to the list

Type your tag here: ADD+

Your tags: (click to remove)

Woman Repair Ship

Identify People In Video By Highlighting Text

- Please look at this video in full.



SELECT WORDS FROM TEXT

- Highlight the WORDS or PHRASES in the text that identify or refer to PEOPLE in the video.

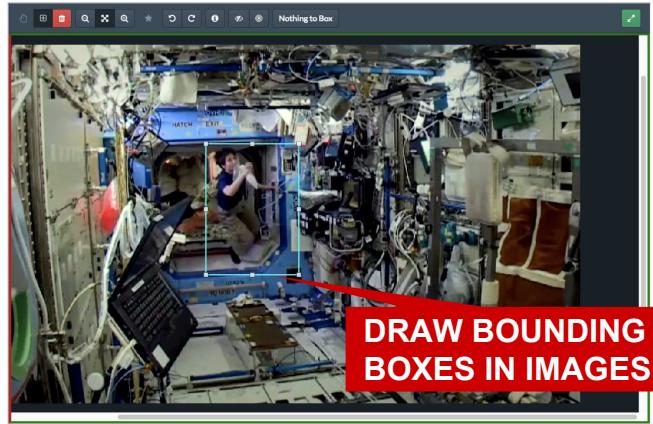
Italian astronaut samantha cristoforetti uploads a strange photograph she's taken

[x] Italian astronaut
 [x] astronaut
 [x] samantha cristoforetti
 [x] strange photograph

- Draw a bounding box around the persons in the image.

Keep in mind that:

- It is possible to draw more than one bounding box if necessary
- It is also possible to choose "Nothing to box" when no person appears in the image.



DRAW BOUNDING BOXES IN IMAGES

Are There People In The Video?

- Look at the video carefully.



BINARY CHOICE

- Are there any people in the video?

Select your answer:

Yes No
- Submit your answer.

Are There People In The Video?

- Look at the video carefully.



TERNARY CHOICE

- Are there any people in the video?

Select your answer:

Yes No Not Clear
- Submit your answer.

MULTIPLE CHOICE

Describe The Video By Selecting Tags Relevant To People

- Look at the video carefully.



MULTIPLE CHOICE

- Select all tags that identify or refer to people explicitly shown in the video.

Selected by me:

Archeologist	Architect	Artist
<input checked="" type="checkbox"/> Astronaut	<input type="checkbox"/> Athlete	<input type="checkbox"/> BusinessPerson
Celebrity	Chef	Criminal
<input checked="" type="checkbox"/> Engineer	<input type="checkbox"/> Farmer	<input type="checkbox"/> FictionalCharacter
Journalist	Judge	Lawyer
MilitaryPerson	Model	Monarch
Philosopher	Politician	Presenter
Producer	Psychologist	<input checked="" type="checkbox"/> Scientist
SportsManager	Writer	
<input type="checkbox"/> Other	<input type="checkbox"/> None	

REDUCED MULTIPLE CHOICE

Describe The Video By Selecting Tags Relevant To People

- Look at the video carefully.



REDUCED MULTIPLE CHOICE + OPEN INPUT

- Select all tags that identify or refer to people explicitly shown in the video.

Selected by me:

Italian	<input checked="" type="checkbox"/> Astronaut	<input checked="" type="checkbox"/> Samantha
Strange	<input checked="" type="checkbox"/> Photograph	Industry
Grinder	Production	<input checked="" type="checkbox"/> Technology
Equipment	Central Processing Unit	
Hardware	Technology	Business
<input checked="" type="checkbox"/> Computer		

Describe The Video By Selecting Tags Relevant To People

- Look at the video carefully.



REDUCED MULTIPLE CHOICE + OPEN INPUT

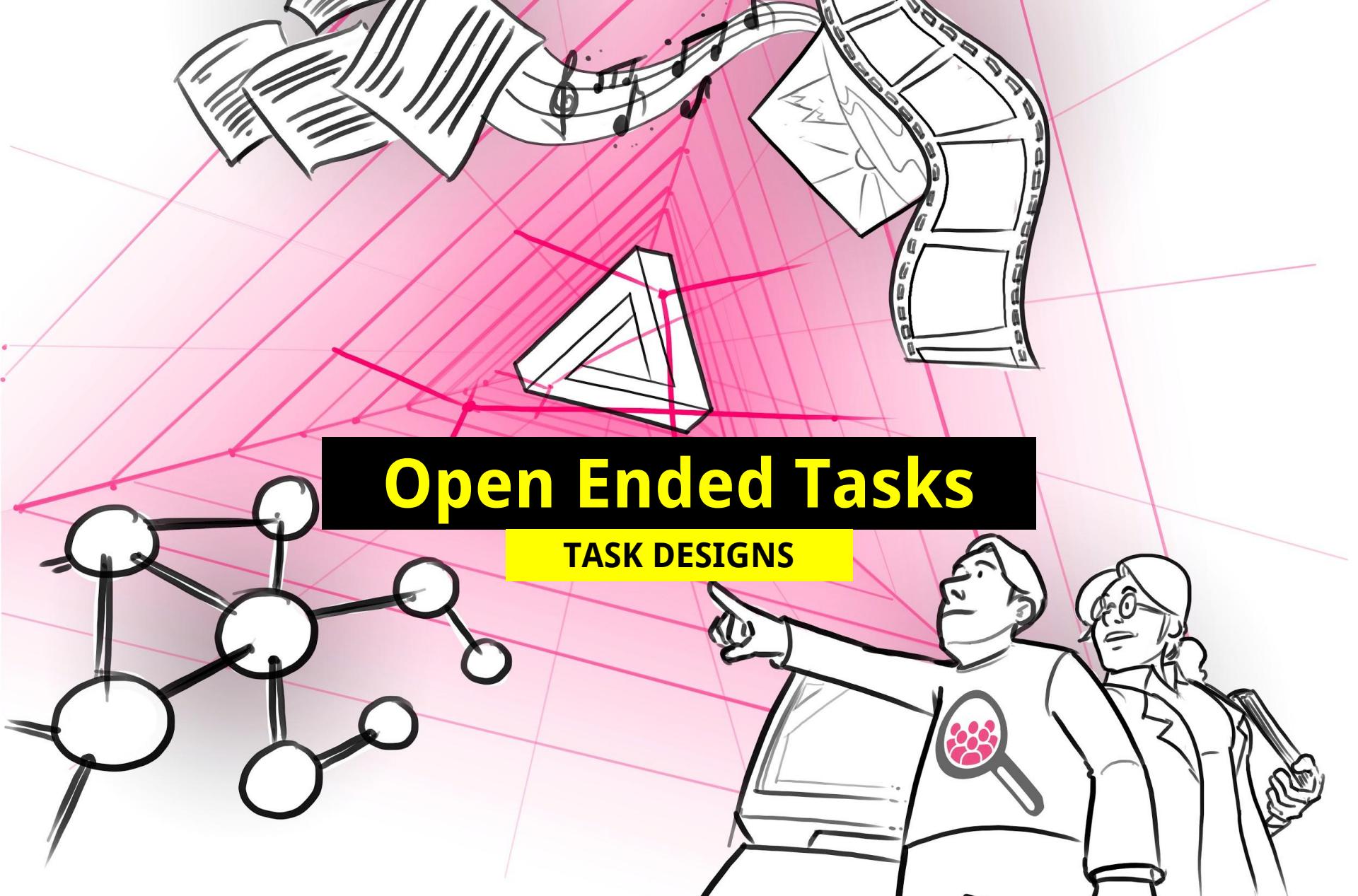
- Select all tags that identify or refer to people explicitly shown in the video.

Selected by me:

Italian	<input checked="" type="checkbox"/> Astronaut	<input checked="" type="checkbox"/> Samantha
Strange	<input checked="" type="checkbox"/> Photograph	Industry
Grinder	Production	<input checked="" type="checkbox"/> Technology
Equipment	Central Processing Unit	
Hardware	Technology	Business
<input checked="" type="checkbox"/> Computer		

Add new tags to the list:
 Type your tag here ADD+

Added by me: (click to remove)



Open Ended Tasks

TASK DESIGNS

Identify The Relations Between The Highlighted Terms In The Sentence

1 Read the following text:
TAIWAN court says it orders former President **CHEN SHUI-BIAN** detained on corruption charges .

2 Write all the RELATION(S) expressed in the sentence above between **CHEN SHUI-BIAN** and **TAIWAN**:

born in| ADD +

Relations: (click to remove)

✓ Employed By ✓ President Of ✓ Lives In ✓ Prosecuted By

Describe The People In The Video

1 Watch the video in full at least once.



0:00 / 0:05

2 Enter tags relevant to the people that appear in the video:
 o Click ADD+ or press Enter to add your tag to the list

Type your tag here ADD +

Your tags: (click to remove)

✓ Woman ✓ Repair ✓ Ship

2 Draw a bounding box around the persons in the image.

Keep in mind that:

- o It is possible to draw more than one bounding box if necessary
- o It is also possible to choose "Nothing to Box" when no person appears in the image.

Nothing to Box



✓ Highlight Events & Actions In Text

1

HIGHLIGHT the words and phrases in the text below that refer to EVENTS or ACTIONS, things that happened, are happening or will happen.

Separately , Esselte Business Systems reported third-quarter net income fell 5.9 % to \$ 9.5 million , or 46 cents a share , from \$ 10.1 million , or 49 cents a share , in the year-ago period .

List of your current selections:

reported
 net income fell 5.9 % to \$ 9.5 million
 fell

3

Have you highlighted all the events and actions? Submit your result:

✓ Identify Relations Between Terms By Highlighting Text

1

Read the following text:

TAIWAN court says it orders former President CHEN SHUI-BIAN detained on corruption charges .

2

Highlight the WORDS or PHRASES in the sentence that identify a relation between Chen Shui-bian and Taiwan.

Taiwan court
 orders former President

✓ Identify People In Video By Highlighting Text

1

Please look at this video in full.



2

Highlight the WORDS or PHRASES in the text that identify or refer to PEOPLE in the video.

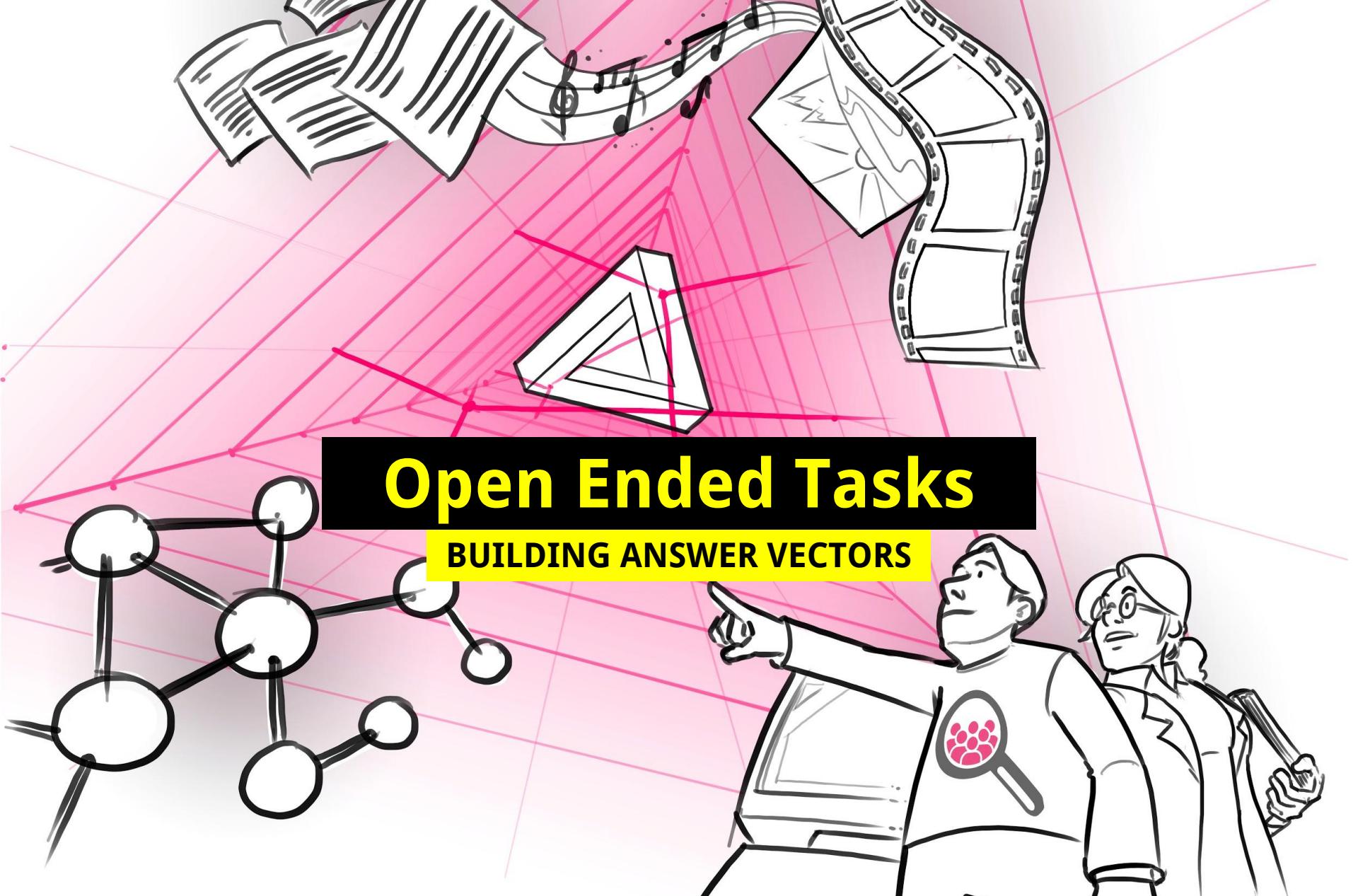
Italian astronaut samantha cristoforetti uploads a strange photograph she's taken

Italian astronaut

astronaut

samantha cristoforetti

strange photograph

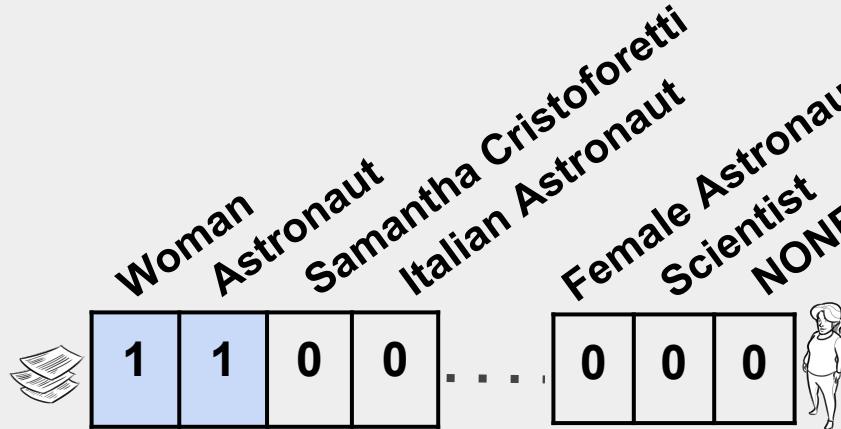


Open Ended Tasks

BUILDING ANSWER VECTORS

BUILDING ANSWER VECTORS

Open Ended



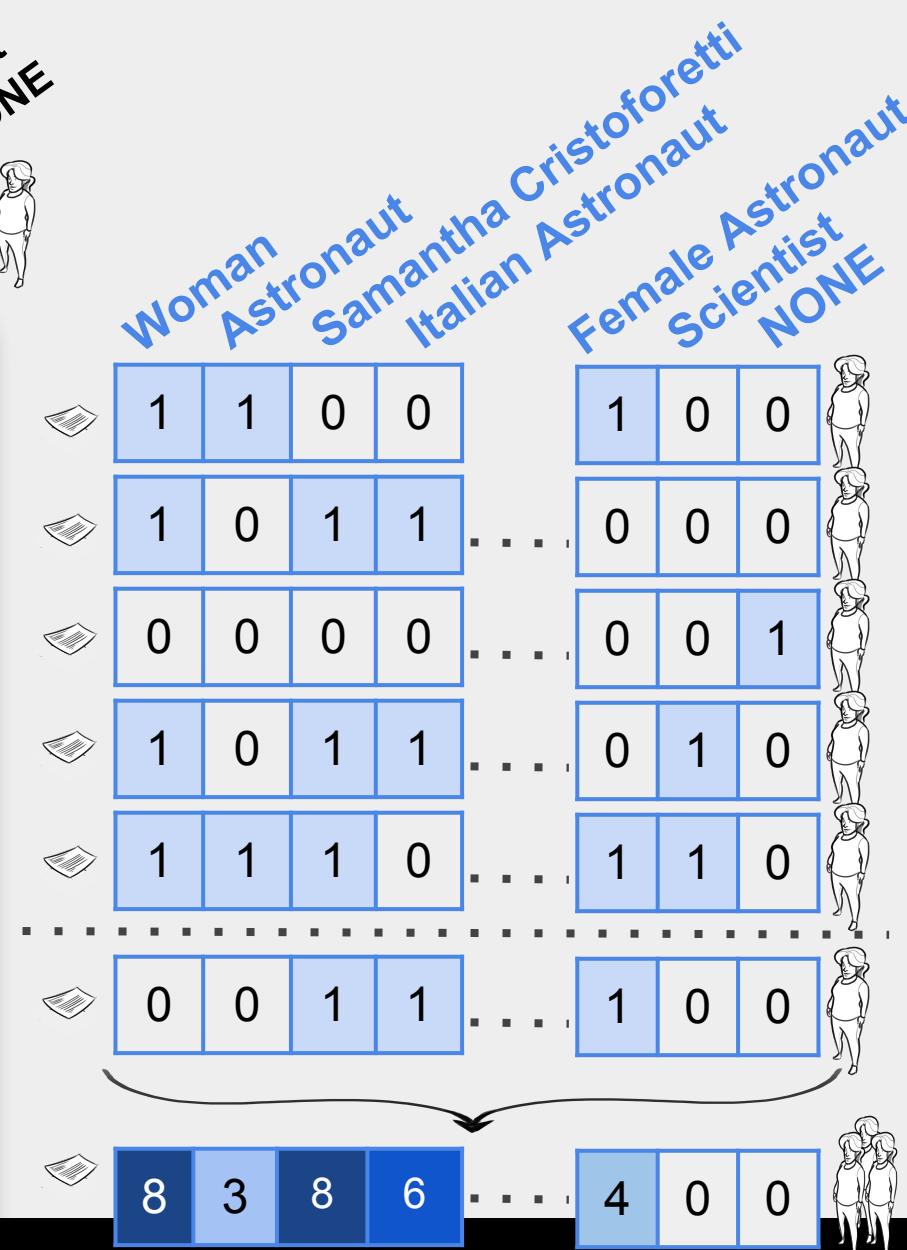
A screenshot of the CrowdTruth interface for video annotation. It shows a video player window displaying a scene inside a space station module. The video controls show 0:00 / 0:05. Below the video, a list of tasks:

- Watch the video in full at least once.

Below the video is a progress bar with a play button and a download icon.

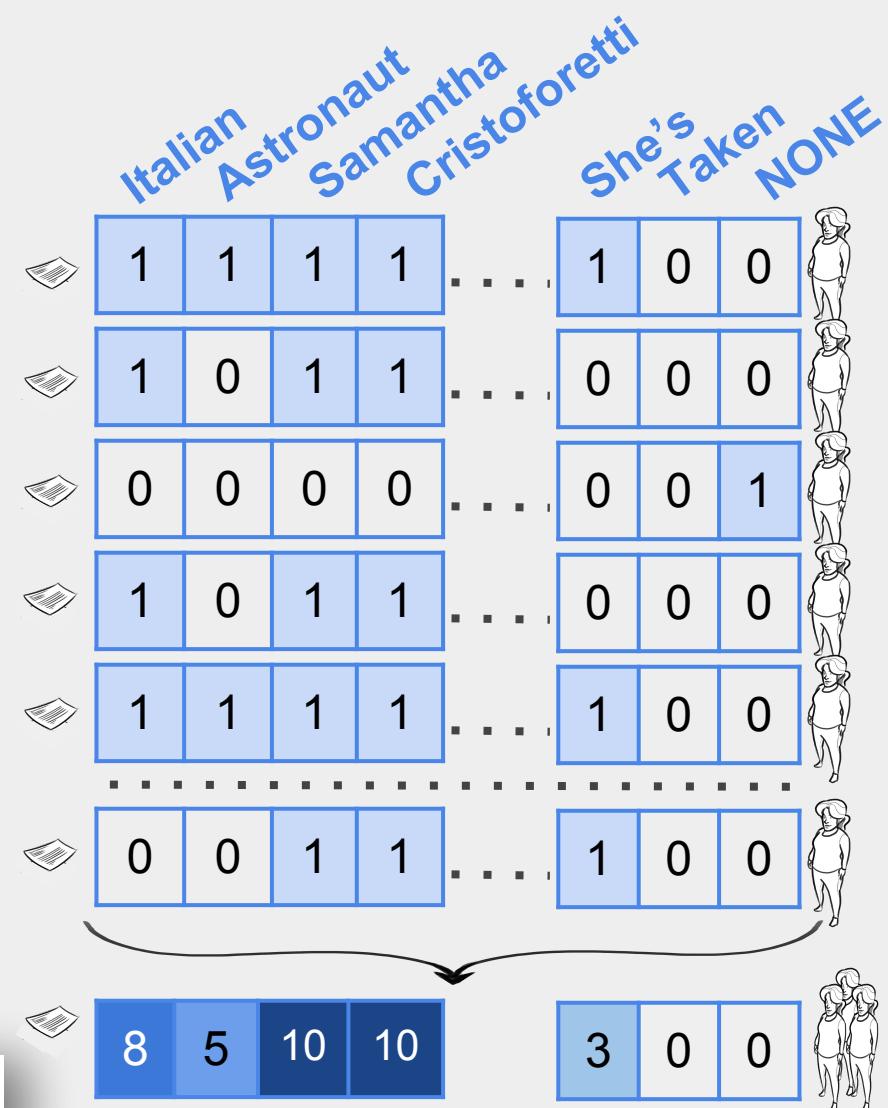
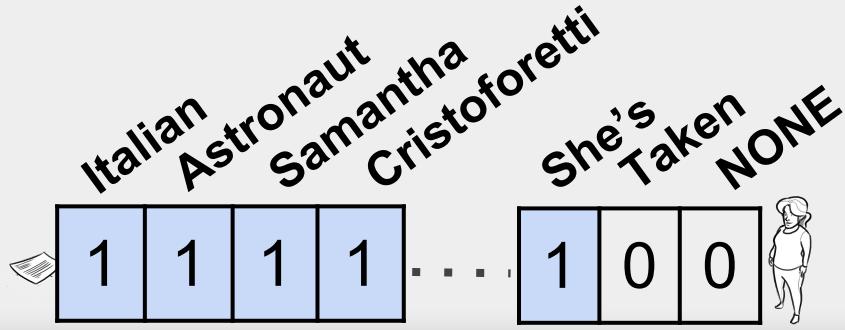
- Enter tags relevant to the people that appear in the video:
 - Click ADD+ or press Enter to add your tag to the list

A text input field labeled "Type your tag here" has "Woman" and "Astronaut" typed into it. A blue "ADD+" button is next to the input field. Below the input field, a box contains the text "Your tags: (click to remove)" and two green buttons with checkmarks: "✓ Woman" and "✓ Astronaut".



BUILDING ANSWER VECTORS

Open Ended



- 2 Highlight the WORDS or PHRASES in the text that identify or refer to people in the video.

Italian astronaut samantha cristoforetti uploads a strange photograph she's taken

[x] Italian
[x] astronaut samantha cristoforetti
[x] samantha cristoforetti



Closed Tasks

TASK DESIGNS

CROWD TASKS

Closed Tasks

Are There People In The Video?

1 Look at the video carefully.

0:00 / 0:05

2 Are there any people in the video?

Select your answer:

Yes No

3 Submit your answer.

BINARY CHOICE

Are There People In The Video?

1 Look at the video carefully.

0:00 / 0:05

2 Are there any people in the video?

Select your answer:

Yes No Not Clear

3 Submit your answer.

TERNARY CHOICE

Describe The Video By Selecting Tags Relevant To People

1 Look at the video carefully.

0:00 / 0:05

2 Select all tags that identify or refer to people explicitly shown in the video.

Selected by me:

- Astronaut Athlete BusinessPerson
 Celebrity Chef Criminal
 Engineer Farmer FictionalCharacter
 Journalist Judge Lawyer
 MilitaryPerson Model Monarch
 Philosopher Politician Presenter
 Producer Psychologist Scientist
 SportsManager Writer
 Other None

MULTIPLE CHOICE

Describe The Video By Selecting Tags Relevant To People

1 Look at the video carefully.

0:00 / 0:05

2 Select all tags that identify or refer to people explicitly shown in the video.

Selected by me:

- Italian Astronaut Samantha
 Strange Photograph Industry
 Grinder Production Technology
 Equipment Central Processing Unit
 Hardware Technology Business
 Computer

MULTIPLE CHOICE (REDUCED) + OPEN INPUT

Describe The Video By Selecting Tags Relevant To People

1 Look at the video carefully.

0:00 / 0:05

2 Select all tags that identify or refer to people explicitly shown in the video.

Selected by me:

- Astronaut Samantha
 Strange Photograph Industry
 Grinder Production Technology
 Equipment Central Processing Unit
 Hardware Technology Business
 Computer

Added by me: (click to remove)

3 Add new tags to the list:

Type your tag here

ADD +

MULTIPLE CHOICE (REDUCED)

CROWD TASKS

Closed Tasks

Given The Sentence, Is The Statement True Or False?

powered by
CrowdTruth 

- 1 Read the following text:

TAIWAN court says it orders former President CHEN SHUI-BIAN detained on corruption charges .

- 2 Given the sentence above, is the statement below TRUE or FALSE:

CHEN SHUI-BIAN is/was a top member/employee of TAIWAN

- TRUE
 FALSE

Select All Statements That Hold True Between The Highlighted Terms

powered by
CrowdTruth 

- 1 Read the following text:

TAIWAN court says it orders former President CHEN SHUI-BIAN detained on corruption charges .

- 2 Select all statements that are expressed in the text above:

<input checked="" type="checkbox"/>	CHEN SHUI-BIAN is/was a member/employee of TAIWAN	<input type="checkbox"/>	TAIWAN was founded by CHEN SHUI-BIAN
<input checked="" type="checkbox"/>	CHEN SHUI-BIAN is/was a top member/employee of TAIWAN	<input checked="" type="checkbox"/>	CHEN SHUI-BIAN is a person who lives/lived in TAIWAN
<input type="checkbox"/>	CHEN SHUI-BIAN is a person who is/was born in TAIWAN	<input type="checkbox"/>	CHEN SHUI-BIAN is a person who died in TAIWAN
<input checked="" type="checkbox"/>	CHEN SHUI-BIAN is a person originating from TAIWAN	<input type="checkbox"/>	There is no valid expression above

Select All Statements That Hold True Between The Highlighted Terms

- 1 Read the following text:

TAIWAN court says it orders former President CHEN SHUI-BIAN detained on corruption char

- 2 Select all statements that are expressed in the text above:

<input type="checkbox"/>	headquarters of CHEN SHUI-BIAN are located at TAIWAN	<input type="checkbox"/>	CHEN SHUI-BIAN is/was a subsidiary of TAIWAN
<input checked="" type="checkbox"/>	CHEN SHUI-BIAN is/was a member/employee of TAIWAN	<input type="checkbox"/>	TAIWAN was founded by CHEN SHUI-BIAN
<input checked="" type="checkbox"/>	CHEN SHUI-BIAN is/was a top member/employee of TAIWAN	<input type="checkbox"/>	CHEN SHUI-BIAN has the alternate name TAIWAN
<input type="checkbox"/>	CHEN SHUI-BIAN died because of TAIWAN	<input type="checkbox"/>	CHEN SHUI-BIAN is/was charged with TAIWAN
<input type="checkbox"/>	CHEN SHUI-BIAN is the father/mother of TAIWAN	<input checked="" type="checkbox"/>	CHEN SHUI-BIAN is a person who lives/lived in TAIWAN
<input type="checkbox"/>	CHEN SHUI-BIAN is a person who is/was born in TAIWAN	<input type="checkbox"/>	CHEN SHUI-BIAN is a person who died in TAIWAN
<input type="checkbox"/>	CHEN SHUI-BIAN attended school(s) TAIWAN	<input checked="" type="checkbox"/>	CHEN SHUI-BIAN is a person originating from TAIWAN
<input type="checkbox"/>	CHEN SHUI-BIAN is/was married to TAIWAN	<input type="checkbox"/>	CHEN SHUI-BIAN is a person with the title of TAIWAN
There is no valid expression above			

Select The Valid Events & Actions

1 In the following text:

Text:

Separately, Esselte Business Systems **reported** third-quarter net income **fell** 5.9% to \$ 9.5 million, or 46 cents a share, from \$ 10.1 million, or 49 cents a share, in the year-ago period.

2 Which phrases refer to events or actions?

- Mouse-over the word phrases to see where they are located in the text.

\$ 10.1

✓ Reported

✓ Fell

\$ 9.5

None Of The Above

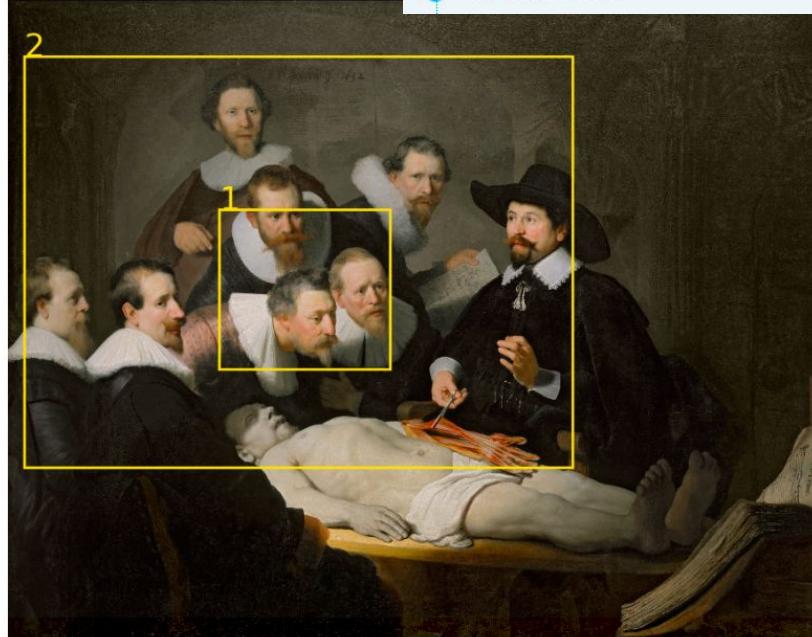
2 Read the text snippet about the painting below:

The sitters had to pose for a relatively short period of time, as Rembrandt

3 Indicate which boxes in the painting are connected:

Remember that you must evaluate all the boxes depicted in the painting

3 Submit your result:

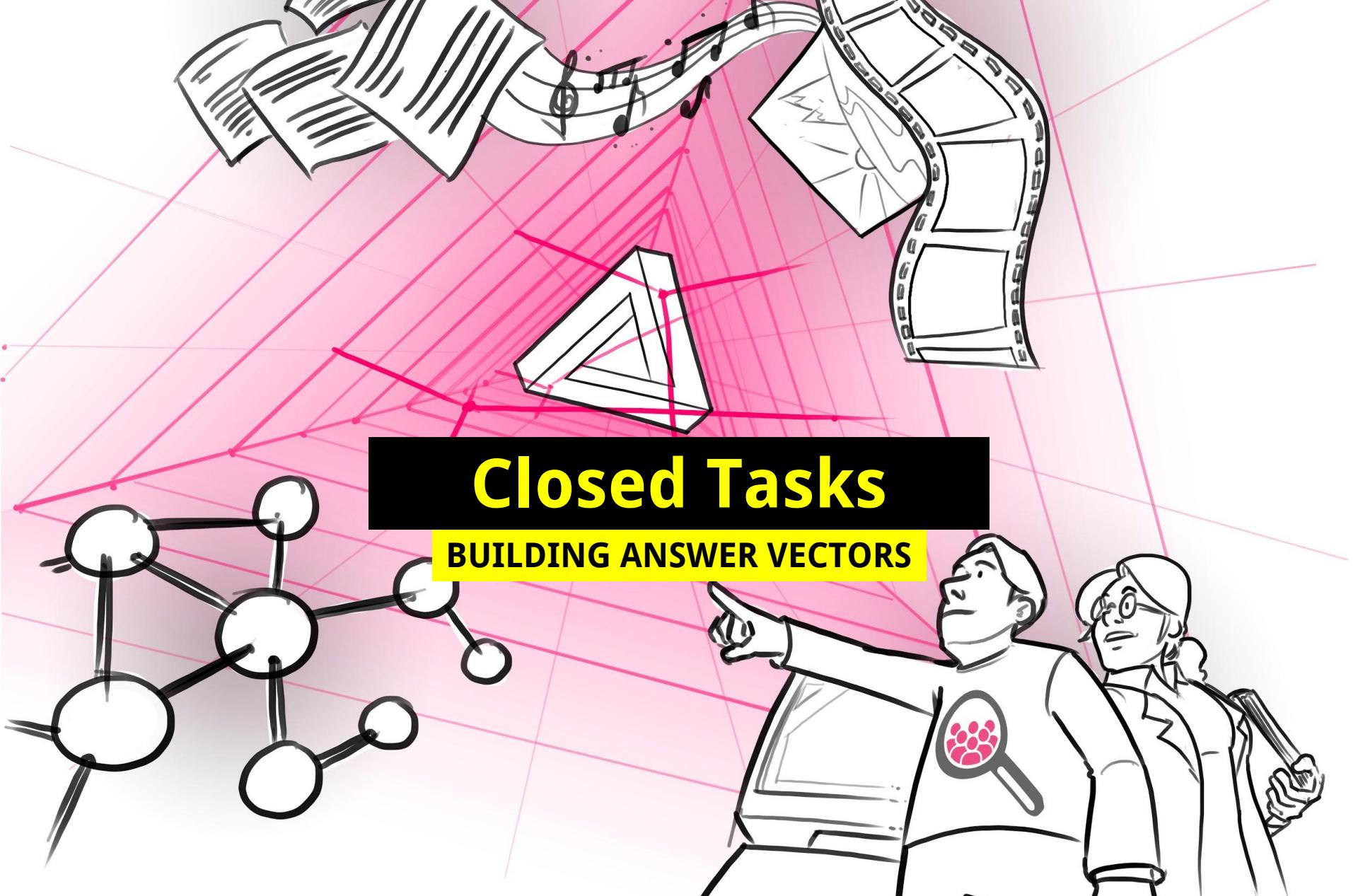


BOX 1 (required)

- YES, the text is relevant to this box
- NO, the text is not relevant to this box

BOX 2 (required)

- YES, the text is relevant to this box
- NO, the text is not relevant to this box



Closed Tasks

BUILDING ANSWER VECTORS

BUILDING ANSWER VECTORS

Binary Choice Tasks

✓ Are There People In The Video?

powered by CrowdTruth

1 Look at the video carefully.

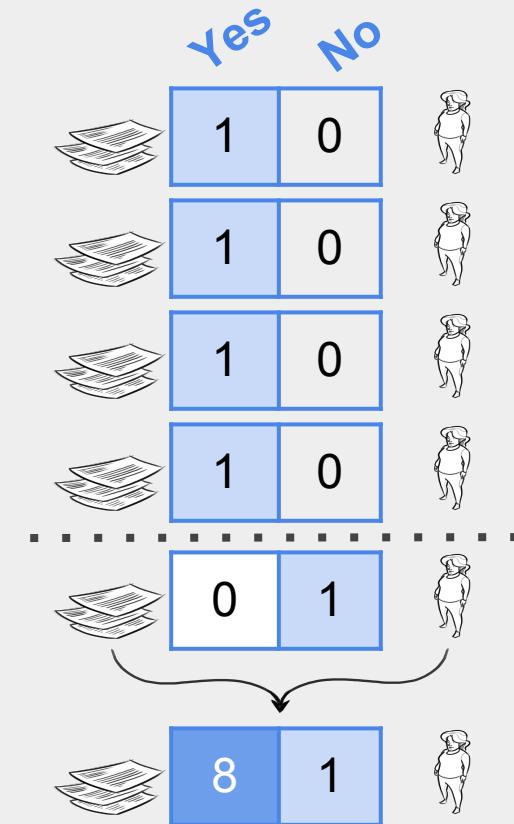


2 Are there any people in the video?

Select your answer:

Yes No

3 Submit your answer.



BUILDING ANSWER VECTORS

Ternary Choice Tasks

Are There People In The Video?

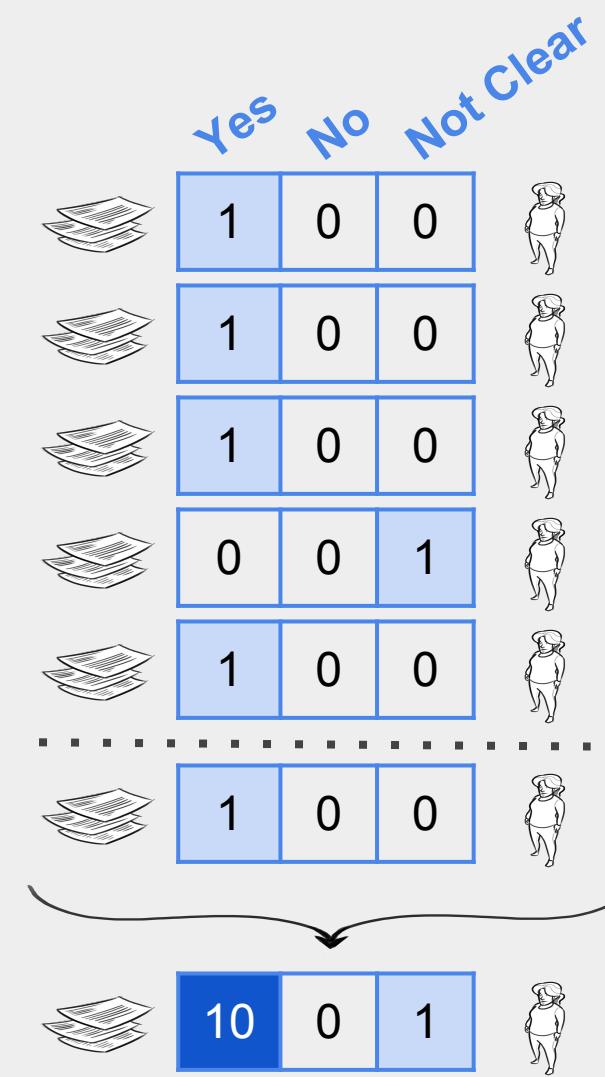
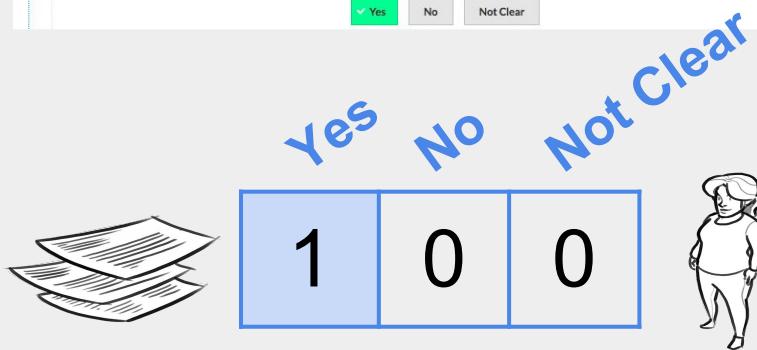
Look at the video carefully.



Are there any people in the video?

Select your answer:

Yes No Not Clear

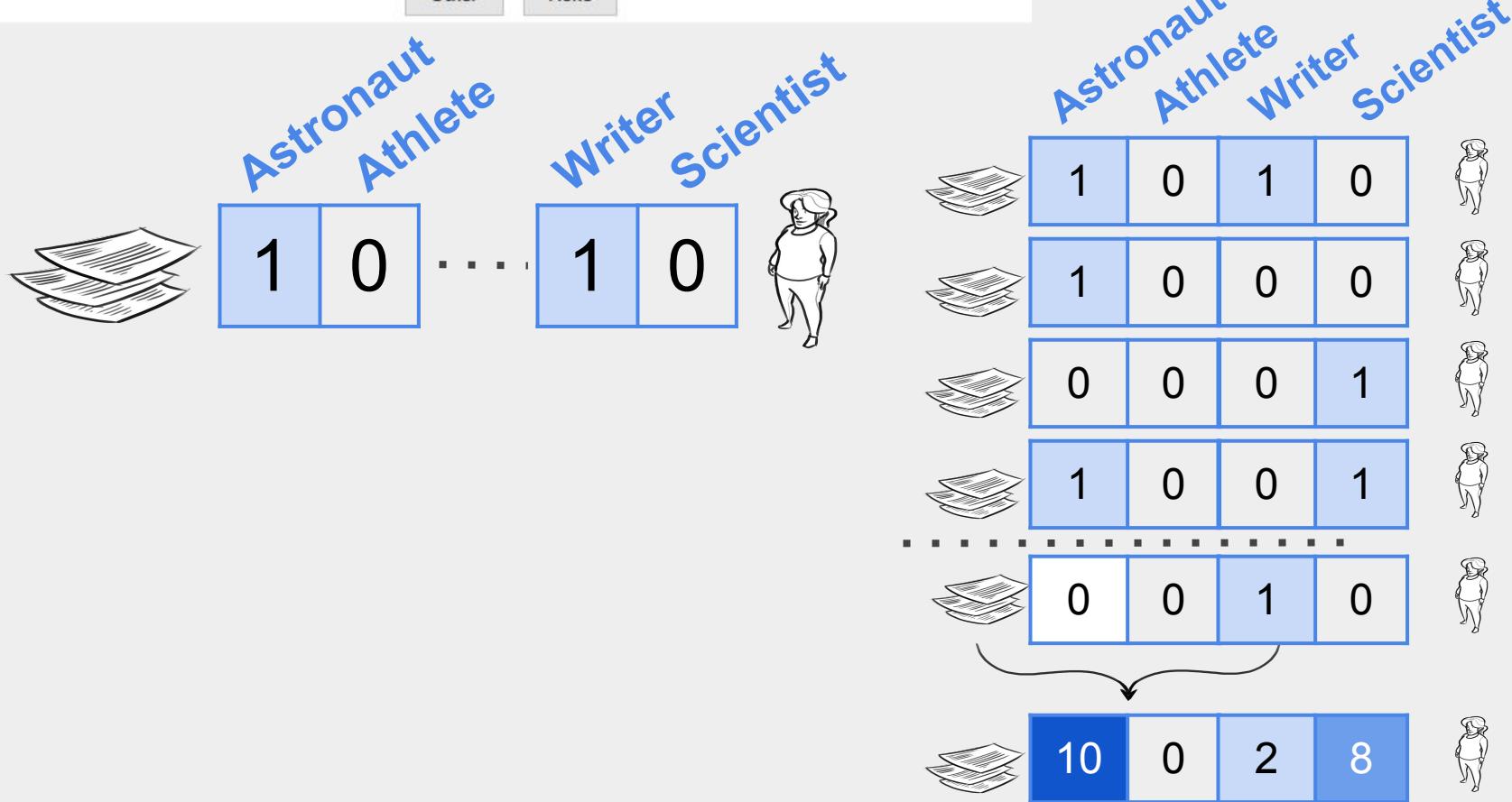


BUILDING ANSWER VECTORS

Multiple Choice Tasks

Select your answer:

Archeologist	Architect	Artist	Astronaut	Athlete	BusinessPerson		
Celebrity	Chef	Criminal	Engineer	Farmer	FictionalCharacter	Journalist	
Judge	Lawyer	MilitaryPerson	Model	Monarch	Philosopher	Politician	
Presenter	Producer	Psychologist	Scientist	SportsManager	Writer		
Other		None					



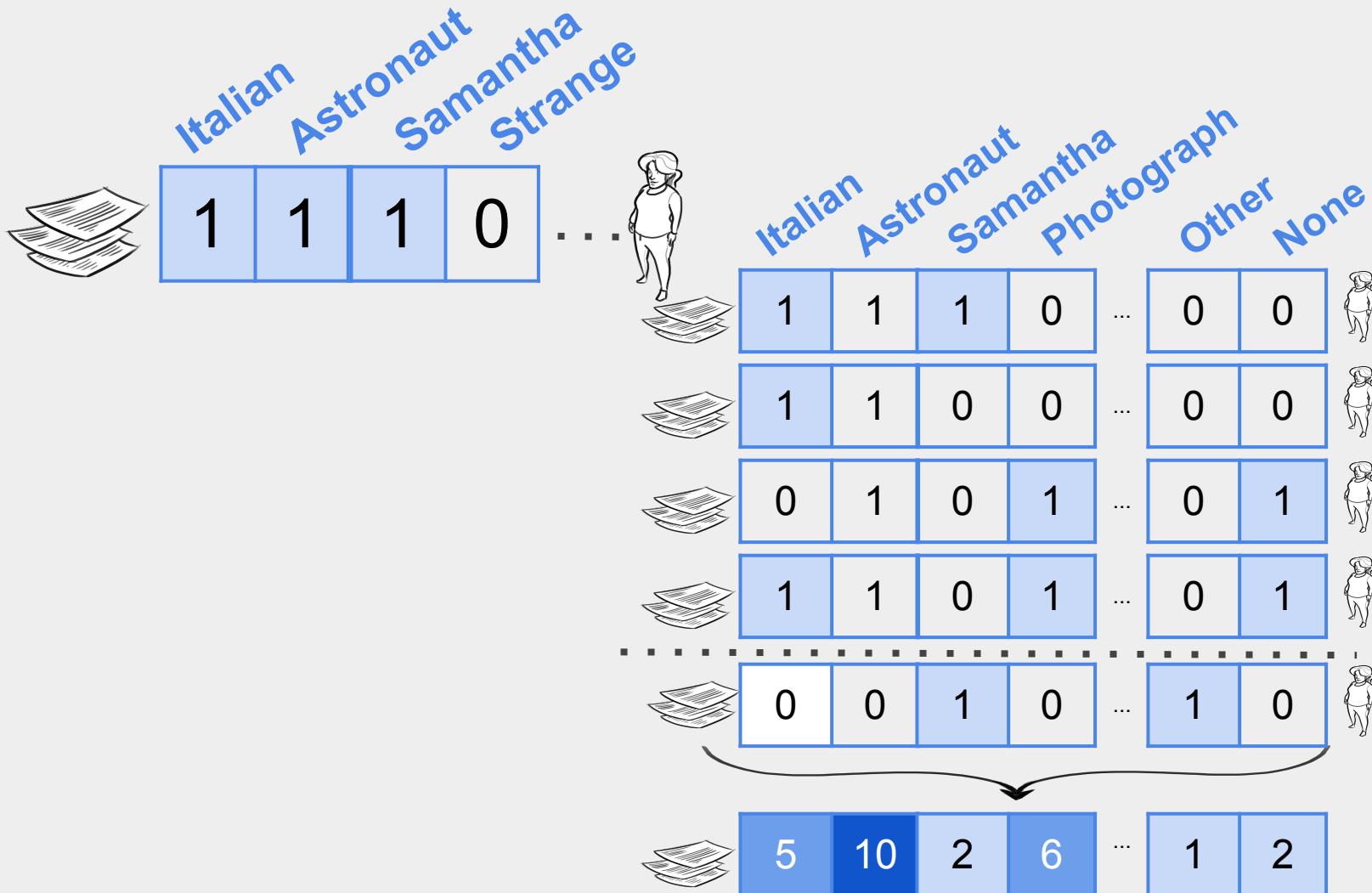
BUILDING ANSWER VECTORS

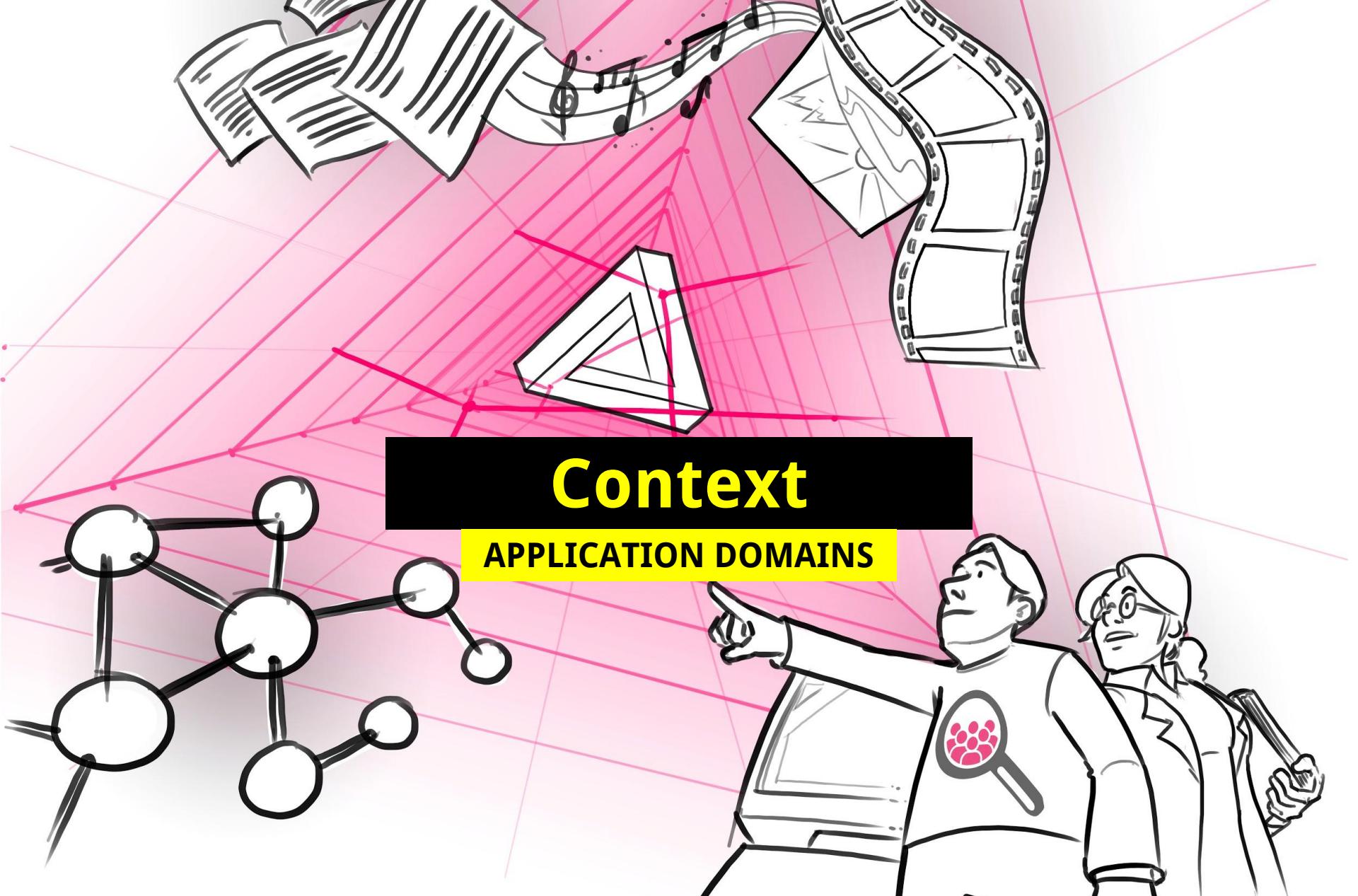
Denced Multiple Choice Tasks

2 Select all tags that identify or refer to people explicitly shown in the video.

Selected by me:

Italian Astronaut Samantha Strange Photograph Industry Grinder Production Technology
 Equipment Central Processing Unit Hardware Technology Business Computer
 Other None Of The Above





Context

APPLICATION DOMAINS

Select all tags that are relevant to the video

Watch the full video at least once
Additional instructions here, only if strictly necessary

Enter tags that are relevant to the video

Watch the full video at least once
Additional instructions here, only if strictly necessary

Select all tags that are explicit

Dover Journey

Add new tags to the list:

Have you selected all relevant tags?

Enter tags relevant to the video:
Click the Add+ button or press <Enter> to add your tag to the list

Type your tag here ADD +

Dover My tag My tag My tag My tag My tag
My tag This tag is invalid My tag

Have you entered all relevant tags? Submit your result:

Submit >

Mark and describe all iconic clothing and accessories in this image

Look at the following image

Mark all iconic clothing or accessories
Use your mouse to draw a border on the image, to mark the required regions

Add a relevant description to the marked regions

Yoko Ono's Sunglasses
Yoko Ono's Raincoat
John Lennon's Glasses

Have you marked and described all iconic clothing and accessories?

Select tags relevant to the image.

Look at the image carefully.

Enter tags relevant to the image
Separate multiple tags by comma's

man, verylonginvalidtag,david bowie

man verylonginvalidtag david bowie

Check your answers.
Make sure you have entered all the relevant tags.

Submit

VIDEO & IMAGE ENRICHMENT

CrowdTruth with Amazon Mechanical Turk & Figure Eight

L. Aroyo, C. Welty: *CrowdTruth: Harnessing disagreement in crowdsourcing relex gold standard*. ACM WebSci 2013.
 L. Aroyo, C. Welty. *The Three Sides of CrowdTruth*, Journal of Human Computation, 2014

✓ Pick the best text for the marked image area

1 Look at the following painting:



2 Which is the most appropriate text that belongs to the green box drawn in the painting?

Doctor Tulp was on of the most famous doctors of his time

The arm is here dissected because Rembrandt took inspiration from Andreas Vesalius "De Humani corporis fabrica"

The collars were very fashionable at that time

3 Have you selected the most relevant text? Submit your result!

SUBMIT >

✓ Answers the question in text and an bounding box

1 Look at the following painting:



2 What question could be asked for the following answer?

The man with the hat is doctor Tulp

Type a possible question here...

3 Draw a bounding box in the painting to identify the region that corresponds best to the answer above (if any)

- To draw a bounding box: click with your left mouse button on the painting and drag a rectangular shape.

4 Have you entered a question and drawn the bounding box? Submit your results!

SUBMIT >

IMAGE ENRICHMENT

CrowdTruth with Mauritshuis

Nikita Galinkin, Zoltán Szlávik, Lora Aroyo and Benjamin Timmermans (2017).

Catch Them If You Can: A Simulation Study on Malicious Behavior in a Cultural Heritage Question Answering System. The 29th Benelux Conference on Artificial Intelligence (BNAIC 2017).



**With
Watson™**

✓ Extract medical relations from the sentence

- 1 Read the following sentence:

Among 56 subjects reporting to a clinic with symptoms of **malaria**, 53 (95%) had ordinarily effective levels of **chloroquine** in blood.

- 2 Is **Chloroquine** related to **Malaria**? Choose all that apply:

Manifestation Diagnosed By Causes Location Treats

Is A

Location

Associated With

Symptom

- 3 Add new tags to the list:

my-tag

ADD +

- 4 Have you selected all relevant tags? Submit your result:

SUBMIT 2 RESULTS >

RELATION EXTRACTION

CrowdTruth for Medical Domain

Anca Dumitrasche, Lora Aroyo and Chris Welty: Crowdsourcing Ground Truth for Medical Relation Extraction. ACM TiiS Special Issue on Human-Centered Machine Learning.



Select All Valid Expressions

- 1 Read the following text:

At least two other buildings , one used by tax officials , caught fire in other fire - bomb attacks on the margins of the protests .

- 2 Select all statements that are expressed in the text above:

- Hover over each statement to see which are the terms in the text.
- Choose only the statements that are expressed in the text above.

CAUGHT FIRE caused PROTESTS

CAUGHT FIRE is caused by PROTESTS

CAUGHT FIRE caused ATTACKS

CAUGHT FIRE is caused by ATTACKS

PROTESTS caused ATTACKS

PROTESTS is caused by ATTACKS

There is no valid expression above

RELATION EXTRACTION

CrowdTruth for Open Domain

Anca Dumitrasche, Lora Aroyo and Chris Welty: Crowdsourcing Ground Truth for Medical Relation Extraction. ACM TiiS Special Issue on Human-Centered Machine Learning.



✓ Select Relevant Statements

1 Read the text:

But environmentalists fear that the Amazon may face new threats ahead. A state-of-the-art radar surveillance project to reveal the Amazon's hidden resources is under way, as well as major road projects to make the Amazon more accessible for industry.

2 Select all the text snippets that refer to the text above.

- If no text SNIPPETS are relevant, select 'NONE OF THE ABOVE'.

Describes a cult by name and identifies the cult members' activities in their everyday life.

Provides examples of cooperation or friendly ties between Iran and Iraq, or ways in which the two countries could be considered allies.

Discusses whether it is hazardous to the health of individuals to work with computer terminals on a daily basis.

Identifies incidents of human smuggling.

Discusses opposition to the use of the euro, the European currency.

Discusses mainstreaming children with physical or mental impairments.

Discusses measures that are being taken by local South American authorities to preserve the Amazon tropical rain forest.

Explains how much sugar Cuba exports and which countries import it.

Discusses efforts that have been made to stabilize the Leaning Tower of Pisa, and how successful have the efforts been.

Describes an advantage in hiring potential or increased income for graduates of U.S. colleges.

NONE OF THE ABOVE

3 Submit your result:

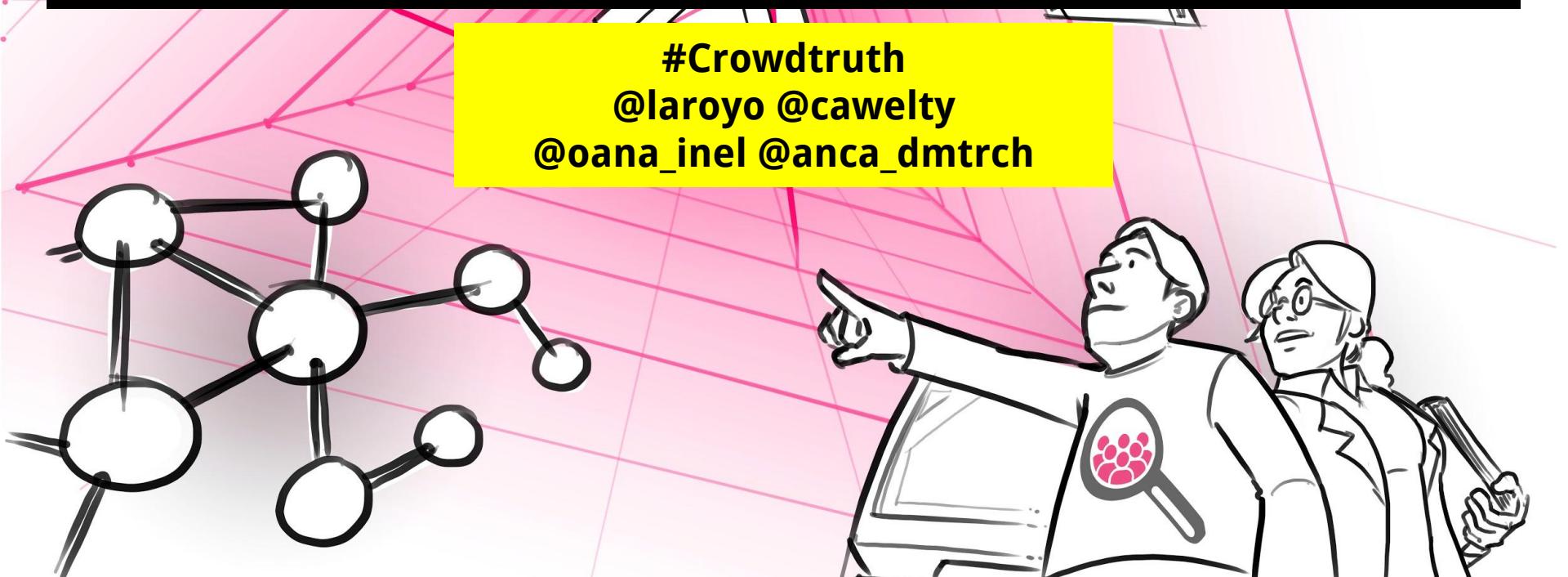
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