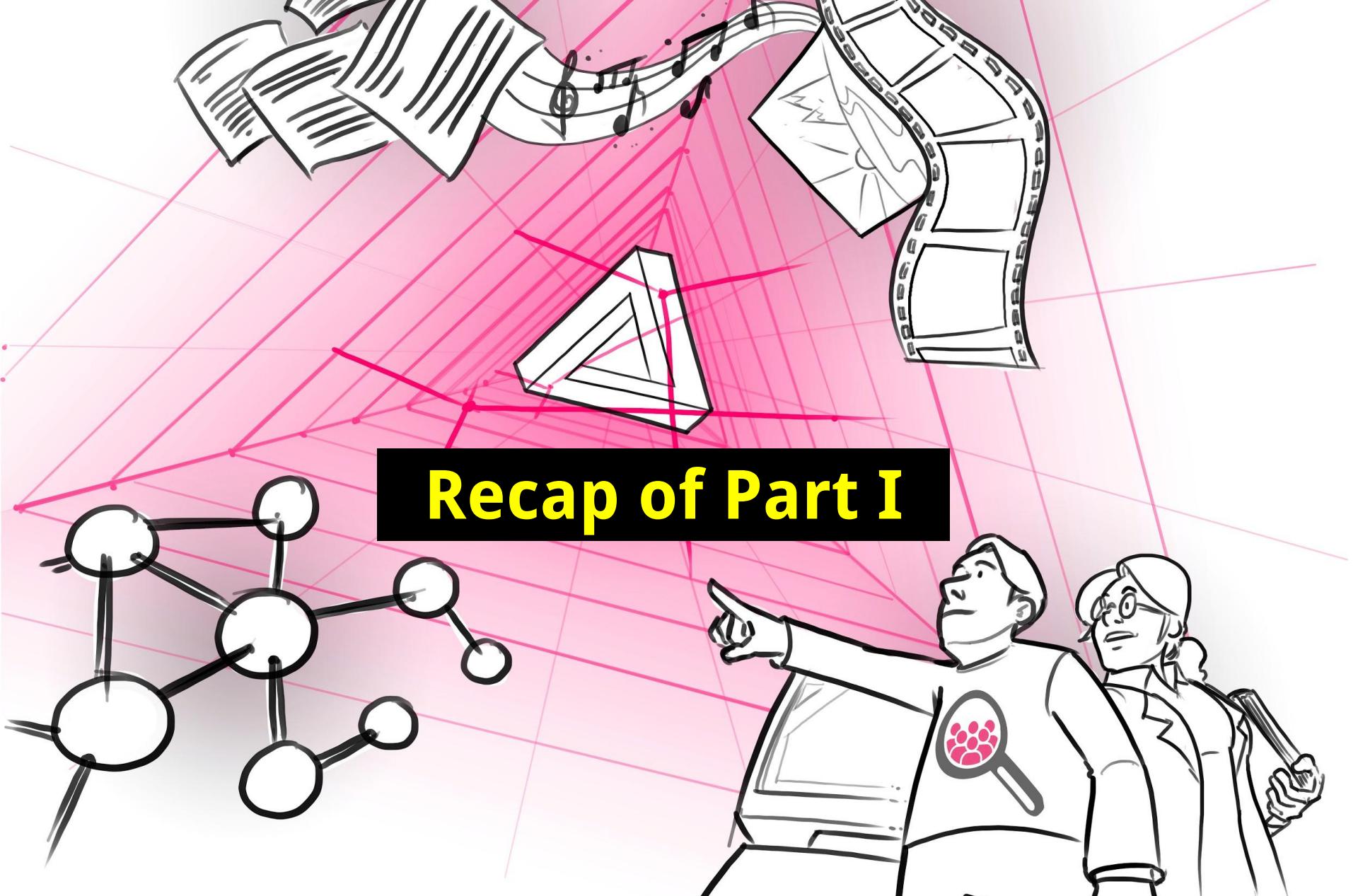


CROWDTRUTH TUTORIAL

Part II: CrowdTruth Task Design & Building CrowdTruth Vectors

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

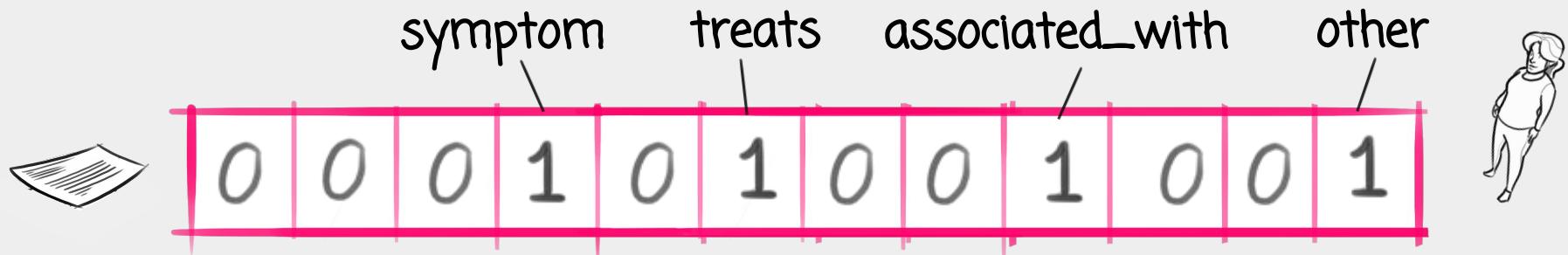
✓ Other

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

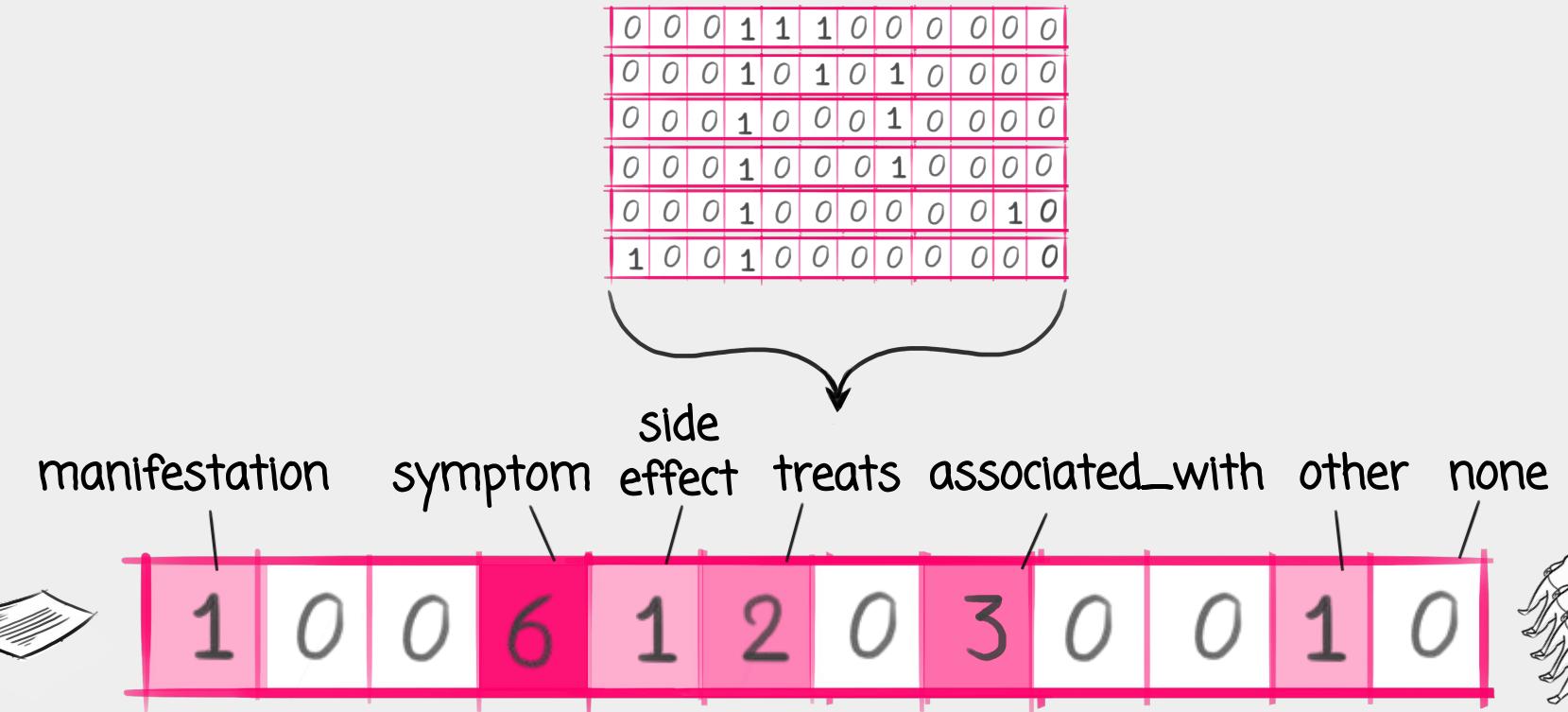
Among 56 subjects reporting to a clinic with symptoms of **MALARIA** 53 (95%) had ordinarily effective levels of **CHLOROQUINE** in blood.

	symptom		treats		associated_with		other		
	0	0	0	1	1	1	0	0	0
	0	0	0	1	0	1	0	1	0
	0	0	0	1	0	0	0	1	0
	0	0	0	1	0	0	0	1	0
	0	0	0	1	0	0	0	0	1
	1	0	0	1	0	0	0	0	0



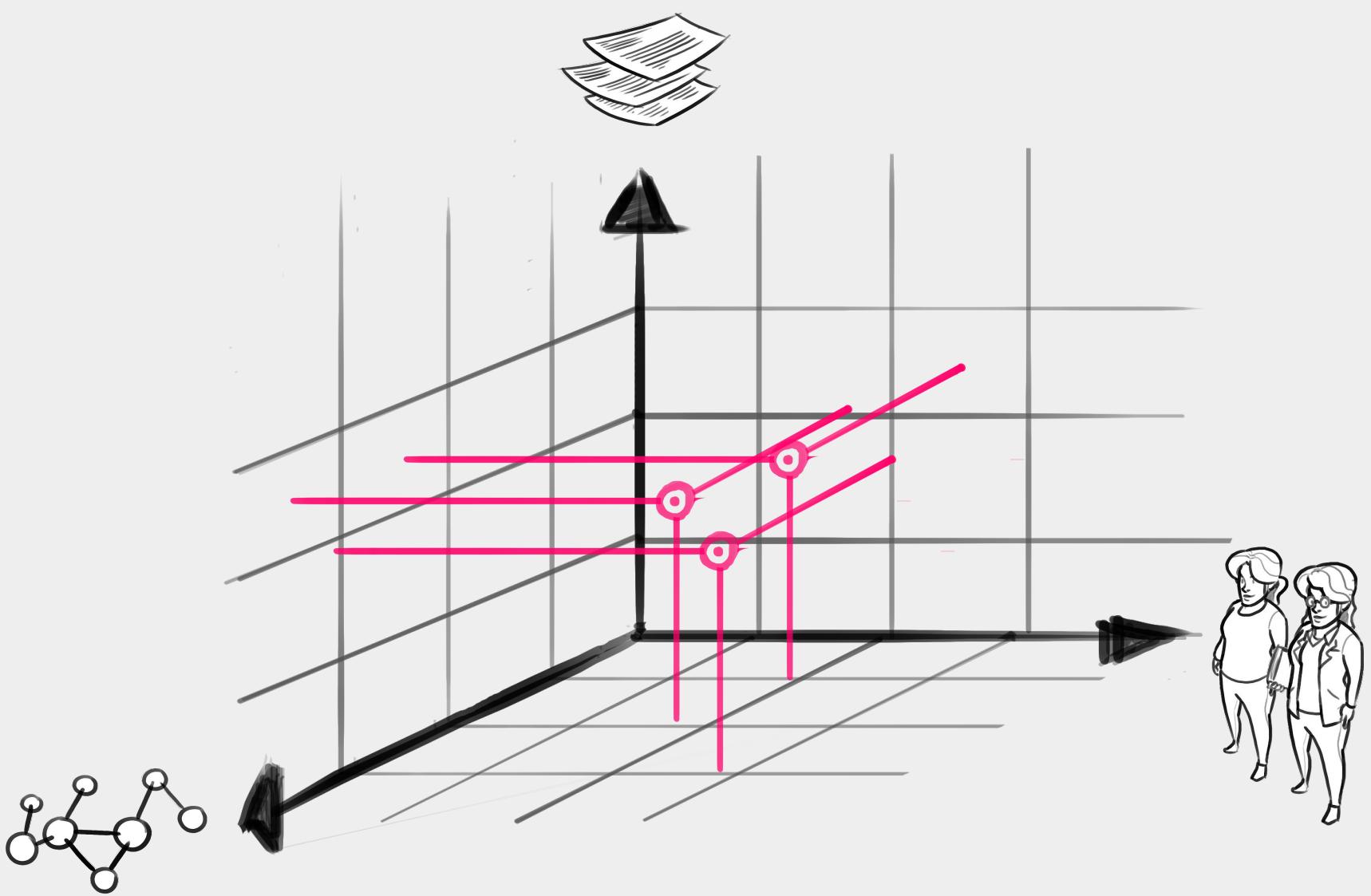
ALL WORKER VECTORS AGGREGATED IN A SENTENCE VECTOR

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



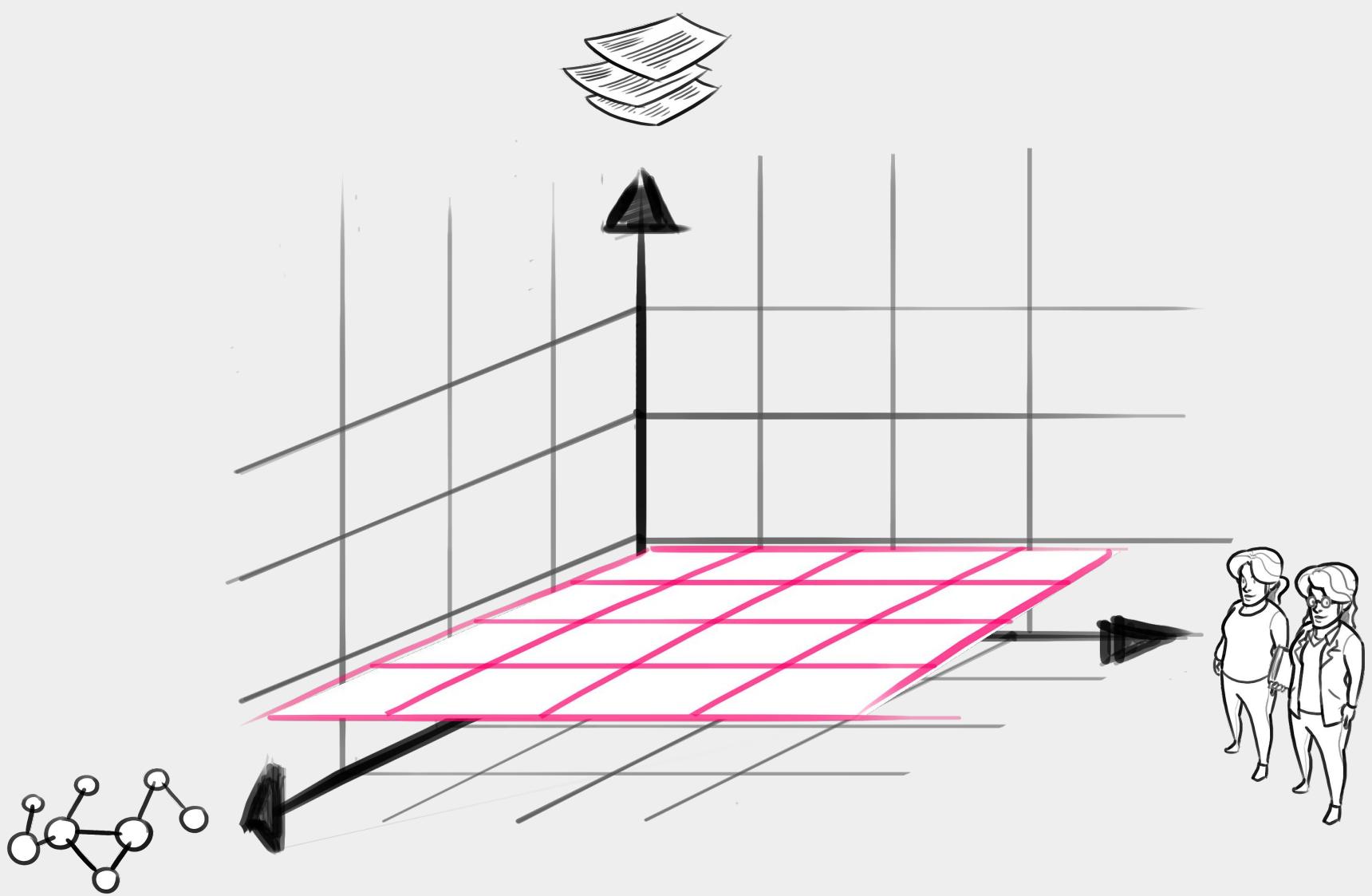
SENTENCE VECTORS FOR DIFFERENT SENTENCES





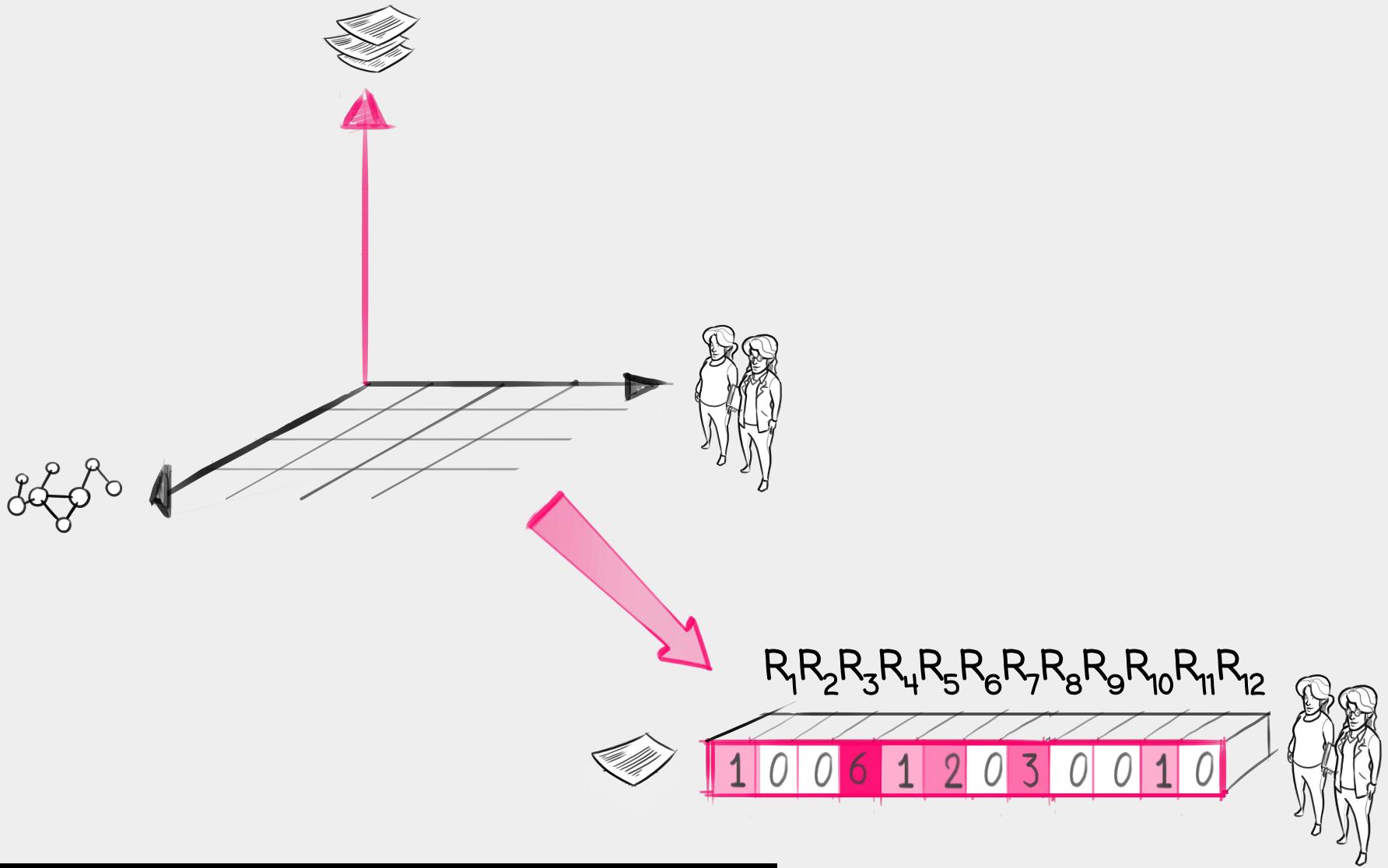
HYPER-DIMENSIONAL SPACE

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

OPEN TASK

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

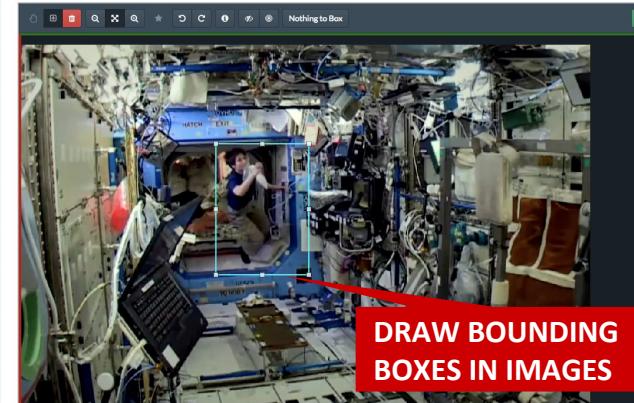
[x] samantha cristoforetti

[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?

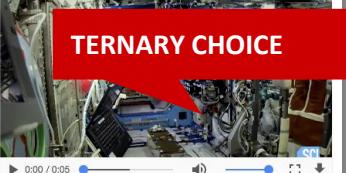
Select your answer:

 - 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		

**SPARSE MULTIPLE CHOICE
+ OPEN INPUT**

Describe The Video By Selecting Tags Relevant To People

- Look at the video carefully.



SPARSE 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 type="checkbox"/> Computer		

Added by me: (click to remove)

Type your tag here: ADD+

Describe The Video By Selecting Tags Relevant To People

- Look at the video carefully.



SPARSE MULTIPLE CHOICE + OPEN INPUT

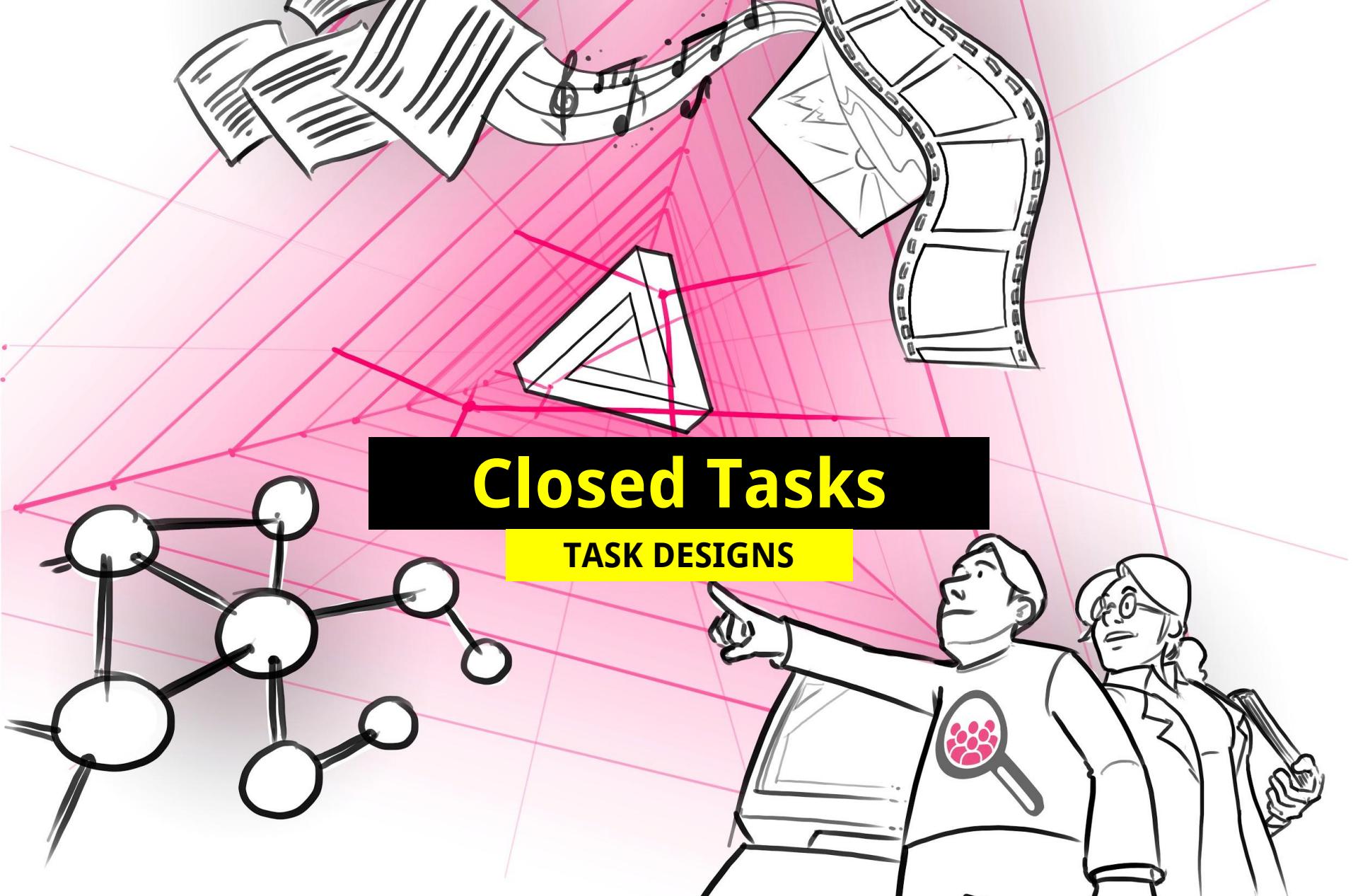
- Select all tags that identify or refer to people explicitly shown in the video.

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
Technology	Central Processing Unit	
Computer		Business

Added by me: (click to remove)

Type your tag here: ADD+



Closed Tasks

TASK DESIGNS

CROWD TASKS

Closed Tasks

✓ Are There People In The Video?

1 Look at the video carefully.



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.



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.



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.

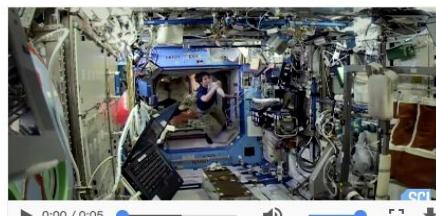


2 Select all tags that identify or refer to people explicitly shown in the video.
Selected by me:
 Italian Astronaut Samantha
 Strange Photograph Industry
 Grinder Production Technology
 Equipment Central Processing Unit
 Hardware Technology Business
 Computer

MULTIPLE CHOICE (SPARSE) + OPEN INPUT

✓ Describe The Video By Selecting Tags Relevant To People

1 Look at the video carefully.



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

Added by me: (click to remove)

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

MULTIPLE CHOICE (SPARSE)

CROWD TASKS

Closed Tasks

Given The Sentence, Is The Statement True Or False?

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

BINARY CHOICE

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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:

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

powered by
CrowdTruth 

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 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	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
CHEN SHUI-BIAN is a person who is/was born in TAIWAN	CHEN SHUI-BIAN is a person who died in TAIWAN
<input checked="" type="checkbox"/> CHEN SHUI-BIAN is a person originating from TAIWAN	There is no valid expression above

MULTIPLE CHOICE

MULTIPLE CHOICE

CROWD TASKS

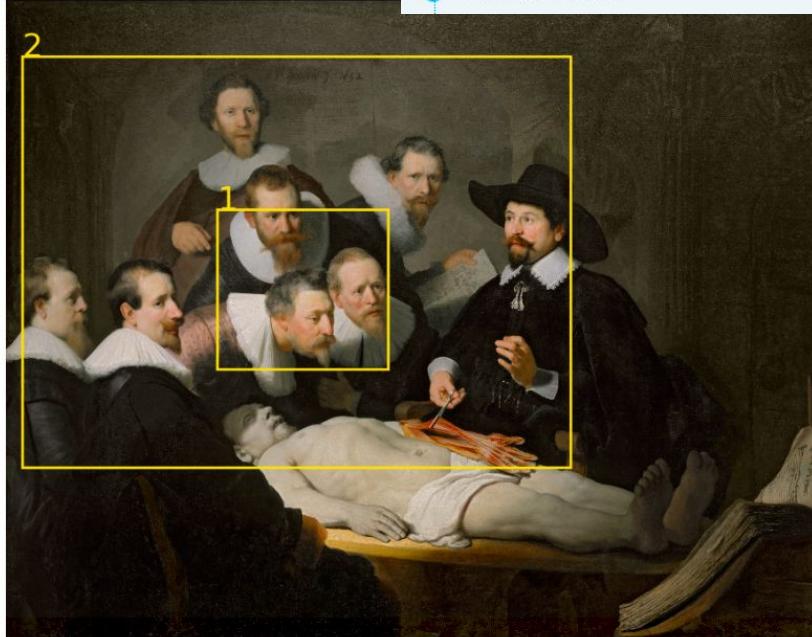
Closed Tasks

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



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

✓ 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**

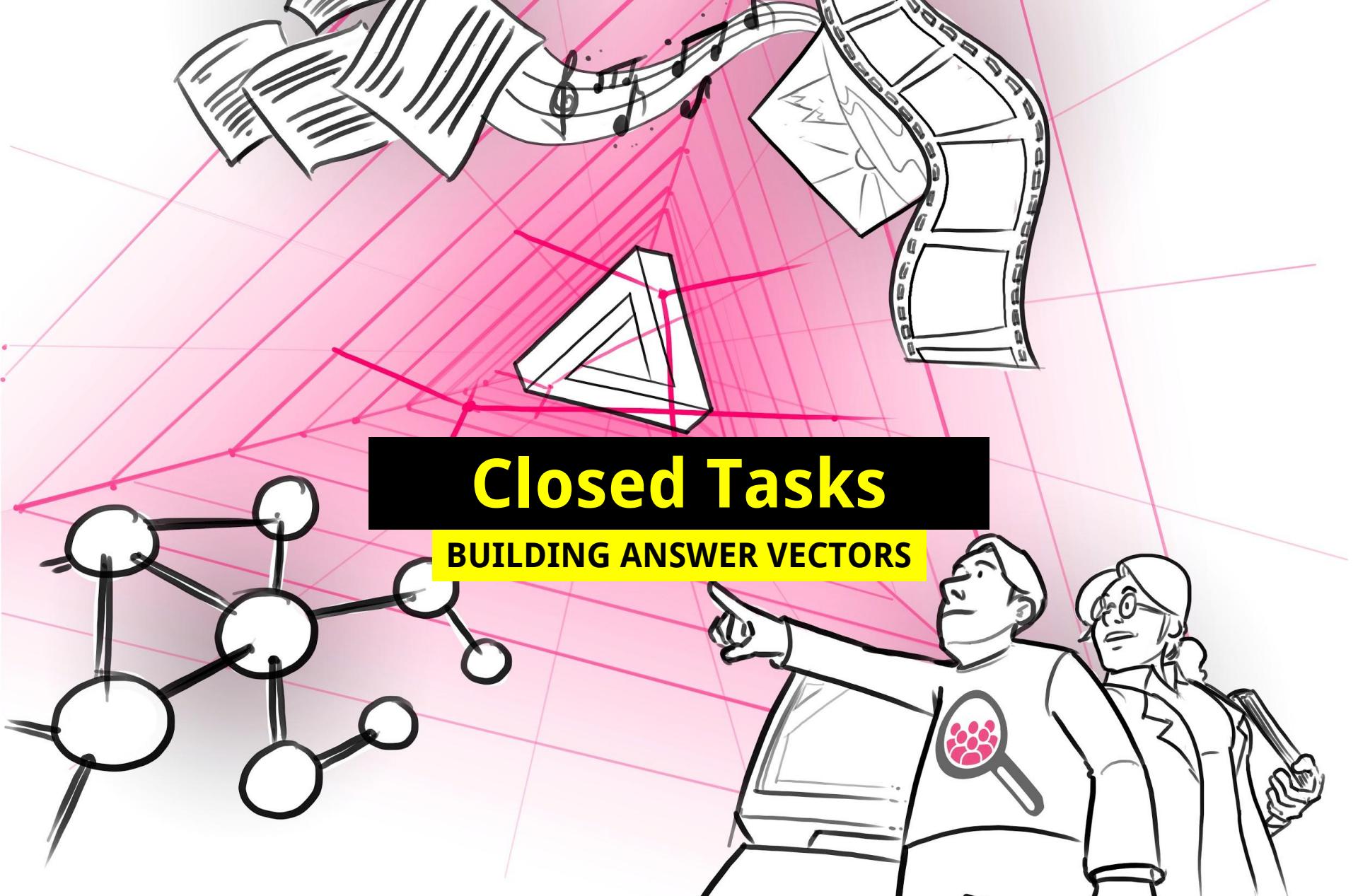
\$ 9.5

None Of The Above

MULTIPLE CHOICE

3 Submit your result:

MULTIPLE CHOICE



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.

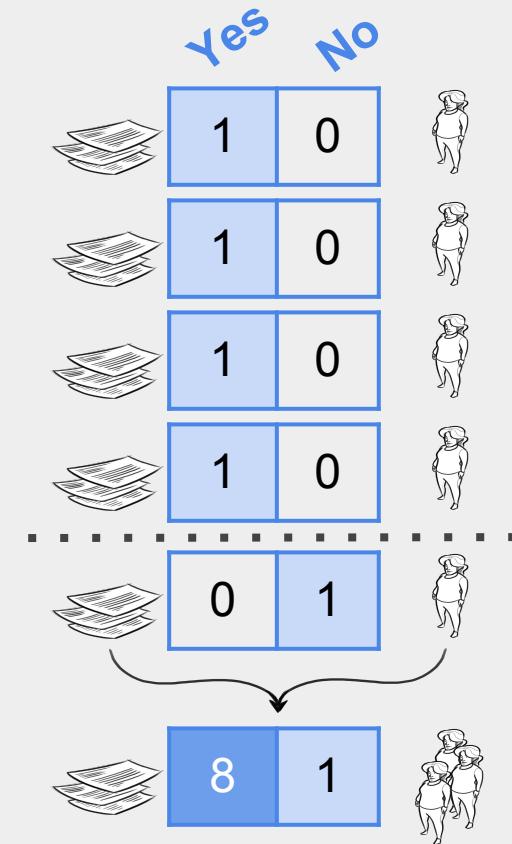


2 Are there any people in the video?

Select your answer:

Yes No

3 Submit your answer.



BUILDING ANSWER VECTORS

Ternary Choice Tasks

Are There People In The Video?

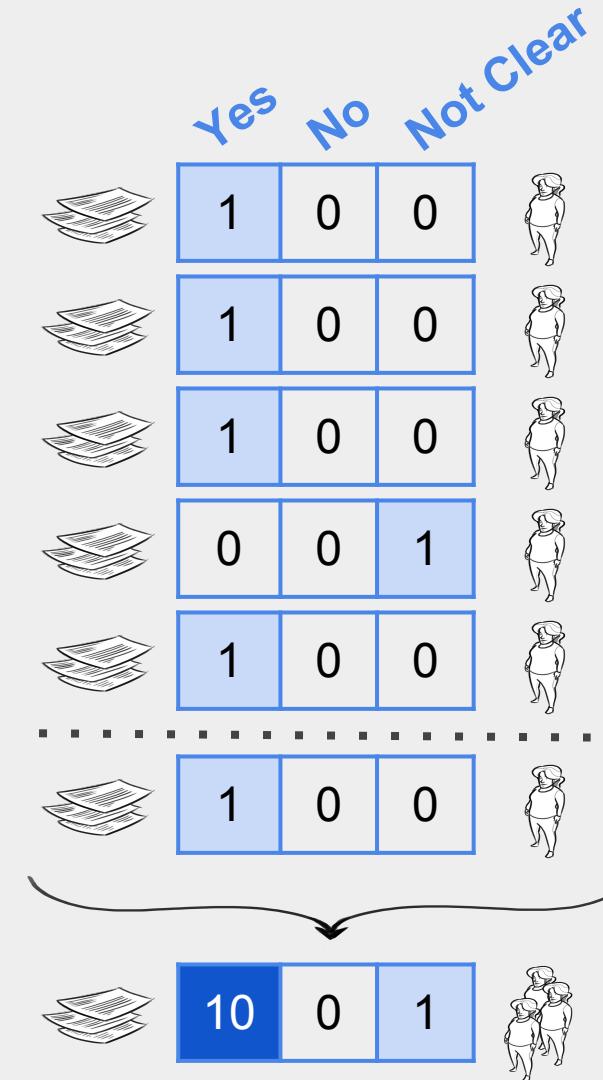
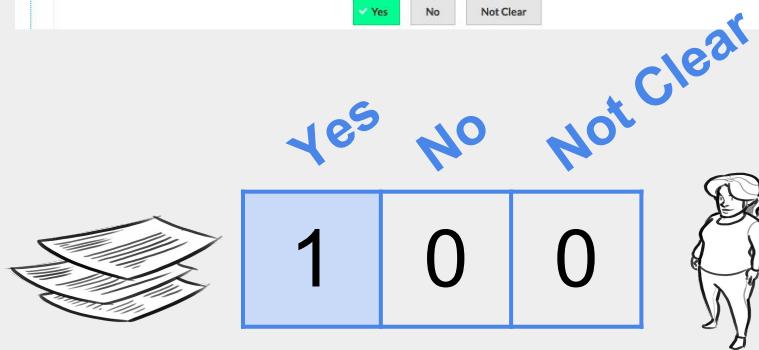
Look at the video carefully.



Are there any people in the video?

Select your answer:

Yes No Not Clear

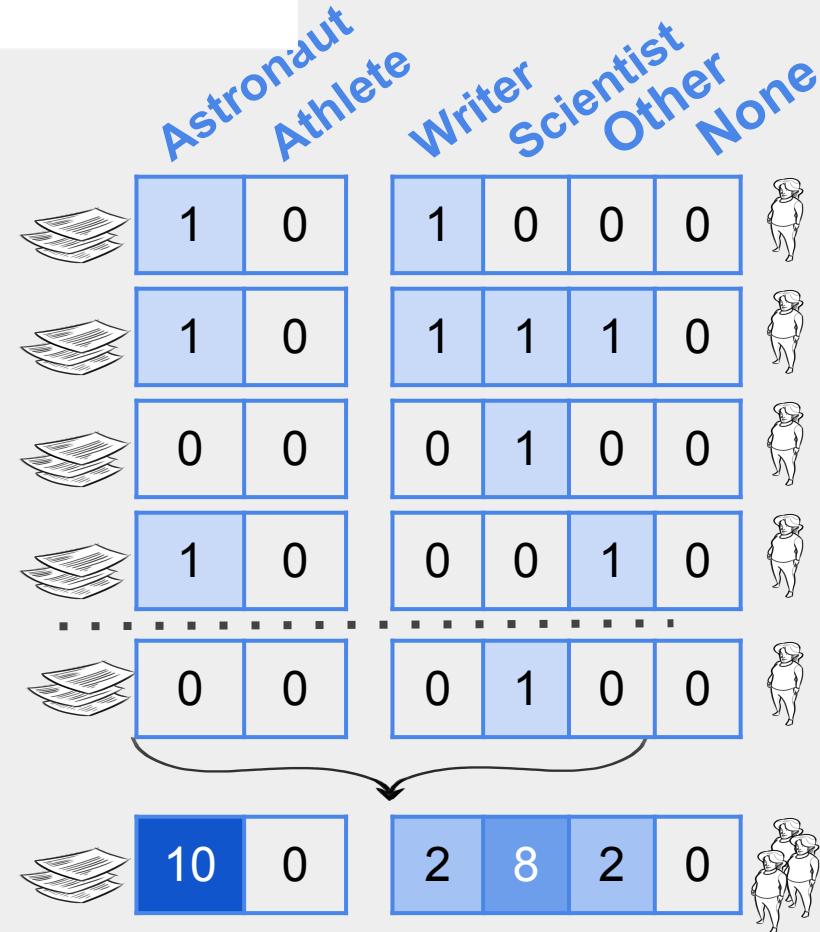
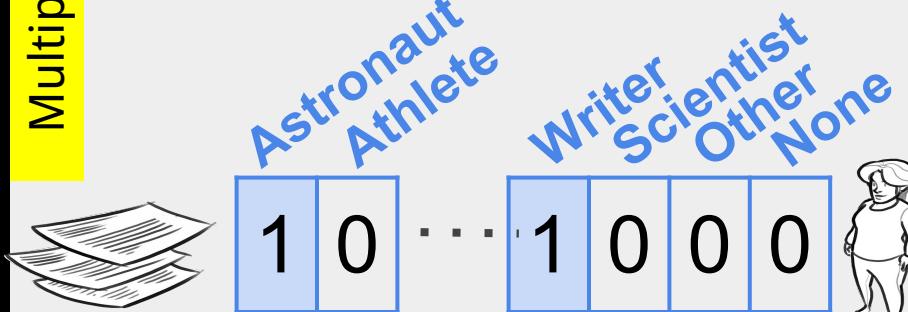


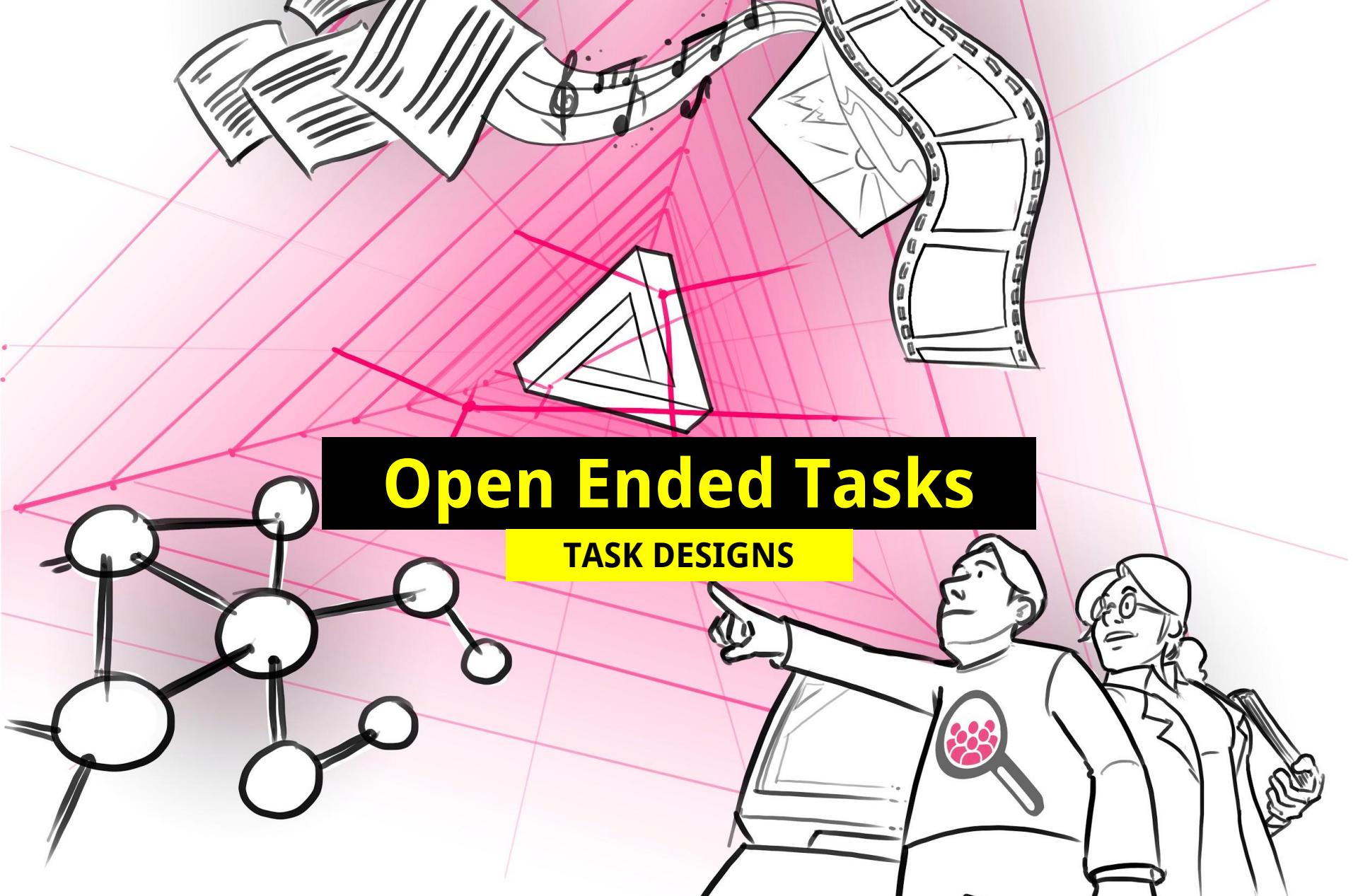
BUILDING ANSWER VECTORS

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			





Open Ended Tasks

TASK DESIGNS

CROWD TASKS

Open Ended

TYPE
KEYWORDS

✓ 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:

[x] **reported**
[x] **net income** **fell** 5.9 % to \$ 9.5 million
[x] **fell**

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

✓ 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

TYPE
KEYWORDS

- 1 Watch the video in full at least once



- 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

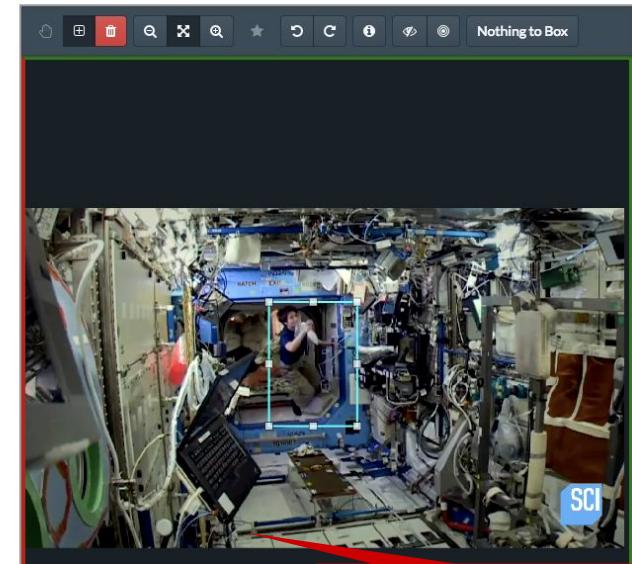
✓ Ship

SELECT WORDS
FROM TEXT

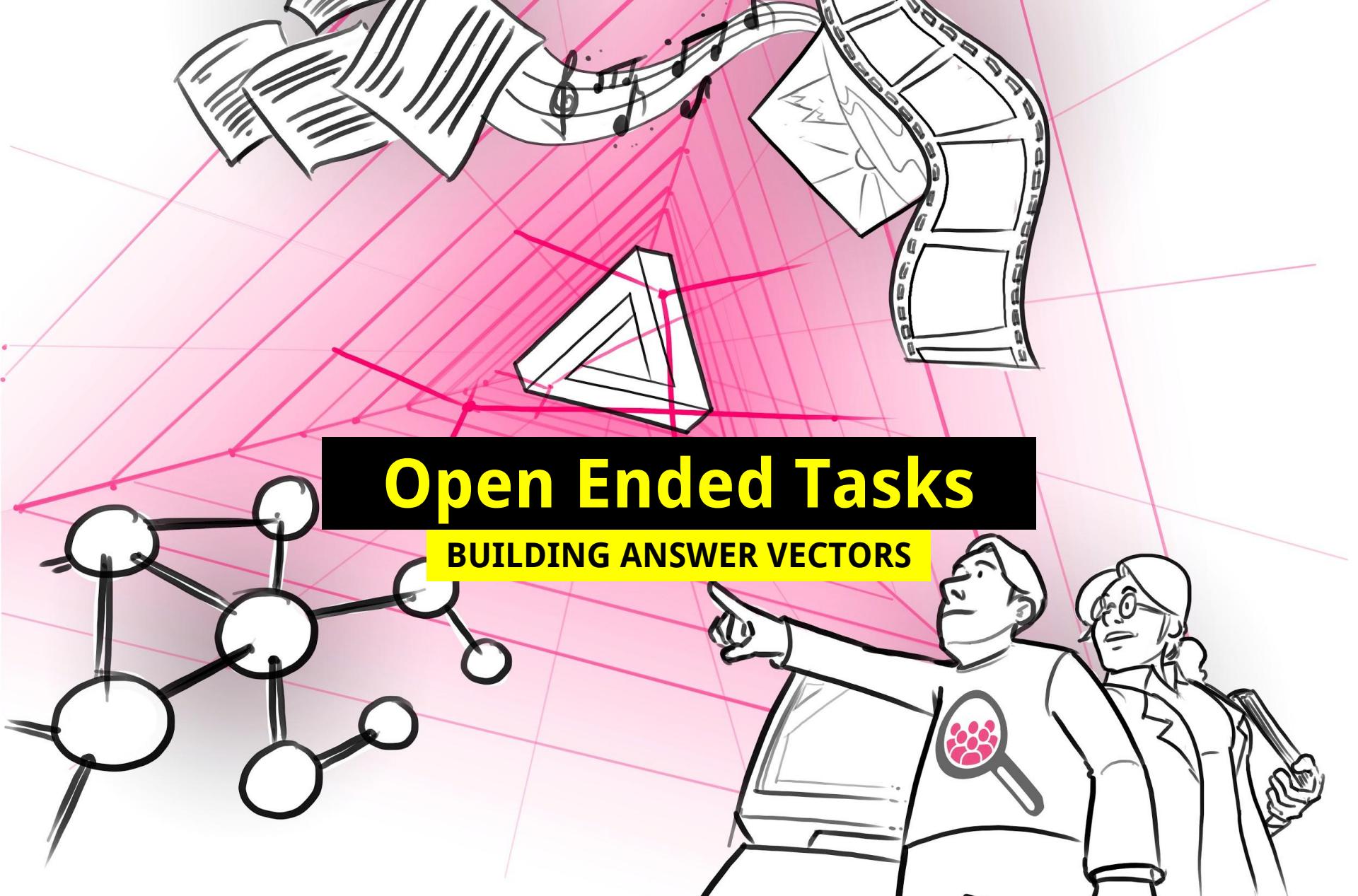
2 Draw a bounding box around the persons in the image.

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.



DRAW BOUNDING
BOXES IN IMAGES

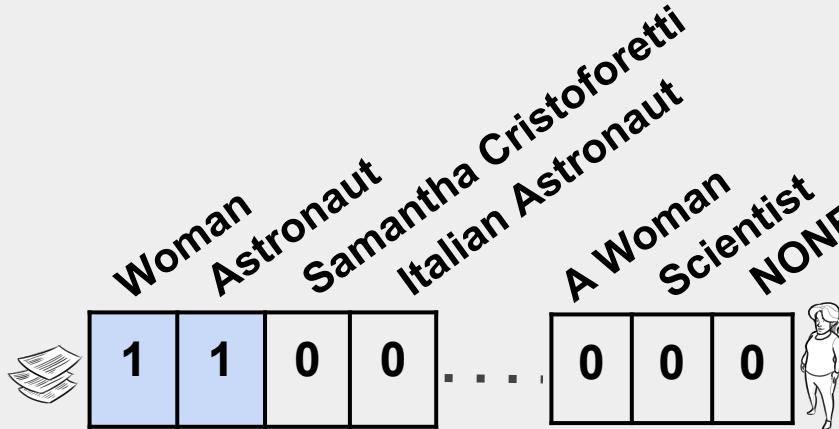


Open Ended Tasks

BUILDING ANSWER VECTORS

BUILDING ANSWER VECTORS

Open Ended



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CrowdTruth
The framework for crowdsourcing visual truth.

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:

- Click ADD+ or press Enter to add your tag to the list

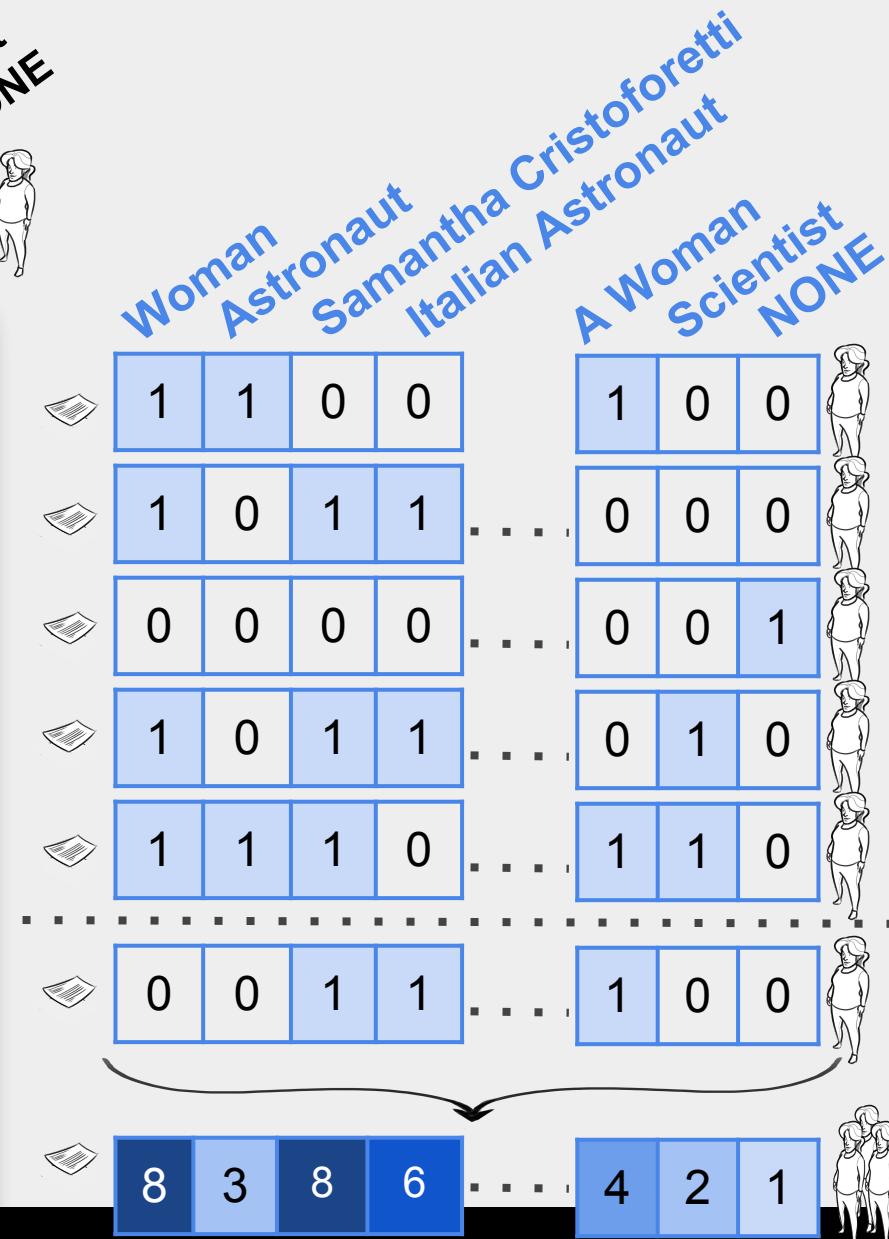
Type your tag here

ADD +

Your tags: (click to remove)

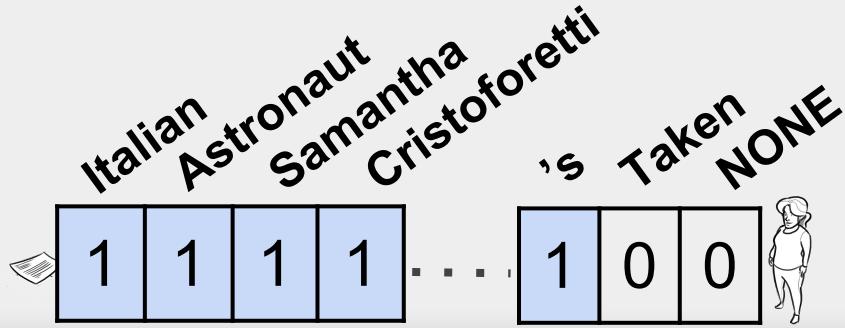
✓ Woman

✓ Astronaut



BUILDING ANSWER VECTORS

Open Ended

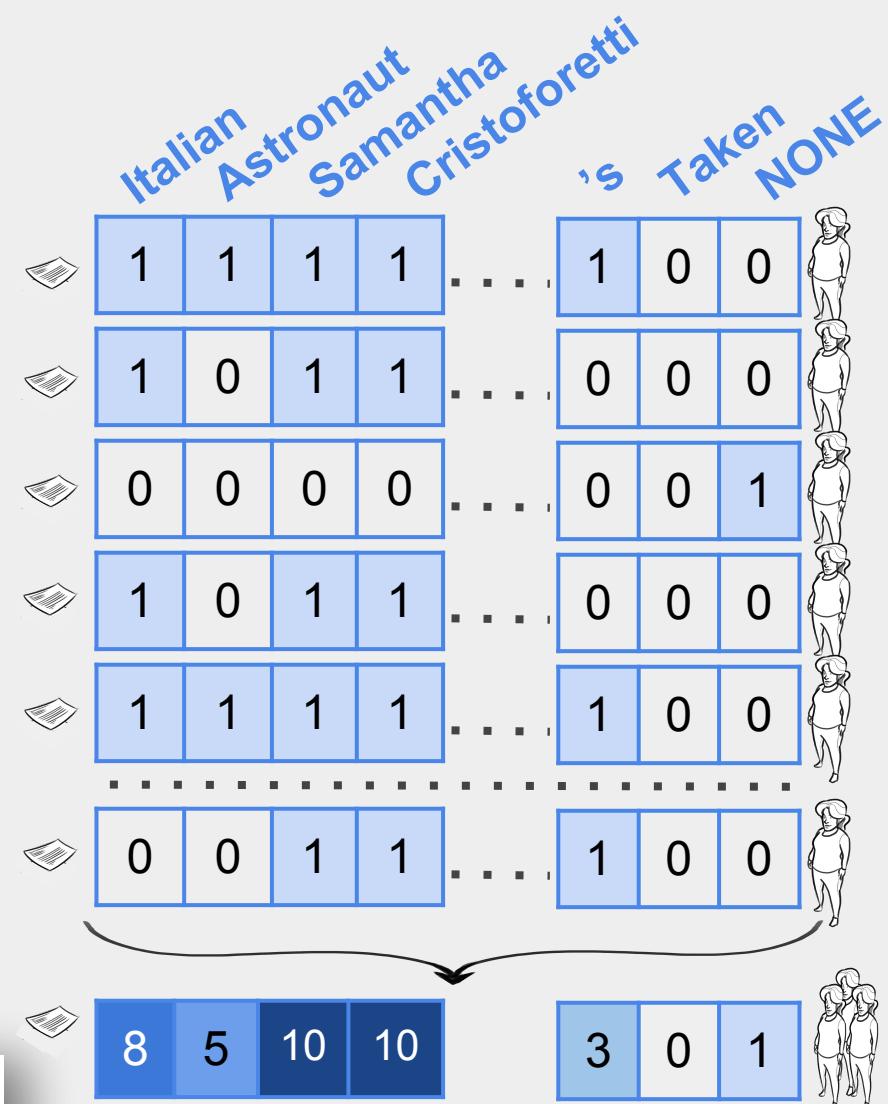


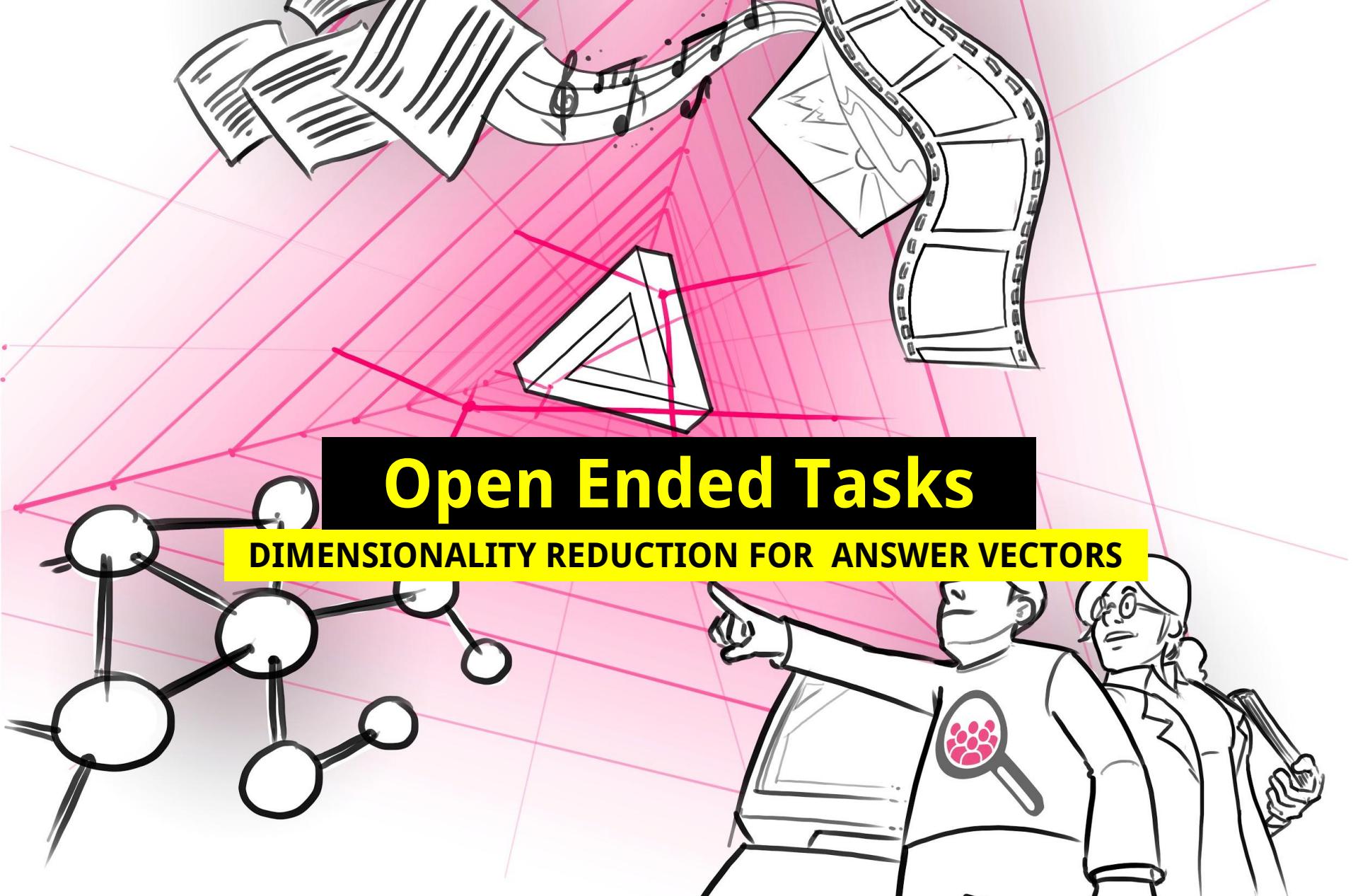
2

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





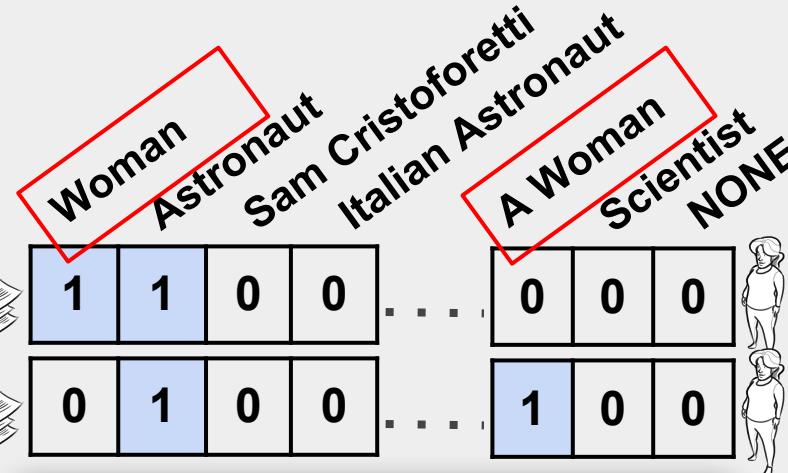
Open Ended Tasks

DIMENSIONALITY REDUCTION FOR ANSWER VECTORS

DIMENSIONALITY REDUCTION

- Stopwords removal, Lemmatization -

Open Ended



powered by
CrowdTruth The framework for crowdsourcing semantic tasks

Describe The People In The Video

1 Watch the video in full at least once.



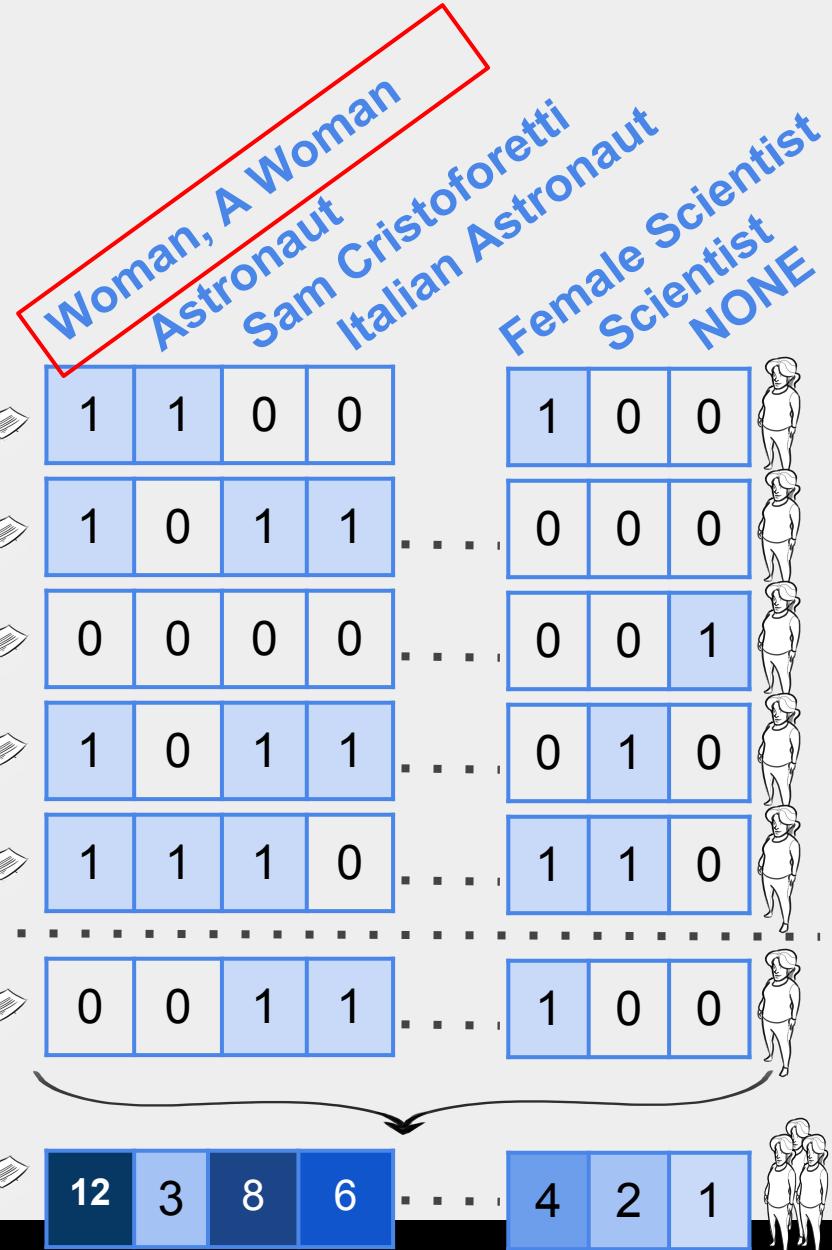
▶ 0:00 / 0:05 🔍

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)

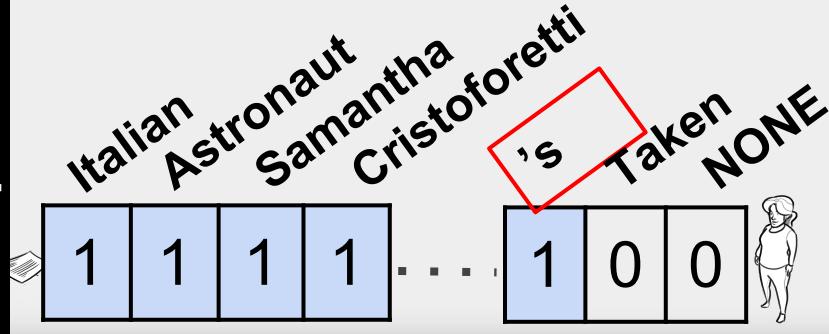
✓ Woman ✓ Astronaut ✓ Ship



DIMENSIONALITY REDUCTION

- Stopwords & auxiliary verbs removal -

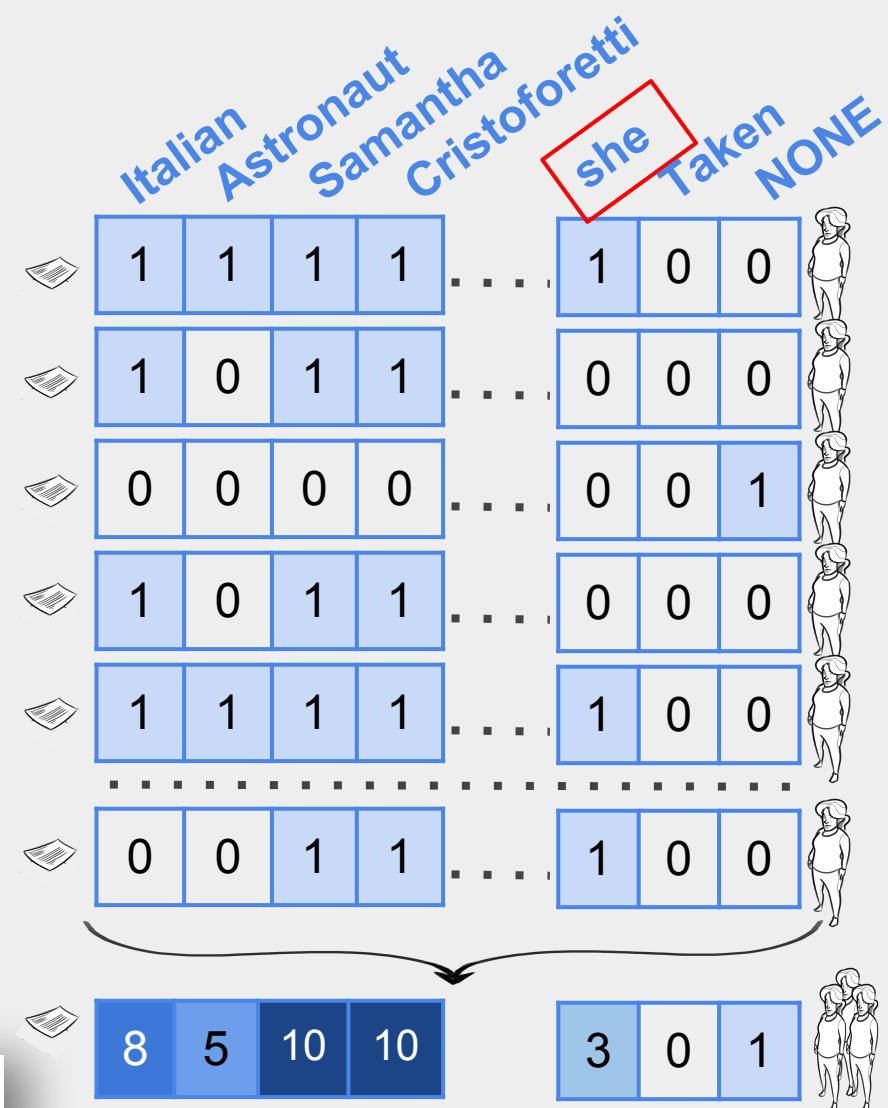
Open Ended

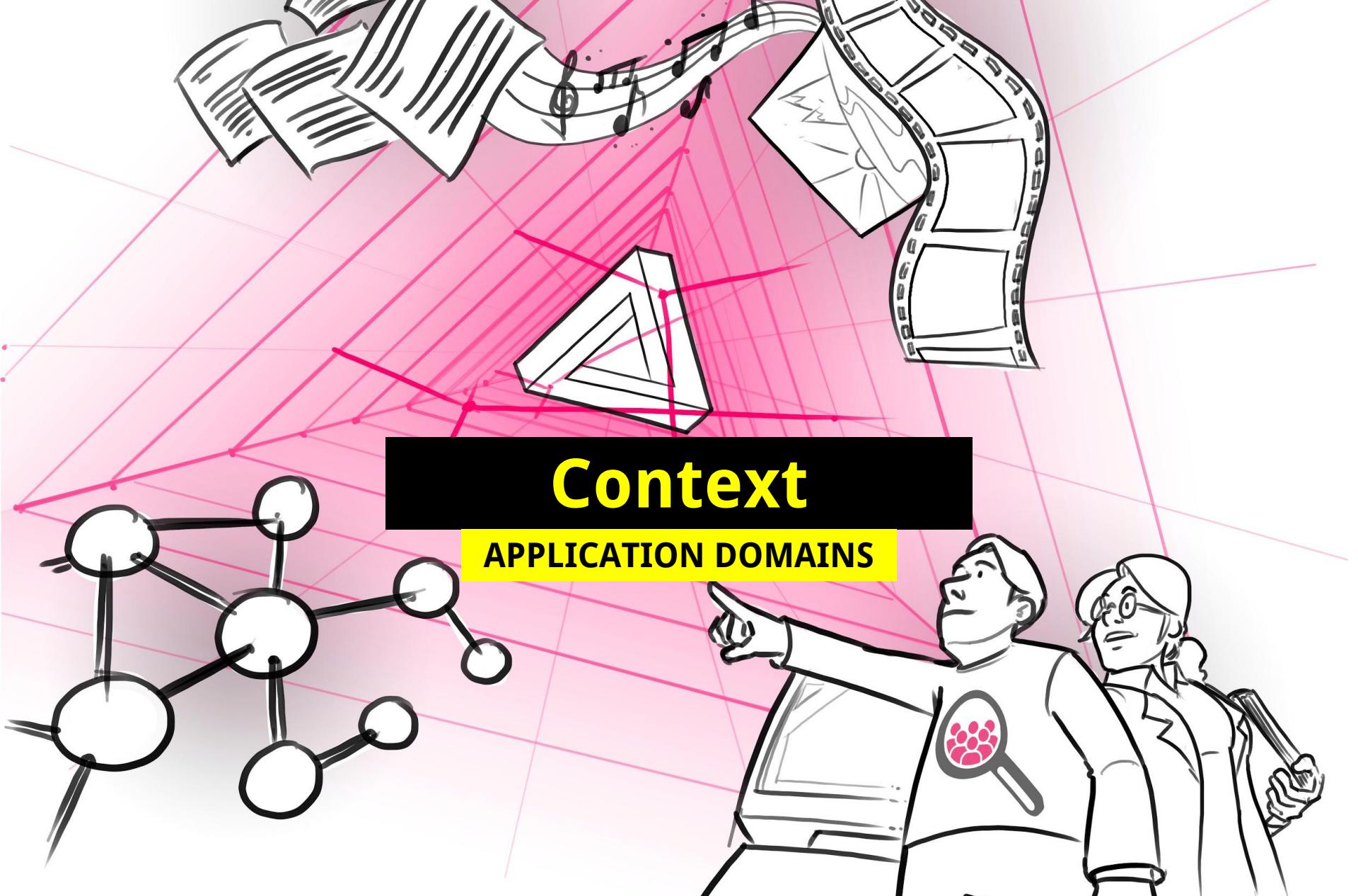


the WORDS or PHRASES in the text that identify or refer to people in the video.

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

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





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:

Type your tag here

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

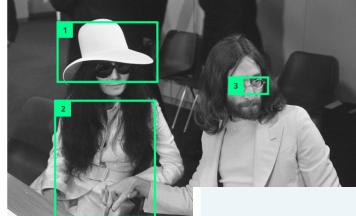
Type your tag here

Have you entered all relevant tags? Submit your result:

>

Mark and describe all iconic clothing and accessories in this image

Look at the following image



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.

VIDEO & IMAGE ENRICHMENT

CrowdTruth with Amazon Mechanical Turk & Figure Eight

R. Gligorov, M. Hildebrand, J. van Ossenbruggen, G. Schreiber, L. Aroyo: *On the role of user-generated metadata in audio visual collections* (2011). K-CAP2011

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

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

RELATION EXTRACTION

CrowdTruth for Medical Domain

Anca Dumitrashe, Lora Aroyo and Chris Welty: Crowdsourcing Ground Truth for Medical Relation Extraction. ACM TiiS Special Issue on Human-Centered Machine Learning., <https://github.com/CrowdTruth/Medical-Relation-Extraction>



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 Dumitrashe, Lora Aroyo and Chris Welty: Crowdsourcing Ground Truth for Medical Relation Extraction. ACM TiiS Special Issue on Human-Centered Machine Learning. <https://github.com/CrowdTruth/Open-Domain-Relation-Extraction>

Tommaso Caselli, Oana Inel: Crowdsourcing StoryLines: Harnessing the Crowd for Causal Relation Annotation. Proceedings of the Workshop Events and Stories in the News 2018. <https://github.com/CrowdTruth/Crowdsourcing-StoryLines>



✓ 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

DOCUMENT RELEVANCE

CrowdTruth for Open Domain

Oana Inel, Giannis Haralabopoulos, Dan Li, Christophe Van Gysel, Zoltán Szlávik, Elena Simperl, Evangelos Kanoulas, Lora Aroyo: *Studying Topical Relevance with Evidence-based Crowdsourcing*, CIKM, 2018.

<https://github.com/CrowdTruth/NYT-Crowdsourcing-Topical-Relevance>



Hands-on Exercises: **Session II**

- 1. Follow hand-out instructions:**
<https://tinyurl.com/CT-annotation-vectors>
- 2. Pick a crowdsourcing task of your choice**
- 3. Design a suitable answer vector for the task**
- 4. Create 1 to 3 slides to summarize:**
 - a. the crowdsourcing task chosen
 - b. the creation of the annotation vector
 - c. possible ambiguity or disagreement angles
- 5. Add your slides in our common space:**
<https://tinyurl.com/CT-annotation-vect-reflections>
- 6. Present & Discuss your ideas!**

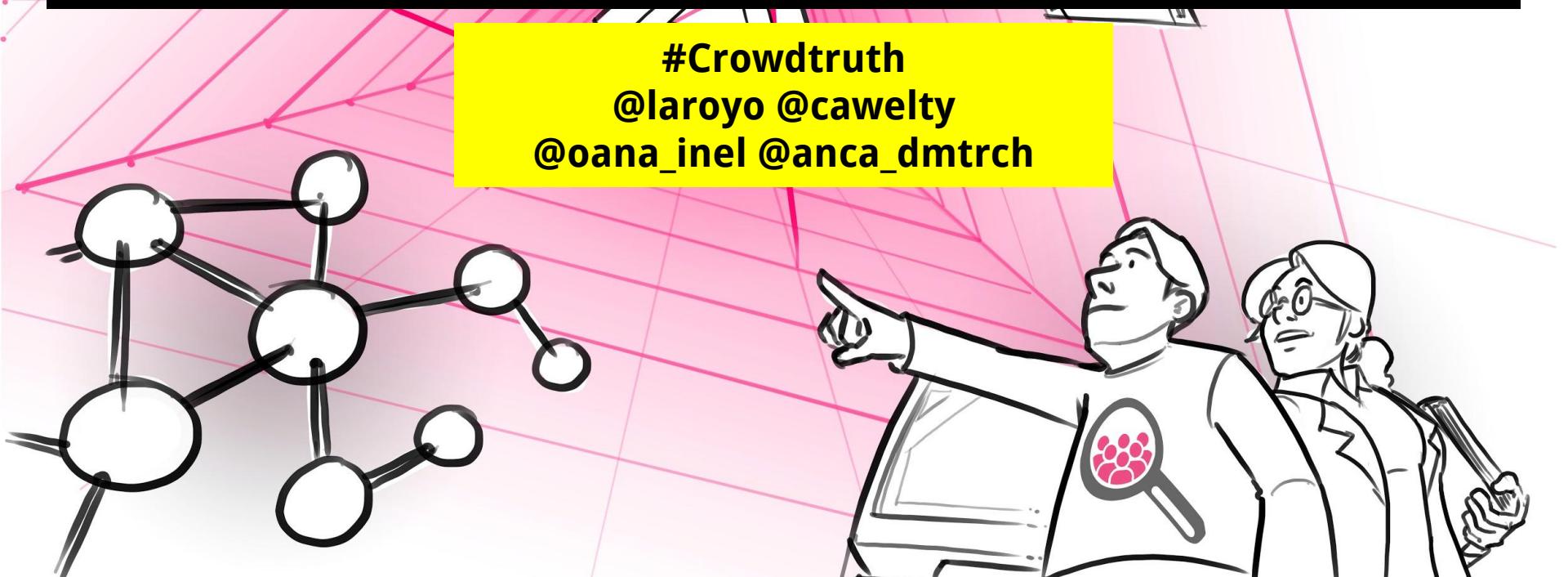
BUILDING ANSWER VECTORS

Hands-on Exercises

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