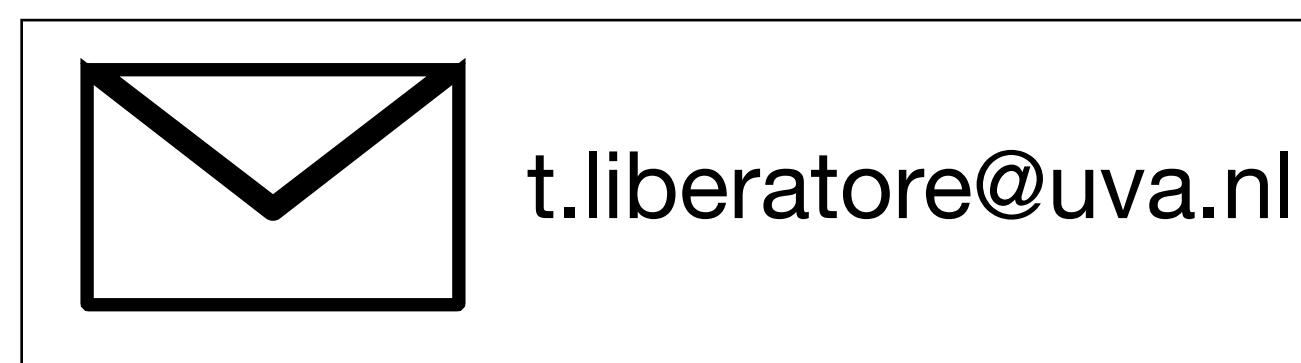


Influence beyond similarity

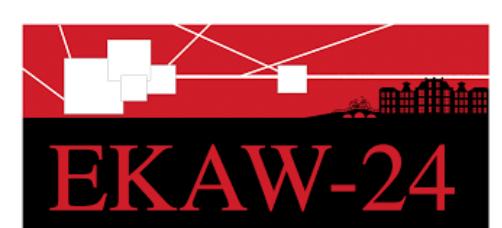
A contrastive learning approach
to Object Influence Retrieval

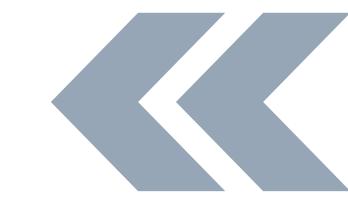
Teresa Liberatore, Paul Groth, Monika Kackovic, Nachoem Wijnberg



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 EKAW-24



Definitions

OBJECT :

artefact created by an agent (ex: a painting created by a painter)



From WikiArt: <https://www.wikiart.org/en/vincent-van-gogh/sunflowers-1888>

AGENT :

a creator of objects (ex: a painter is a creator of paintings)

Vincent van Gogh (Q5582)

Dutch painter (1853–1890)
Vincent Willem van Gogh | Vincent-Willem van Gogh | Van Gogh

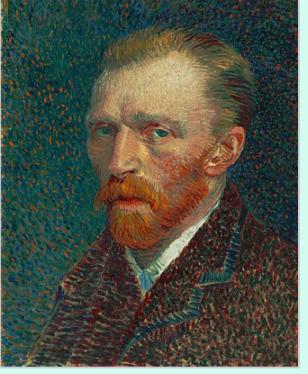
[In more languages](#) [Configure](#)

Language	Label	Description	Also known as
English	Vincent van Gogh	Dutch painter (1853–1890)	Vincent Willem van Gogh Vincent-Willem van Gogh Van Gogh
Dutch	Vincent van Gogh	Nederlands kunstschilder (1853–1890)	Vincent Willem van Gogh Vincent Van Gogh V.W. van Gogh
German	Vincent van Gogh	niederländischer Maler und Zeichner (1853–1890)	Vincent Willem van Gogh Van Gogh
French	Vincent van Gogh	peintre néerlandais (1853–1890)	Vincent Willem van Gogh Van Gogh
default for all languages	Vincent van Gogh	...	

[All entered languages](#)

Statements

instance of [human](#) [3 references](#)

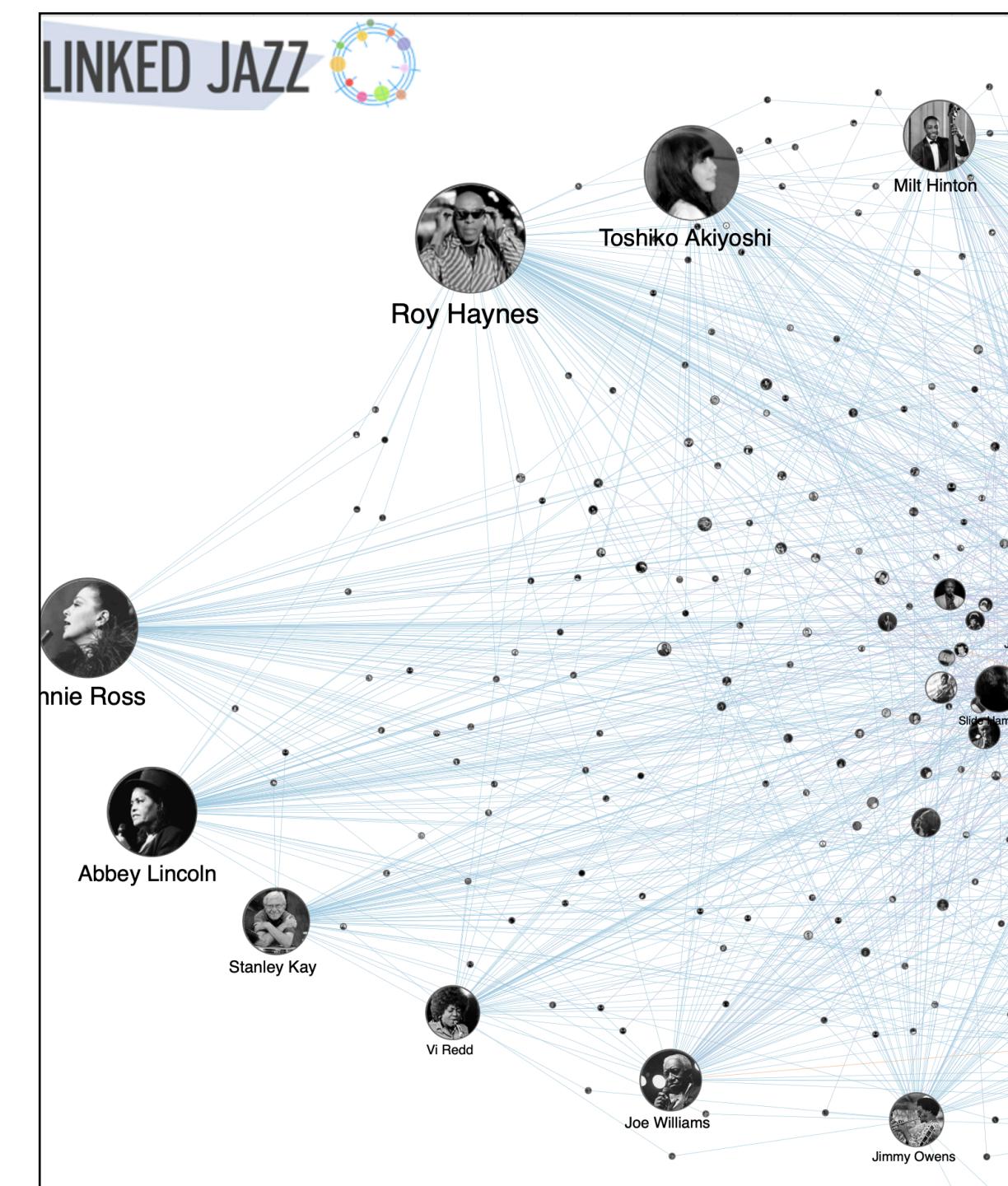
image  [Vincent van Gogh - Self-Portrait - Google Art Project \(454045\).jpg](#)
4,747 x 6,000; 10.19 MB



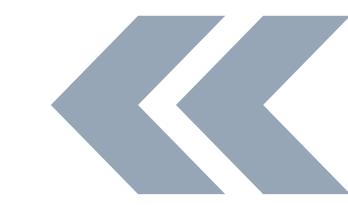
From Wikidata: <https://www.wikidata.org/wiki/Q5582>

CREATIVE INFLUENCE:

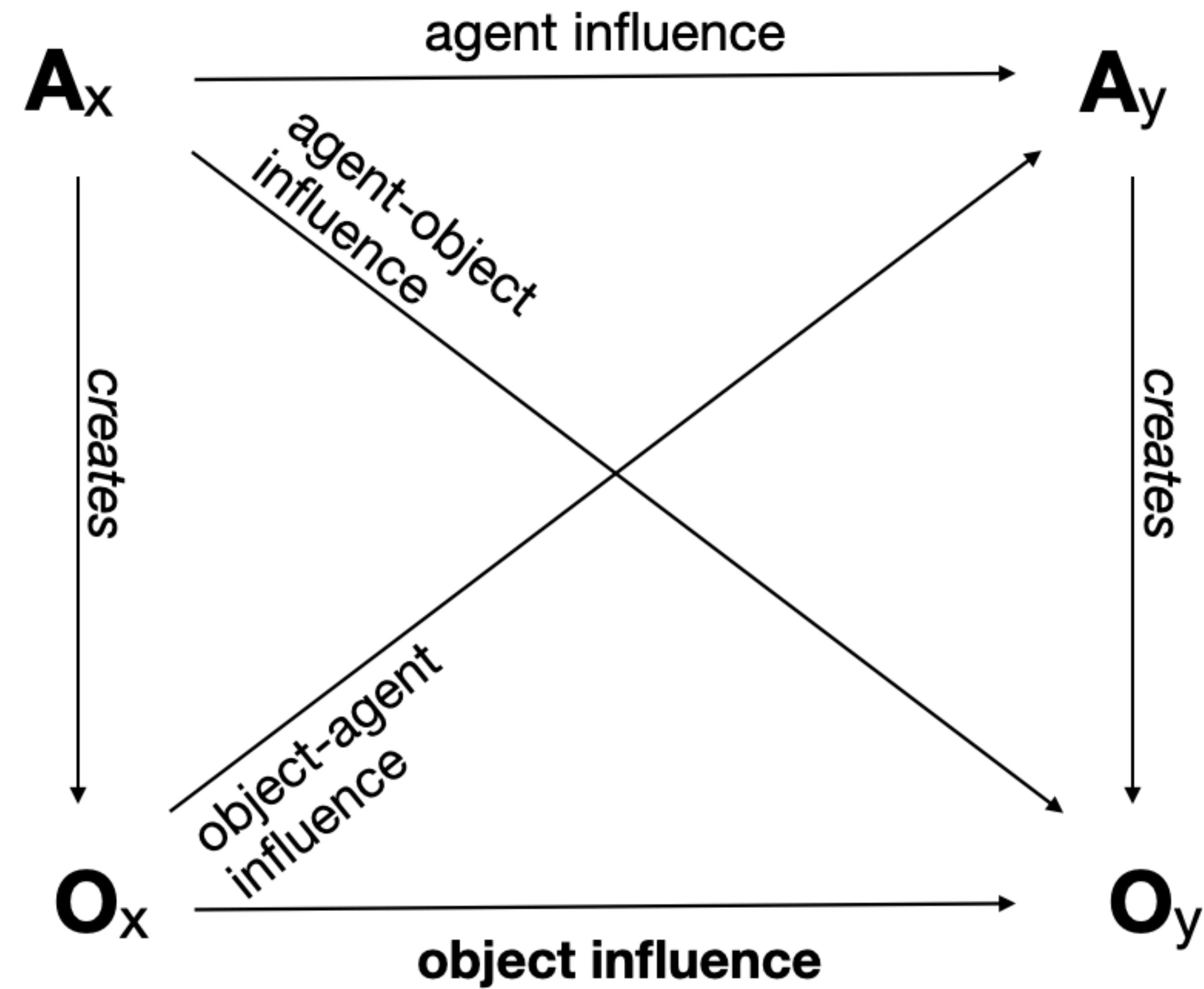
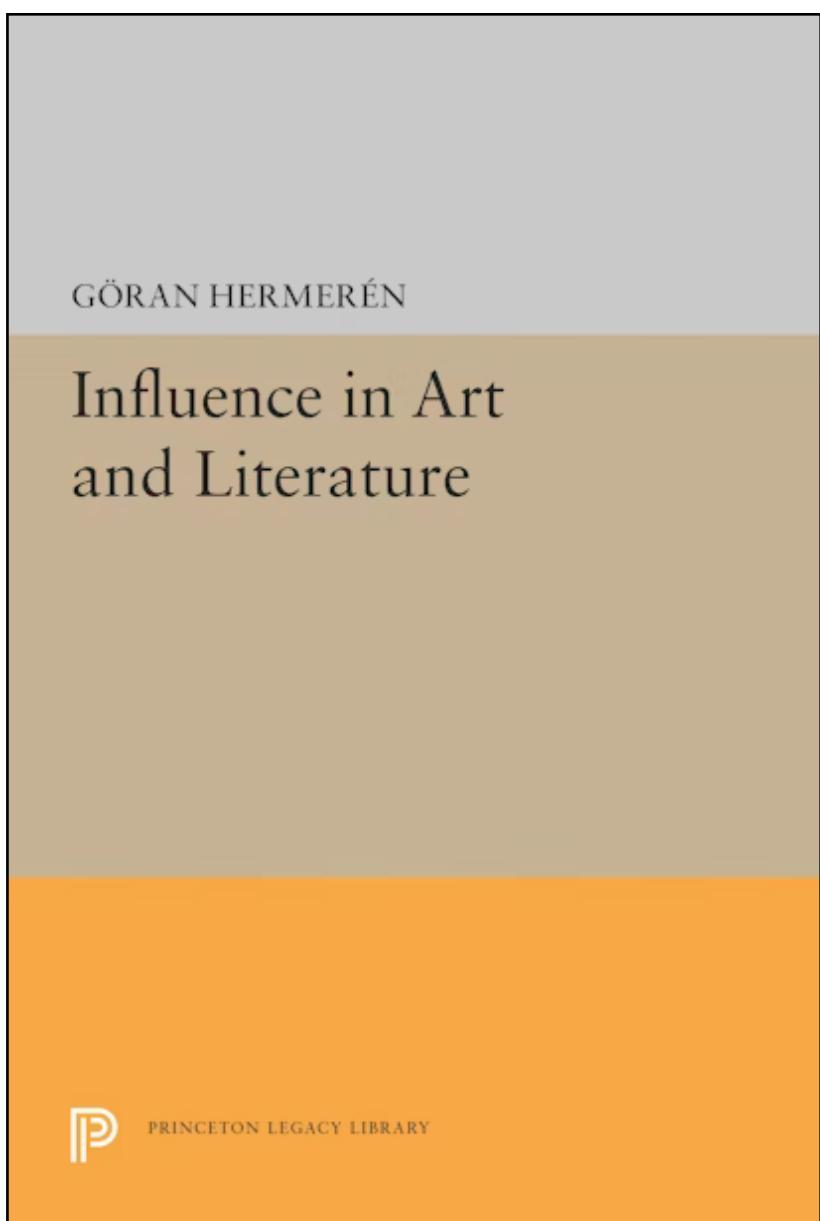
The relations between objects or agents that represents the source of inspiration and flow of ideas.



From the Linked Jazz project: <https://triplydb.com/pratt/linked-jazz>



Creative Influence: zooming in



Creative Influence: zooming in → AGENT INFLUENCE

Vincent van Gogh (Q5582)

Dutch painter (1853–1890)
Vincent Willem van Gogh | Vincent-Willem van Gogh | Van Gogh

+ In more languages
Configure

Language	Label	Description	Also known as
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German	Vincent van Gogh	niederländischer Maler und Zeichner (1853–1890)	Vincent Willem van Gogh Van Gogh
French	Vincent van Gogh	peintre néerlandais (1853–1890)	Vincent Willem van Gogh Van Gogh
default for all languages	Vincent van Gogh	—	—

All entered languages

Statements

instance of	human
	+ 3 references

image 

influenced by

- Anton Mauve
 - ▲ Anton Mauve
 - ▽ 0 references
- Paul Gauguin
 - ▲ Paul Gauguin
 - ▽ 0 references
- Willem Roelofs
 - ▲ Willem Roelofs
 - ▽ 0 references
- Paul Cézanne
 - ▲ Paul Cézanne
 - ▽ 0 references
- Peter Paul Rubens
 - ▲ Peter Paul Rubens
 - ▽ 0 references
- Jean-François Millet
 - ▲ Jean-François Millet
 - ▽ 1 reference

Between 1885 and his death in 1890, van Gogh appears to have been building an *oeuvre*,^[238] a collection that reflected his personal vision and could be commercially successful. He was influenced by Blanc's definition of style, that a true painting required optimal use of colour, perspective and brushstrokes. Van Gogh applied the word "purposeful" to paintings he thought he had mastered, as opposed to those he thought of as studies.^[239] He painted many series of studies;^[240] most of which were still lifes, many executed as colour experiments or as gifts to friends.^[240] The work in Arles contributed considerably to his *oeuvre*: those he thought the most important from that time were *The Sower*, *Night Cafe*, *Memory of the Garden in Etten* and *Starry Night*. With their broad brushstrokes, inventive perspectives, colours, contours and designs, these paintings represent the style he sought.^[236]



agent influence \longrightarrow **A_x** \longrightarrow **A_y**

Analyzing Music Metadata on Artist Influence

Marek Kopeł^(✉)

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50-370 Wrocław, Poland
marek.kopeł@pwr.edu.pl
<http://www.ii.pwr.wroc.pl/kopel>

Measuring the influence of painters through artwork facial features

Bruna Dalmoro*, Charles Monteiro⁺ and Soraia Raupp Musse^{*}
Graduate Program in Computer Science*, Graduate Program in History⁺
Pontifical Catholic University of Rio Grande do Sul
Email: {bruna.dalmoro,charles.monteiro,soraia.musse}@pucrs.br

Intelligenza Artificiale 18 (2024) 35–49
DOI 10.3233/IA-240029
IOS Press

Creative influence prediction using graph theory

Francesco Alfieri^a, Luigi Asprino^b, Nicolas Lazzari^{b,*} and Valentina Presutti^b
^aDepartment of Computer Science and Engineering, University of Bologna, Bologna, Italy
^bDepartment of Languages, Literatures and Modern Cultures (LILEC), University of Bologna, Bologna, Italy

Multimed Tools Appl (2016) 75:3565–3591
DOI 10.1007/s11042-014-2193-x

Toward automated discovery of artistic influence

Babak Saleh · Kanako Abe · Ravneet Singh Arora ·
Ahmed Elgammal

Received: 2 January 2014 / Revised: 14 May 2014 / Accepted: 13 July 2014 /
Published online: 19 August 2014
© Springer Science+Business Media New York 2014

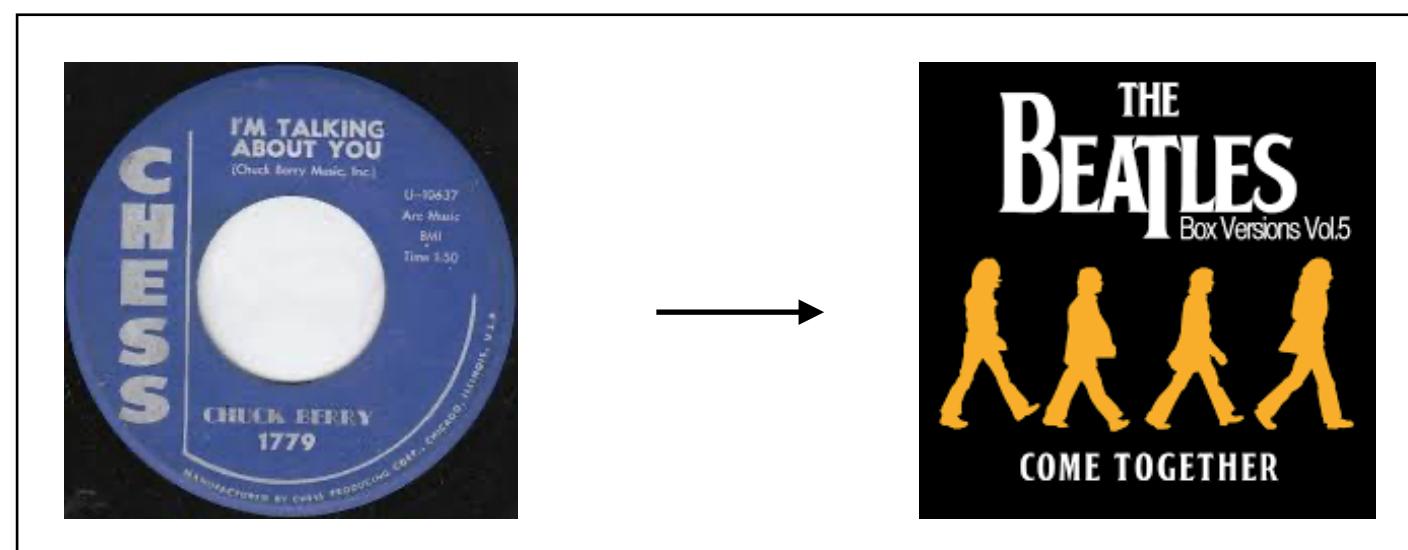
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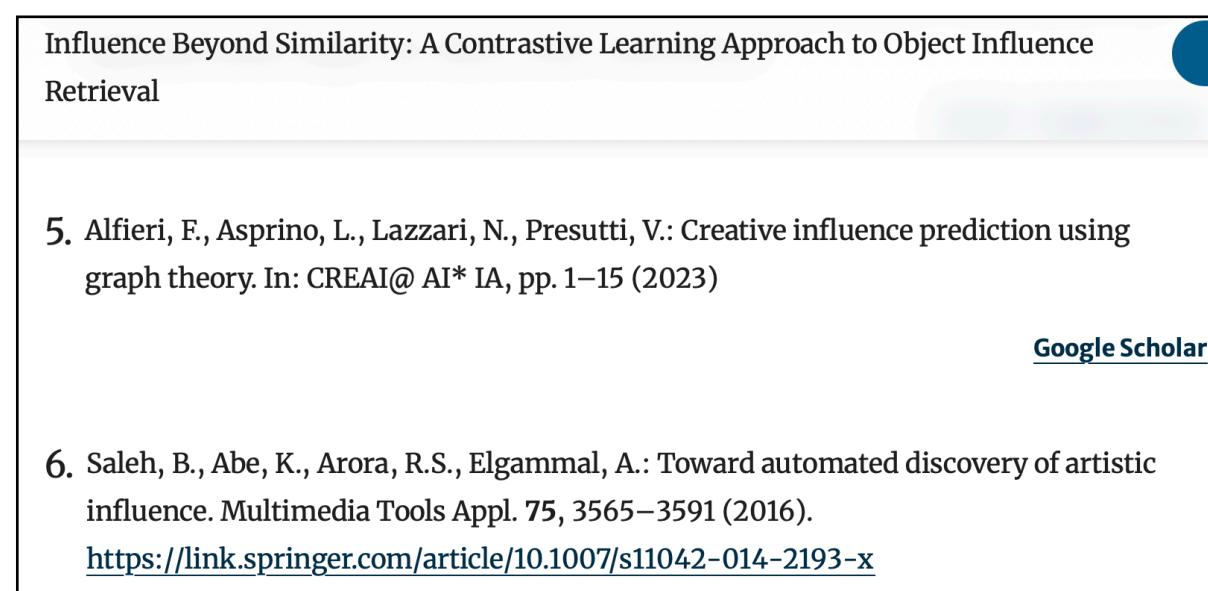
Creative Influence: zooming in → OBJECT INFLUENCE



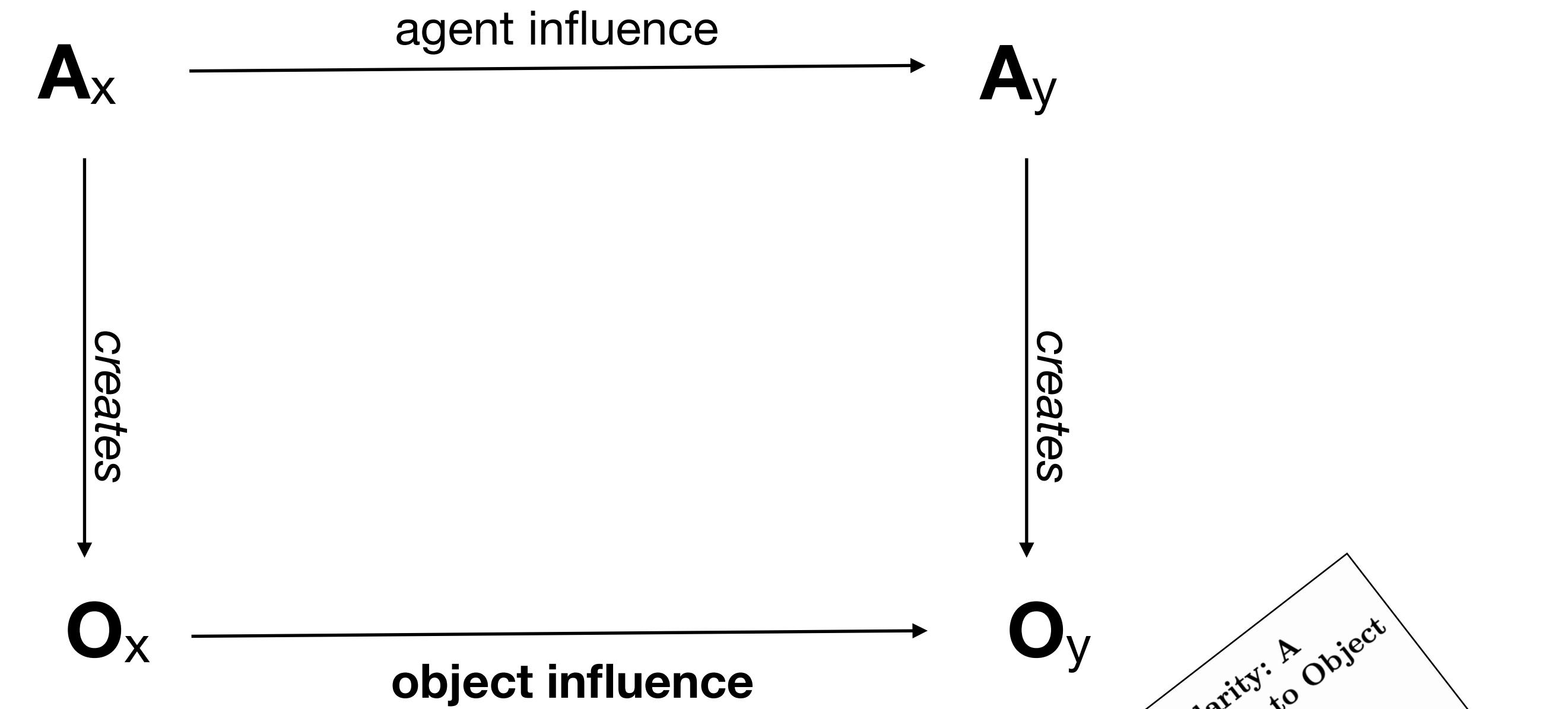
Source: <https://blog.academyart.edu/art-school-inspiration-artworks-that-inspired-other-artworks/>



Source: <https://faroutmagazine.co.uk/best-songs-inspired-by-other-songs-beatles-dylan-beach-boys-nirvana/>



Paper citations



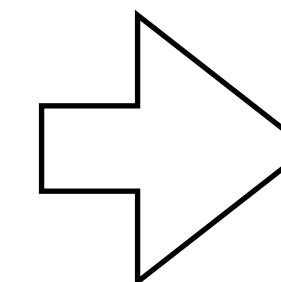
Influence Beyond Similarity: A Contrastive Learning Approach to Object Influence Retrieval
Teresa Liberatore¹, Paul Groth¹, Monika Kackovic¹, and Nachoern Wijnberg^{1,2}
¹ University of Amsterdam, Amsterdam, Netherlands
² University of Johannesburg, Johannesburg, South Africa

Object Influence: why do we care about it?

POV: Creative Industries management &

UNIVERSITY OF AMSTERDAM
Amsterdam Business School

Discovering object influence can mean...
New insights in the history of influences
and innovations

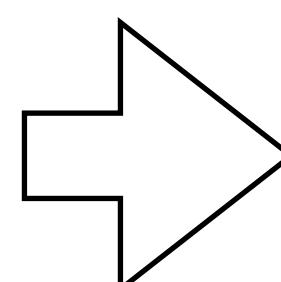


Exhibition Matthew Wong | Vincent van Gogh

The work of the Chinese-Canadian artist Matthew Wong (1984-2019) is dynamic, colourful and expressive. Of the many artists who inspired him, Vincent van Gogh was the most significant. This exhibition invites you to discover more about Wong's work and his artistic connection with Van Gogh.

Source: <https://www.vangoghmuseum.nl/en/visit/whats-on/exhibitions/overview-past-exhibitions/matthew-wong-vincent-van-gogh>

Discovering object influence can mean...
implications for intellectual property and
copyrights



Getty Images is suing the creators of AI art tool Stable Diffusion for scraping its content



/ Getty Images claims Stability AI 'unlawfully' scraped millions of images from its site. It's a significant escalation in the developing legal battles between generative AI firms and content creators.

By James Vincent, a senior reporter who has covered AI, robotics, and more for eight years at The Verge.
Jan 17, 2023 at 11:30 AM GMT+1

[View article](#) | [Comments \(18 New\)](#)

Source: <https://www.theverge.com/2023/1/17/23558516/ai-art-copyright-stable-diffusion-getty-images-lawsuit>

Curation of engaging
art exhibitions based
on object influences

Protection of artistic
originality and
intellectual property

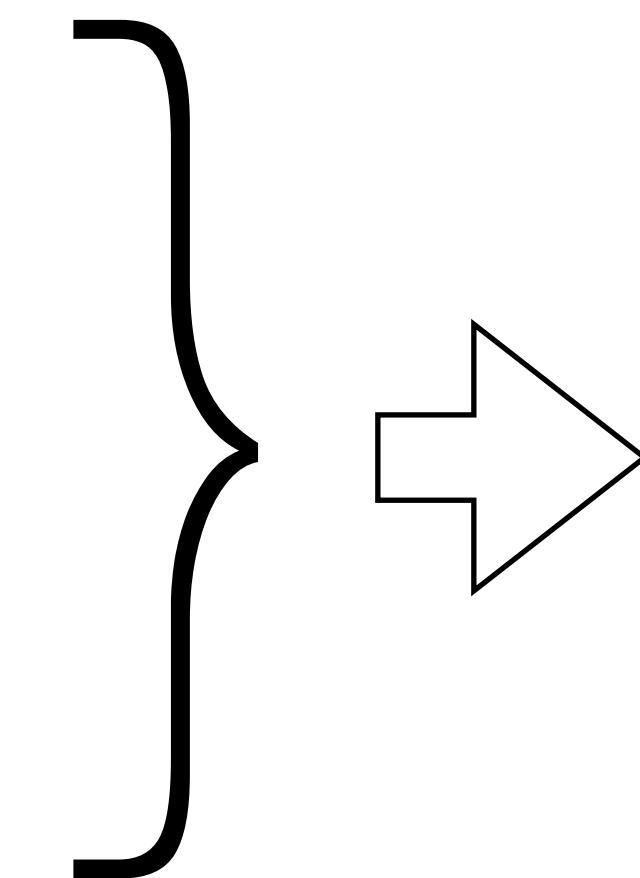
Object Influence: why do we care about it?

POV: Knowledge Management & INDE lab

*Discovering object influence as ...
knowledge discovery*

Object influence is a **relation**

*Discovering object influence can mean...
Under assumptions it can be suggested
from existing data*



Object Influence Retrieval

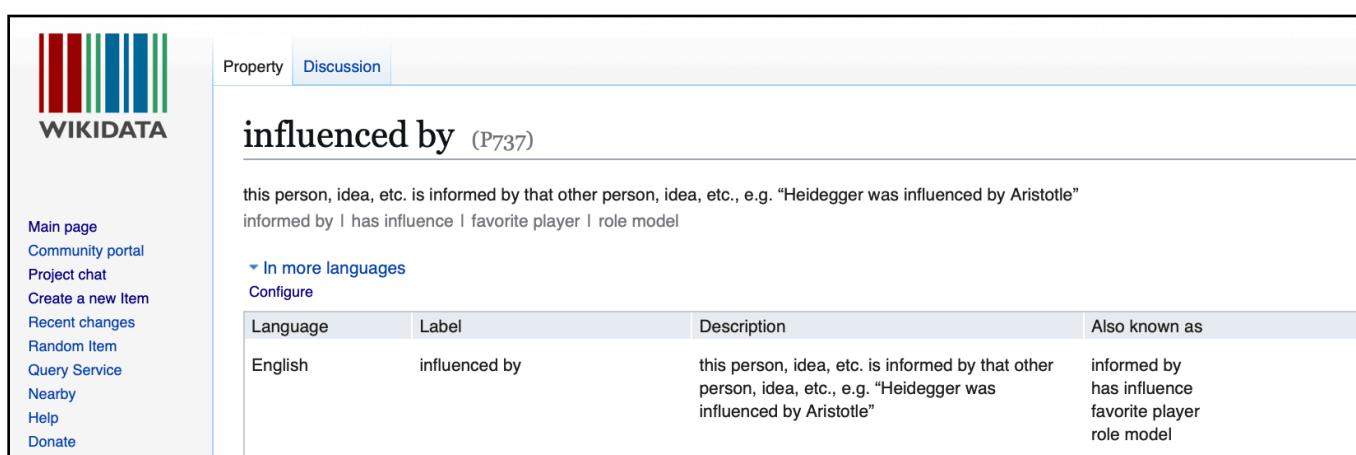
A new task!

Given an object,
retrieve the objects
that potentially
influenced it.

What do we know? → Dataset

	 WikiArt
Number of objects	39815
Number of agents	154
Mean objects per agent	258

WikiArtINFL:
WikiArt augmented with ***agent influence*** information



The screenshot shows the Wikidata interface for the property "influenced by" (P737). It includes the Wikidata logo, a sidebar with links like Main page, Community portal, and Project chat, and a detailed description of the property.

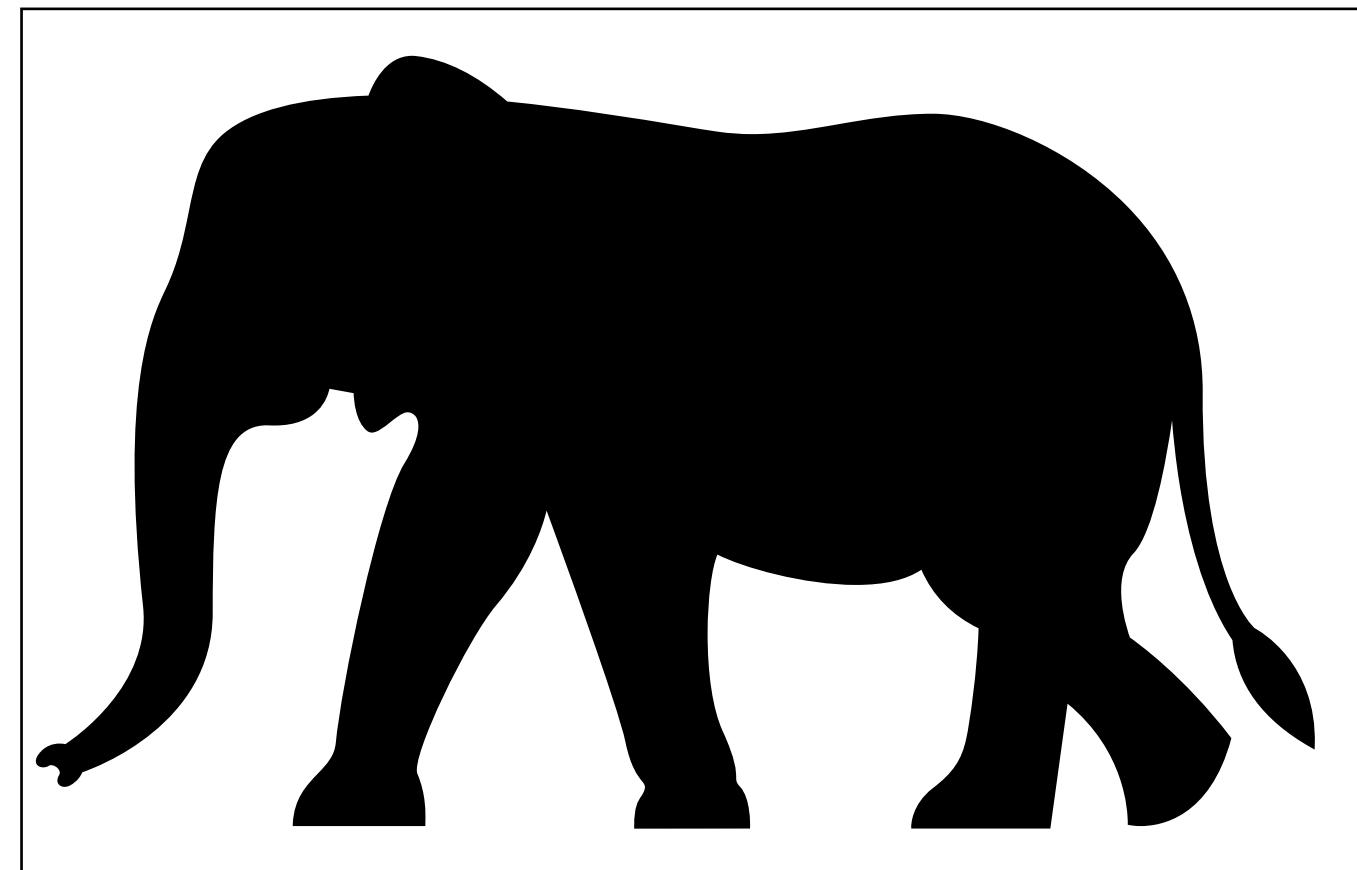
Influence between agents

Object similarity:

- Paintings → feature vectors from pre-trained model
- Paintings similarity → cosine similarity of feature vectors

What don't we know?

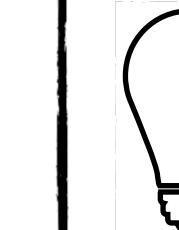
We don't have
ground-truths about
object influences



WikiArtINFL

&

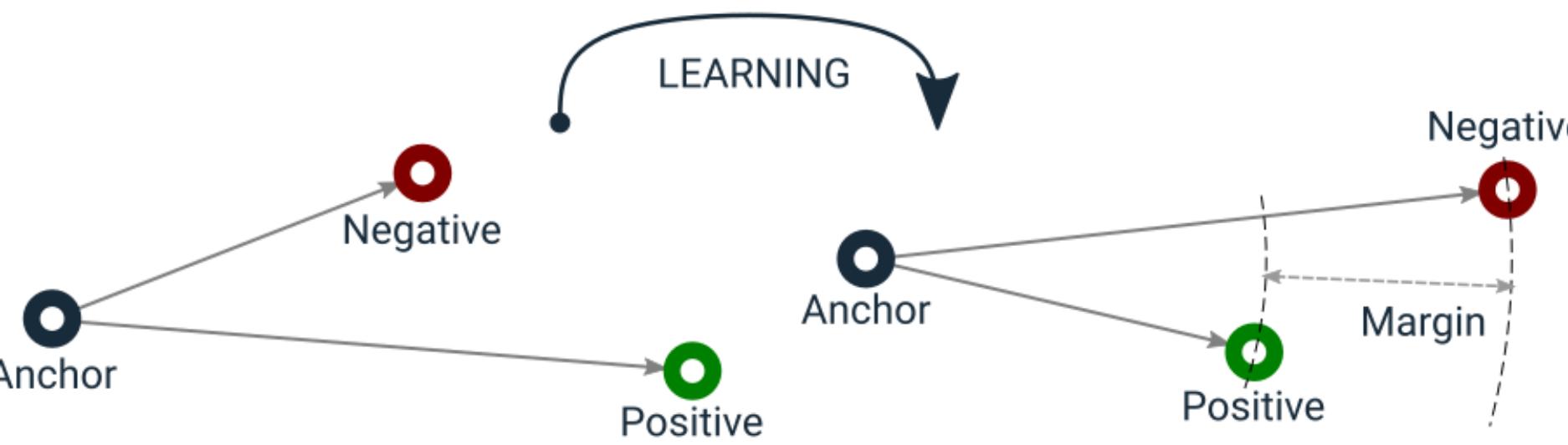
Object similarity



CLOIR:

Combine what we know
with contrastive learning

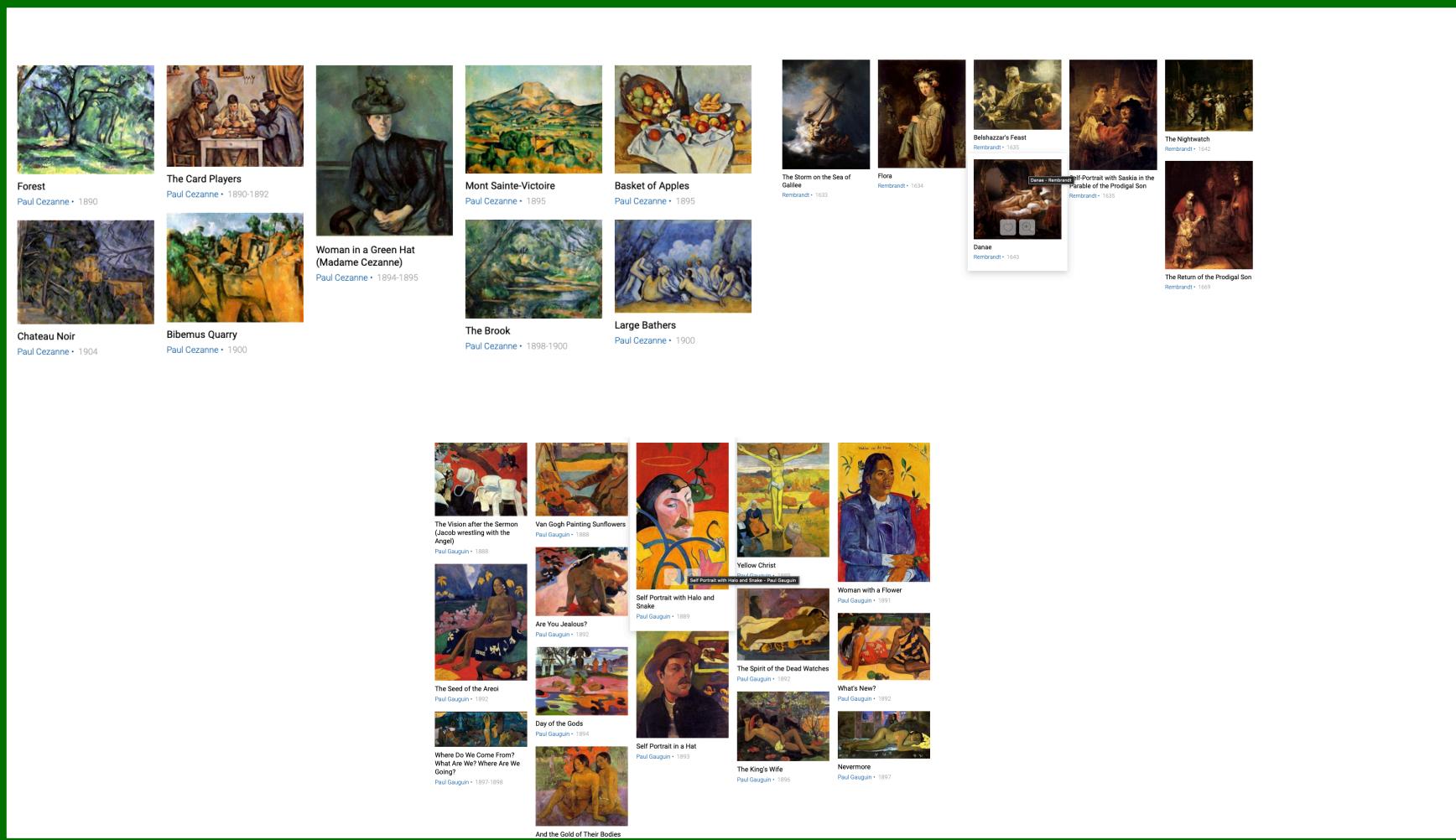
Contrastive Learning



ANCHOR OBJECT O_x :
made by Agent A_x



Potential positives: all objects made by
the (known) influencers of agent A_x



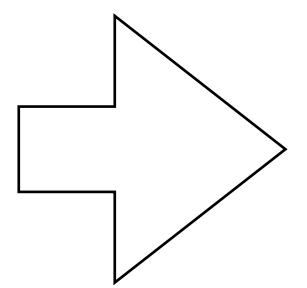
Potential negatives: all the
objects in the dataset **MINUS**
the potential positives





Baseline

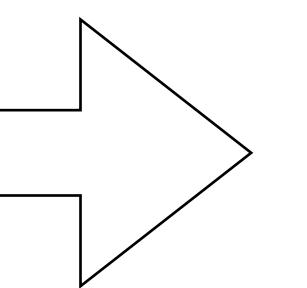
Object representation: visual embeddings of paintings (+ text embeddings of metadata) from pre-trained models



Object proximity \approx object similarity

CLOIR

Object representation: visual embeddings of paintings (+ text embeddings of metadata) from CLOIR



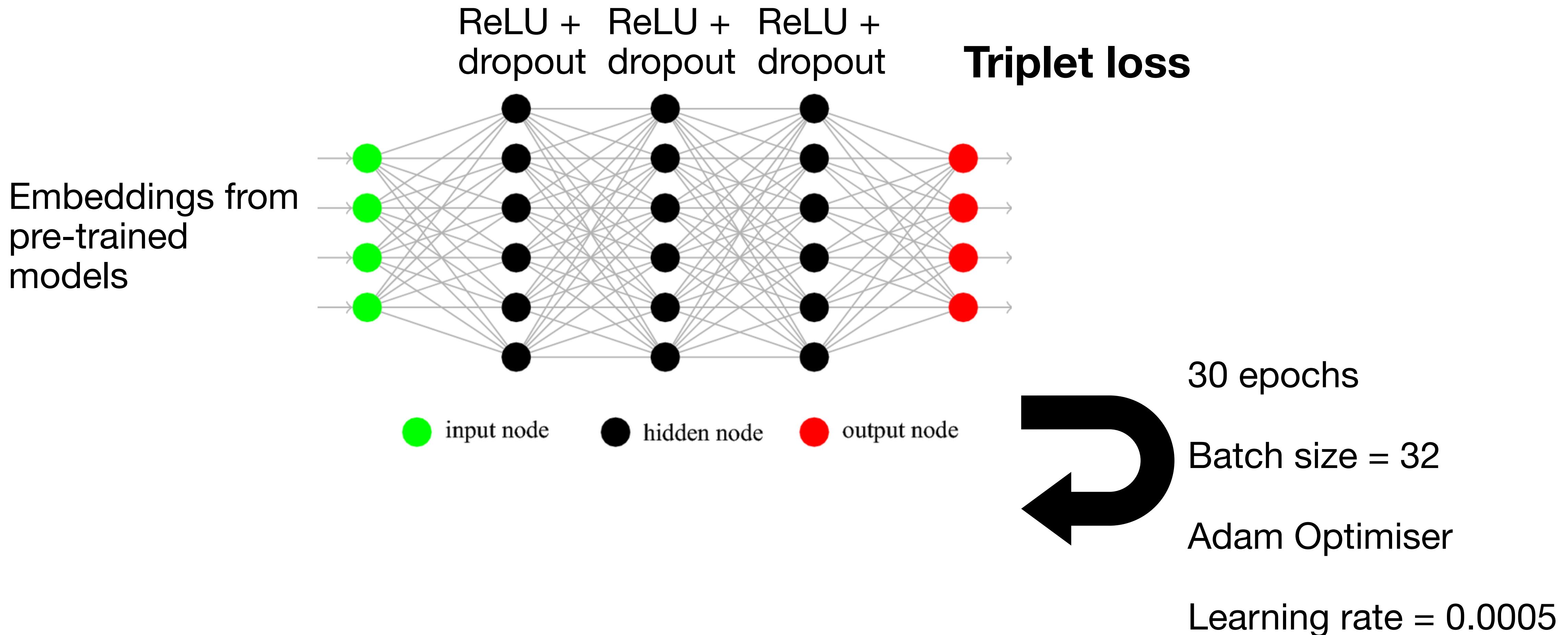
Object proximity \approx object influence?



Retrieve based on proximity \approx OIR



CLOIR model specification



Experiments

- Train / test split

Stratified: 70% of *objects* of A_x are in training set, remaining 30% of *objects* of A_x are in test set

Leave-out Agents: 70% of *agents* are in training set, remaining 30% of *agents* in test set.

- Sampling of examples

How

Random

Size

10

100

- Which Features

Image

ResNet

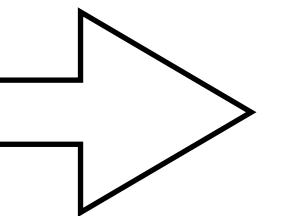
CLIP

Image + text

ResNet + GPT2

CLIP

OIR is a retrieval task

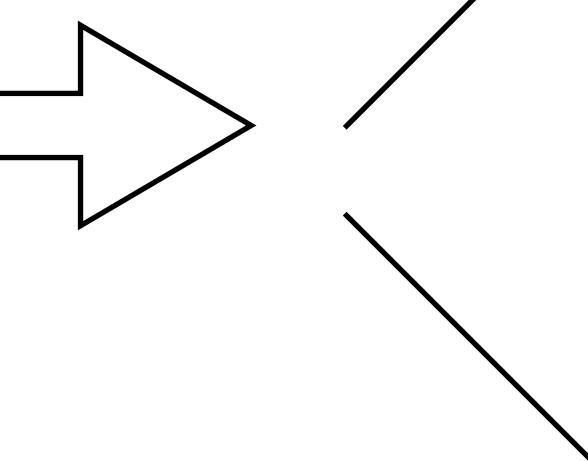


Retrieval metrics

Precision at 10

Mean Reciprocal Rank

Retrieval is considered correct if

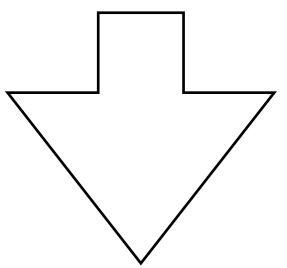


Retrieved object is made by an influencer of the agent.

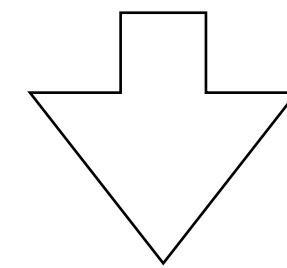
Retrieved object is made by an influencer of the agent or by any of the influencers of the influencers.

Results

	Sampling	Size	Feature	Model	P@10	MRR
Baseline	-	-	Image-Text	ResNet+GPT2	0.1	0.18
CLOIR	Similarity	100	Image-Text	ResNet+GPT2	0.41	0.41

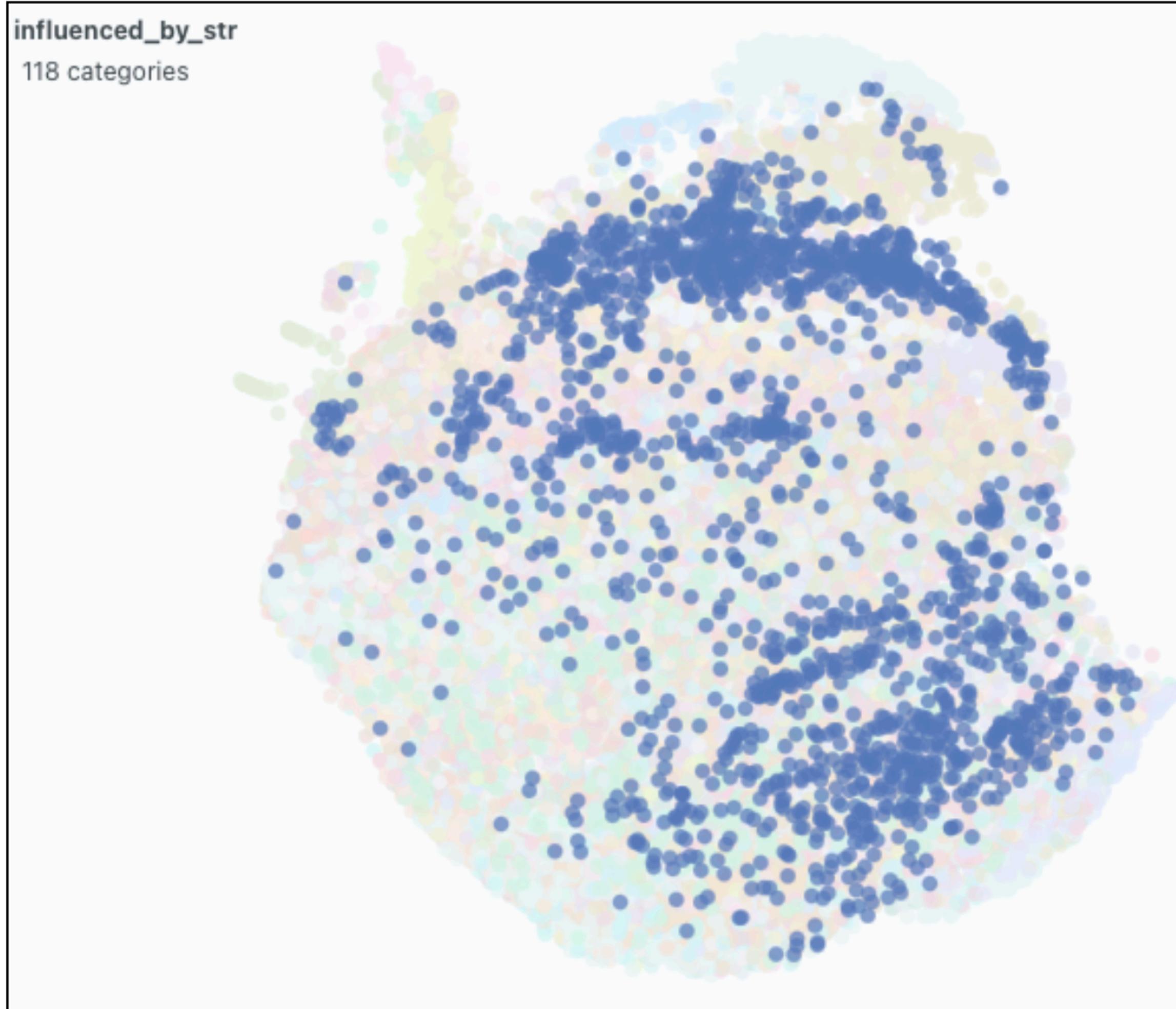


+ 0.309 in
P@10

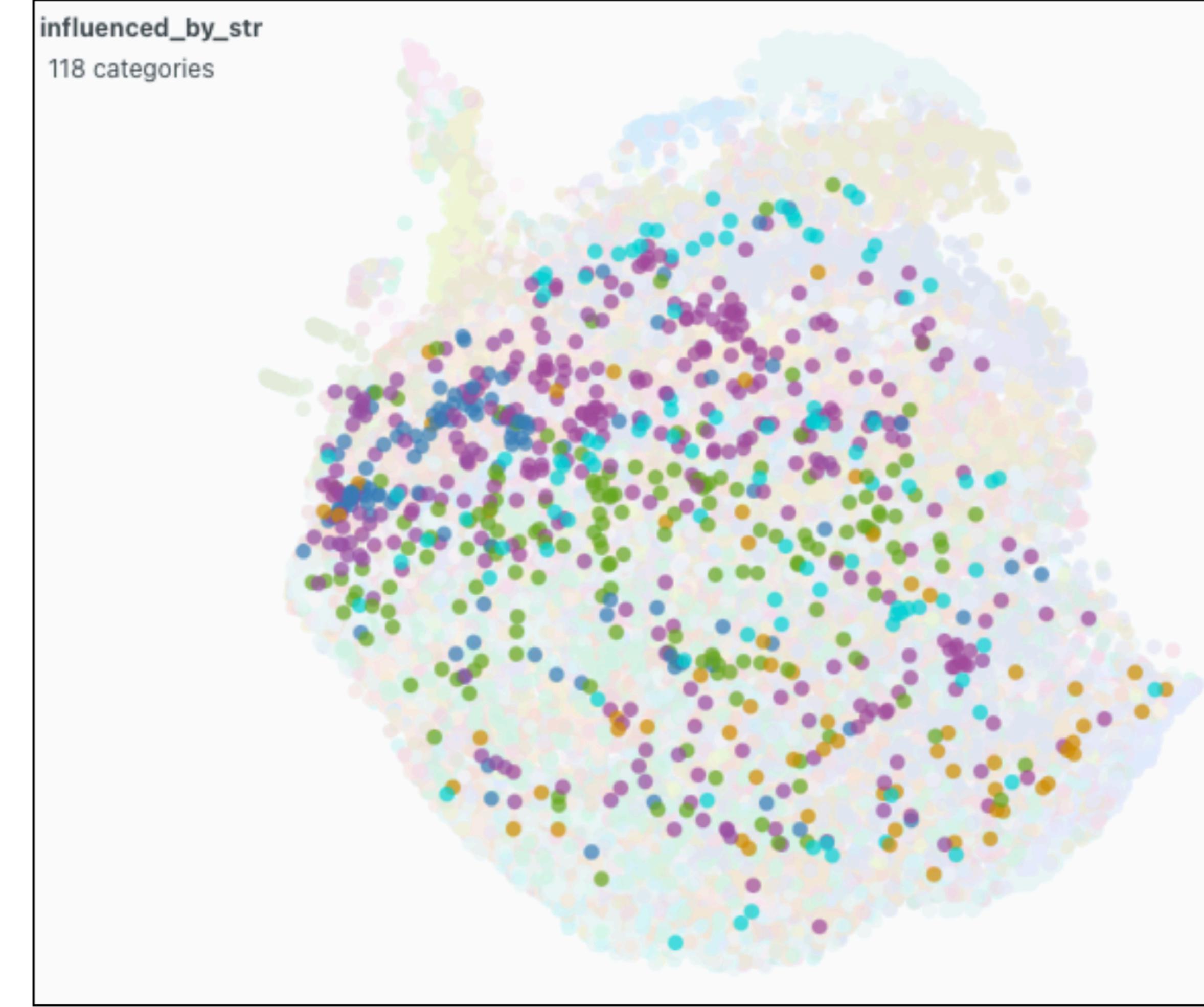


+ 0.231 in
MRR

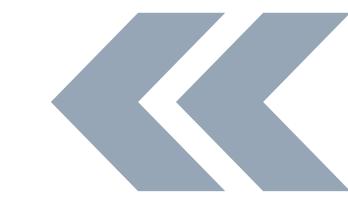
Embedding space: baseline



Objects made by Vincent Van Gogh

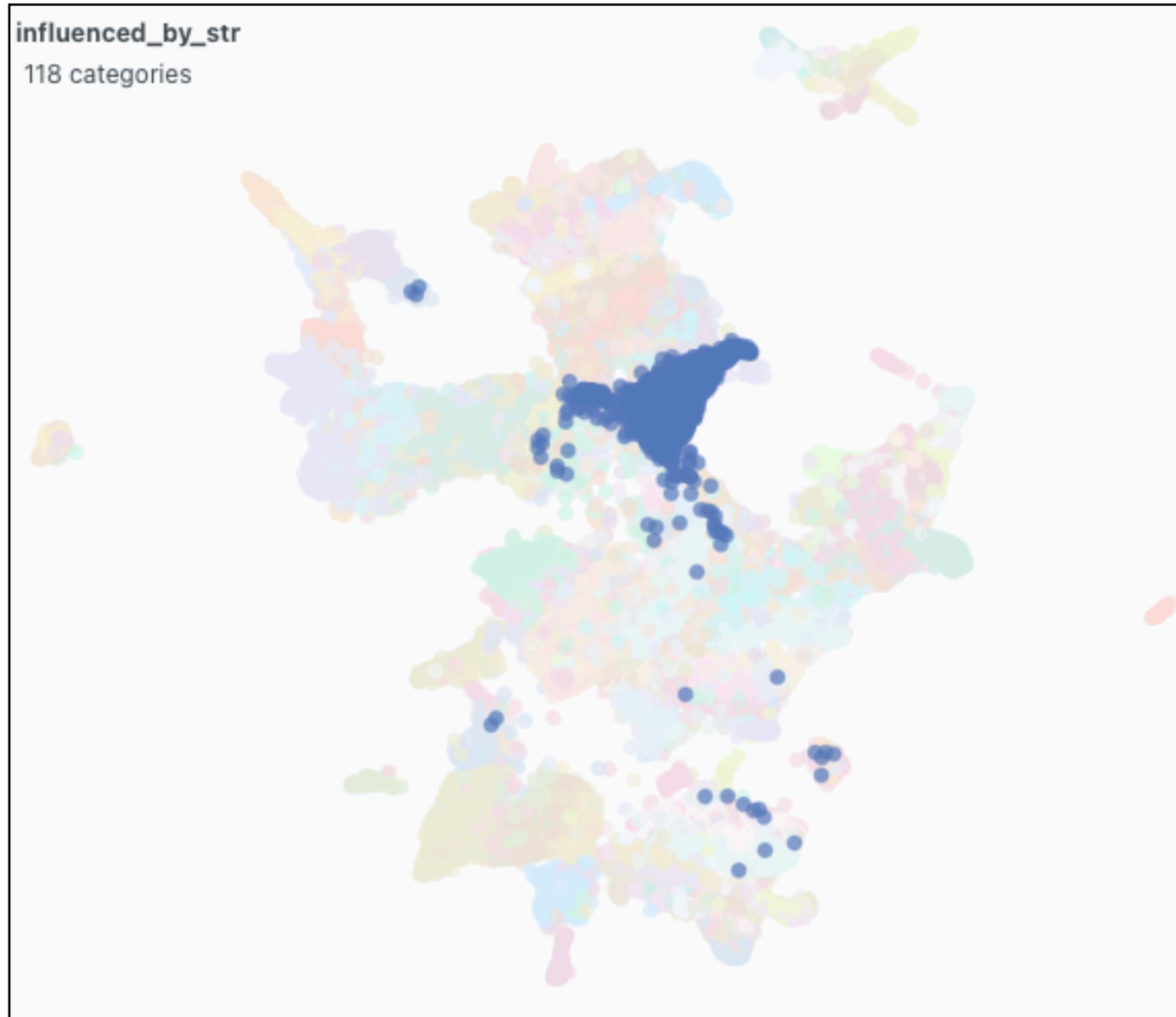


Objects made by agents influenced by Vincent Van Gogh

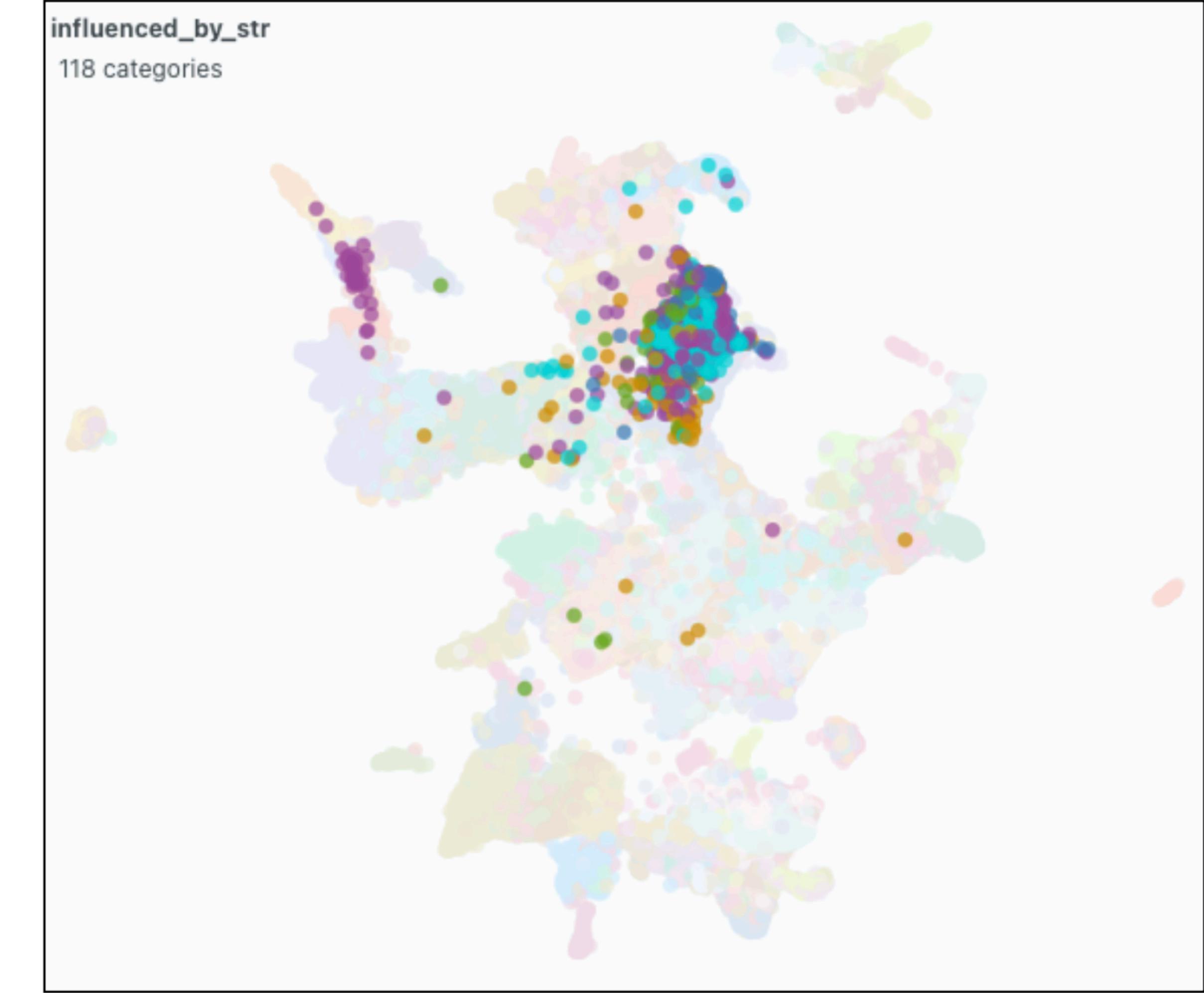


Embedding space: CLOIR →

Object proximity ≈ object influence?

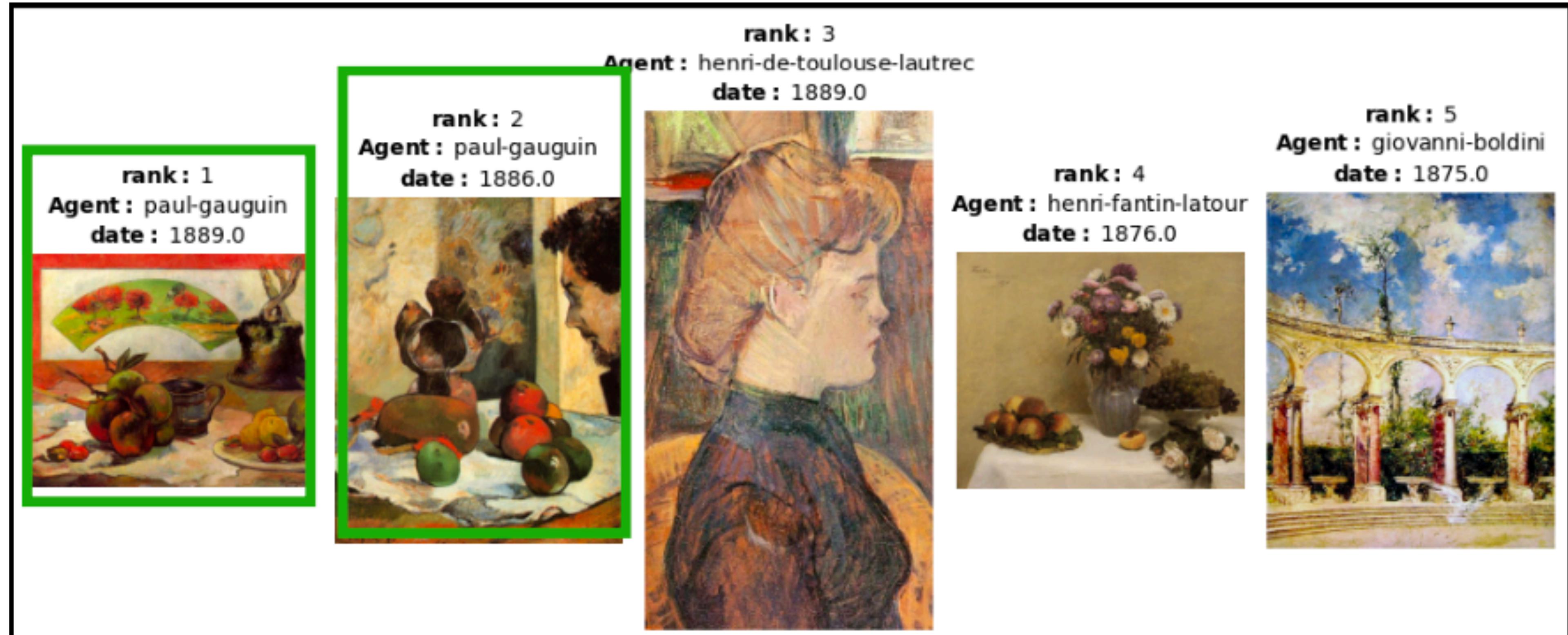
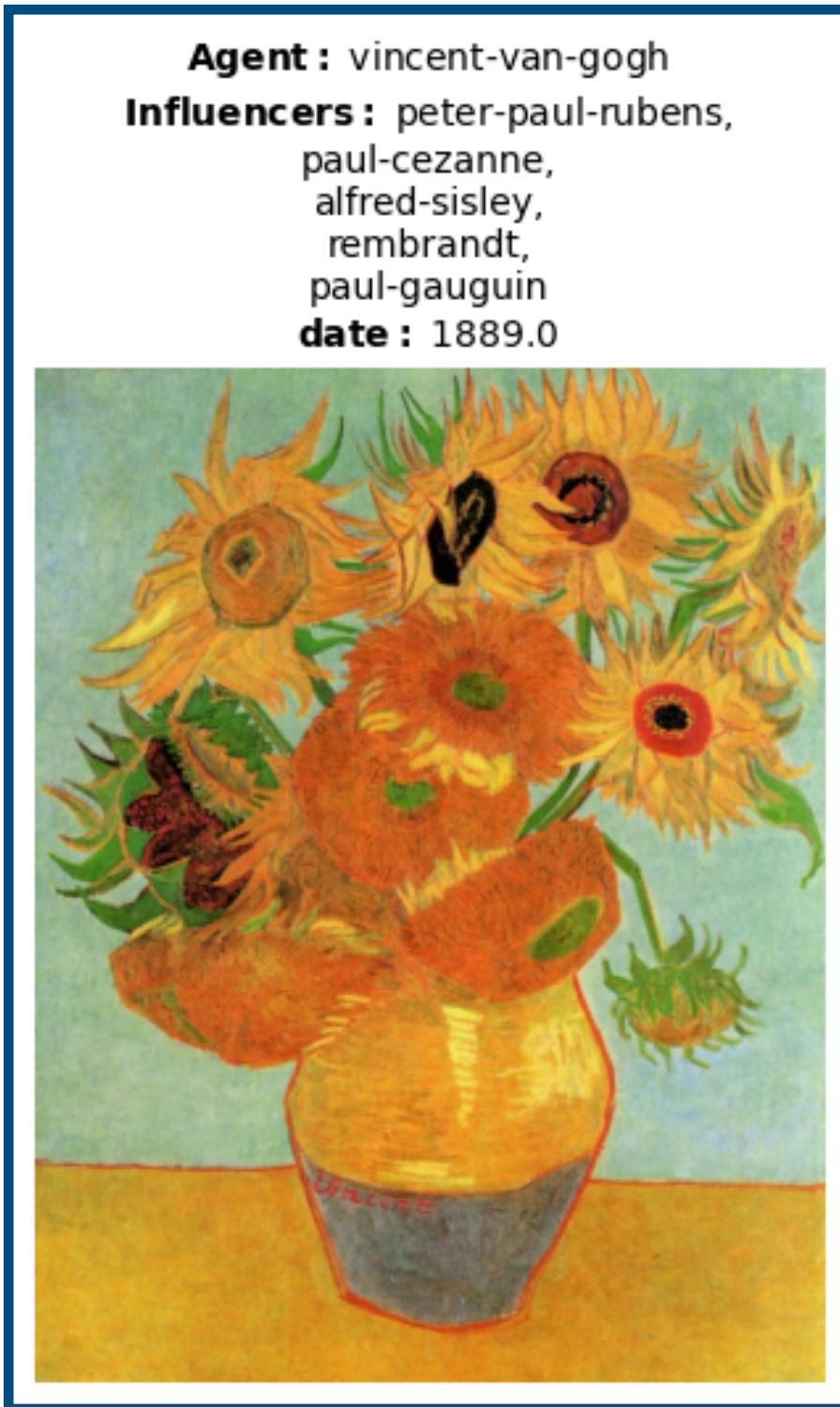


Objects made by Vincent Van Gogh

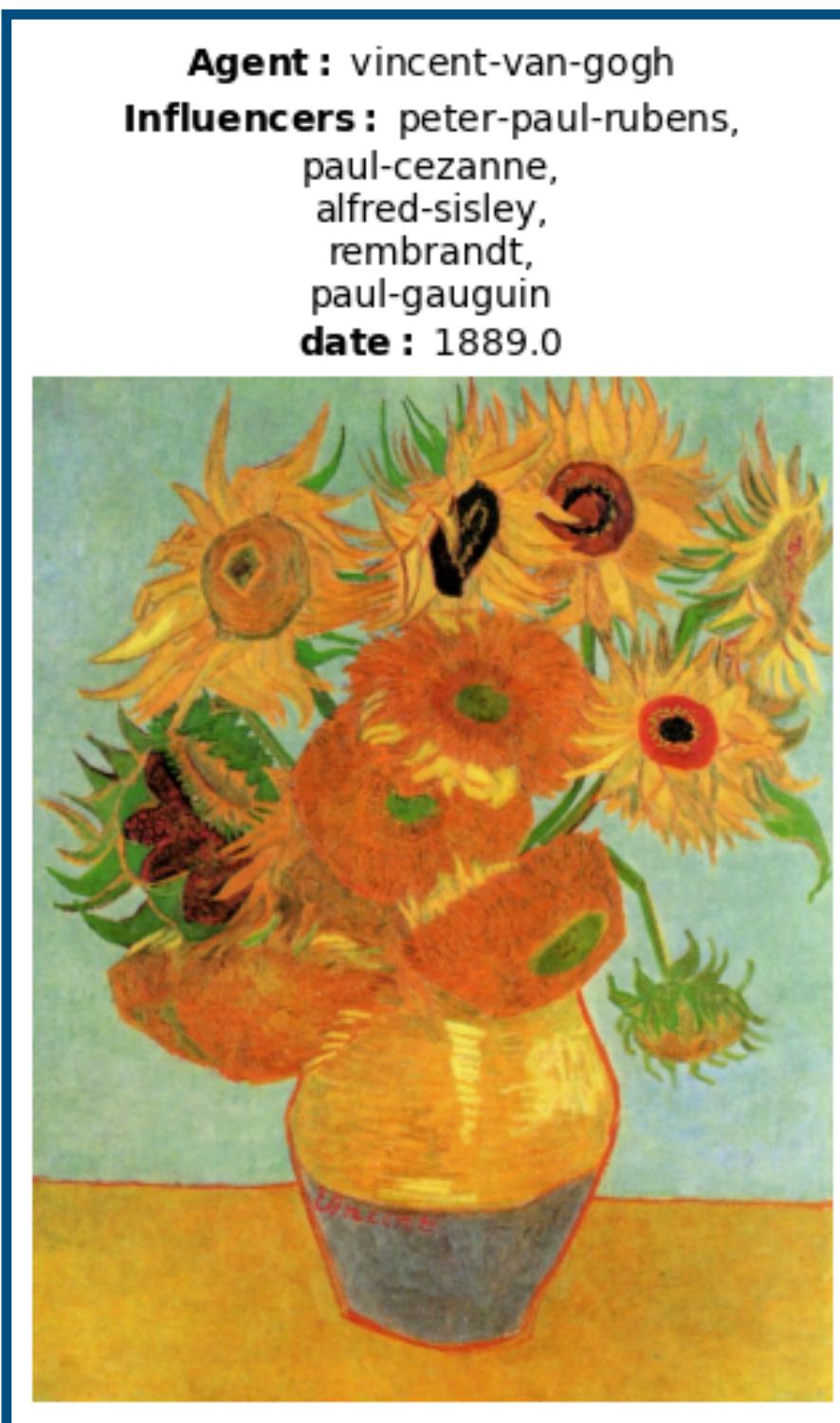


Objects made by agents influenced by Vincent Van Gogh

Object Influence Retrieval: Baseline



Object Influence Retrieval: CLOIR



CONCLUSION

- We introduced the task of Object Influence Retrieval (OIR)
- We propose CLOIR which beats a baseline
- But there is room for improvement to solve OIR: join the challenge!

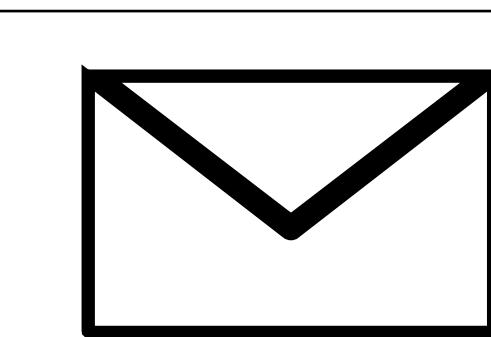


[Link to the paper](#)



[GitHub repo](#)

CURRENT WORK



t.liberatore@uva.nl

- Operationalisation of Agent Influence
- Focus: Fashion Industry



[FashionDB](#)

Teresa Liberatore, Paul Groth, Monika Kackovic, Nachoem Wijnberg