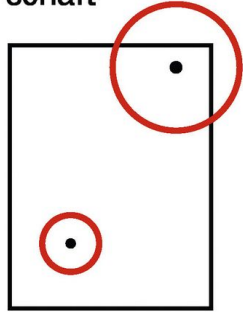


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From Data to Context:

AI-Based Style Attribution in Art History

Teresa Kamencek¹, Velitchko Filipov², Michaela Tuscher², Silvia Miksch², Raphael Rosenberg¹

¹ CReA Lab, Department of Art History, University of Vienna

² CVAST, Institute of Visual Computing and Human-Centered Technology, TU Wien

CVAST

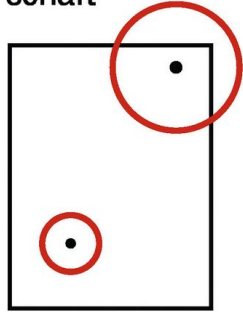


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From Data to Context:

AI-Based Style Attribution in Art History without Images

Teresa Kamencek¹, Velitchko Filipov², Michaela Tuscher², Silvia Miksch², Raphael Rosenberg¹

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100 Cities

Latest Blog Posts



25.07.2024

How women artists got established in the Munich exhibition scene – analyzing catalogue data from 1905-1915, by Nike Seidl

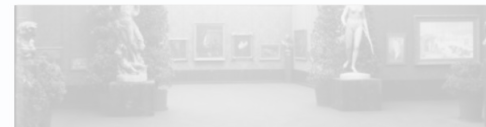
Damenakademie München Does art have a gender? This question might spontaneously be answered with a "no". However, when Donakt E. Gordon created a directory of modern artists on the basis ...



25.06.2024

Picasso and the Dealers: The Making of his First Museum Exhibition in Zurich, 1932, by Johannes Nathan

Museum exhibitions of contemporary art are frequently mounted in joint efforts with artists and the art trade. This practice, usually discussed only behind closed doors today, seems to ...



20.01.2024

Historicizing the Avant-Garde: The 1903 Impressionist Exhibition at the Vienna Secession, by Christian Huemer

The importance of exhibitions for the production, circulation, and reception of modern art has long been recognized. Nevertheless, out of hundreds of shows organized internationally in the first years of ...

Lanf. No.	Klimt, Gustav, Wien.	M.
177	— Zeichnung	300.—
178	— Zeichnung	300.—
179	— Zeichnung	280.—
180	— Zeichnung	300.—
181	— Zeichnung	300.—
182	— Zeichnung	280.—
183	— Zeichnung	300.—
184	— Zeichnung	280.—
185	— Zeichnung	300.—
186	— Zeichnung	300.—
187	— Zeichnung	300.—
188	— Zeichnung	300.—
189	— Zeichnung	300.—
190	— Zeichnung	300.—
191	— Zeichnung	300.—
192	— Zeichnung	300.—
	Klinger, Max, Leipzig.	
193	— Bildnisstudie, Zeichnung	Unverkäuflich
194	— Bildnisstudie, Zeichnung	Unverkäuflich
195	— Bildnisstudie, Zeichnung	Unverkäuflich
	Klinger, Julius, Berlin.	
196	— Zeichnung	300.—
197	— Zeichnung	400.—
	Kolbe, Georg, Berlin.	
198	— Männliche Aktstudie	75.—
199	— Weibliche Aktstudie	75.—
200	— Weibliche Aktstudie	100.—

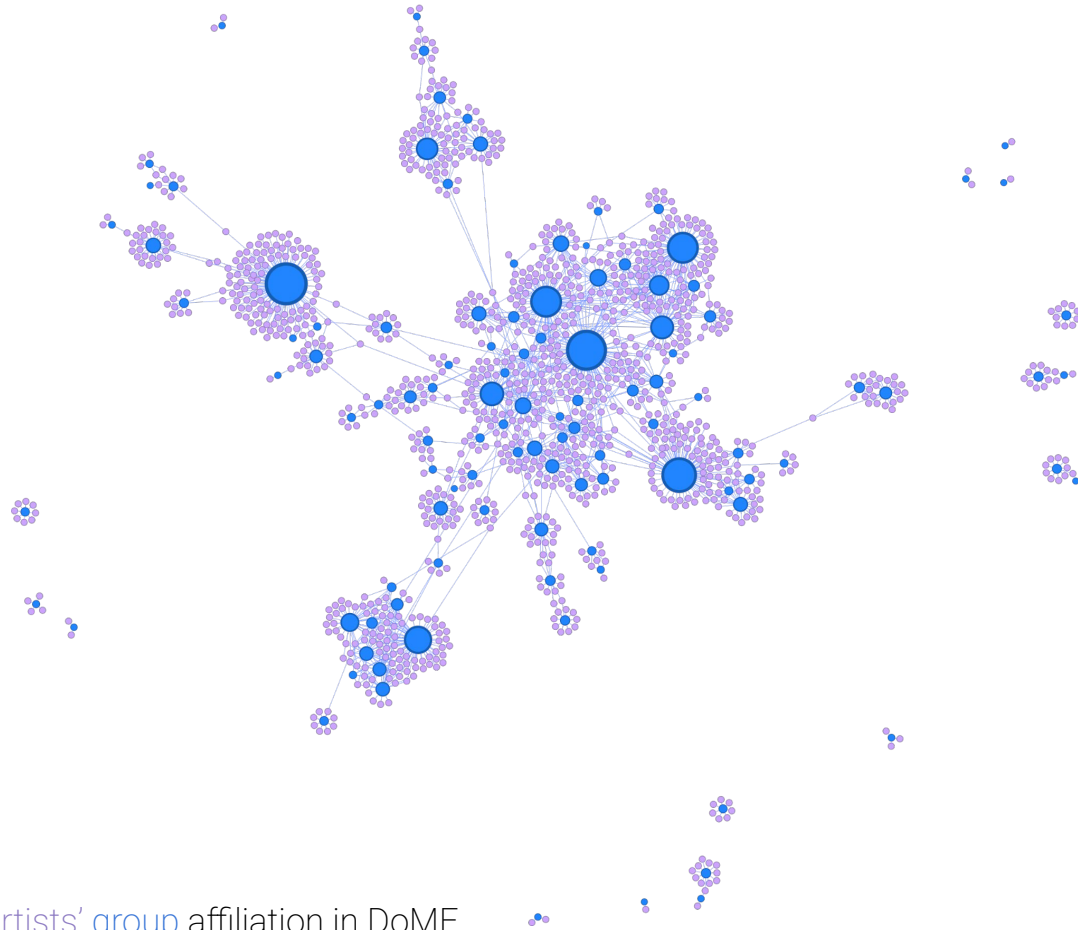
17



- Gustav Klimt Vienna (view artist profile)	
177.	Zeichnung # 300 drawing
178.	Zeichnung # 300 drawing
179.	Zeichnung # 280 drawing
180.	Zeichnung # 300 drawing
181.	Zeichnung # 300 drawing
182.	Zeichnung # 280 drawing
183.	Zeichnung # 300 drawing
184.	Zeichnung # 280 drawing
185.	Zeichnung # 300 drawing
186.	Zeichnung # 300 drawing
187.	Zeichnung # 300 drawing
188.	Zeichnung # 300 drawing
189.	Zeichnung # 300 drawing
190.	Zeichnung # 300 drawing
191.	Zeichnung # 300 drawing
192.	Zeichnung # 300 drawing

Exhibition Catalogue of the 14th Exhibition hosted by the Berliner Secession, Paul Cassirers Kunstverlag 1907, p. 17.

Entry of the same Exhibition in DoME,
<https://exhibitions.univie.ac.at/exhibition/133>



Network representation of artists' group affiliation in DoME.

Style Attribution without Images?

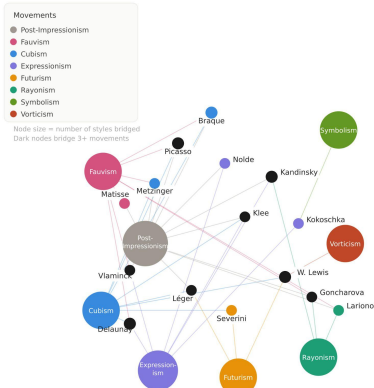
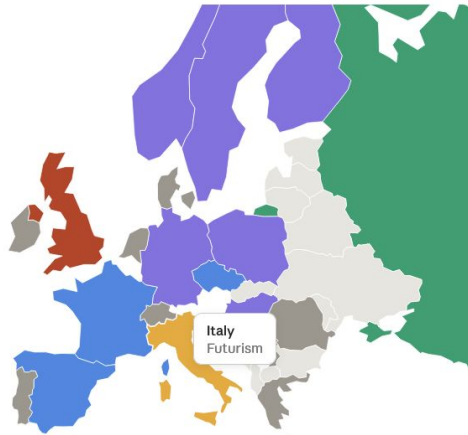
Can we still meaningfully attribute styles under these conditions and feed them back to our database?

→ Can **AI** meaningfully attribute styles under these conditions?

“To the historian of art, **style is an essential object of investigation.**”

(Schapiro 1953)

- **Style is one of art history's foundational ordering categories** (Locher 2001; 2011)
- Since Winckelmann (1764), it historically served to describe **epochs and formal change from different perspectives** (see e.g., Semper 1860; Riegl 1893; Wölfflin 1915)
- However, style became increasingly **plural and relational**, making maintaining the idea of a coherent history of style **methodologically difficult** (see Schapiro 1953; Sauerländer 1983)
- Digital methods allow us to rethink style not as a fixed label, but as a **dynamically changing, relational category**:



Expressionism dominates from the outset. Cubism arrives weakly via the Sturm gallery after 1910.

How?

Basic Idea:

Collect artworks by all the artists registered in DoME from other databases and use Machine Learning to identify their style

How: Image and Auction Databases

The problem, as illustrated by the example of ...

Prometheus (more than 4 million images):

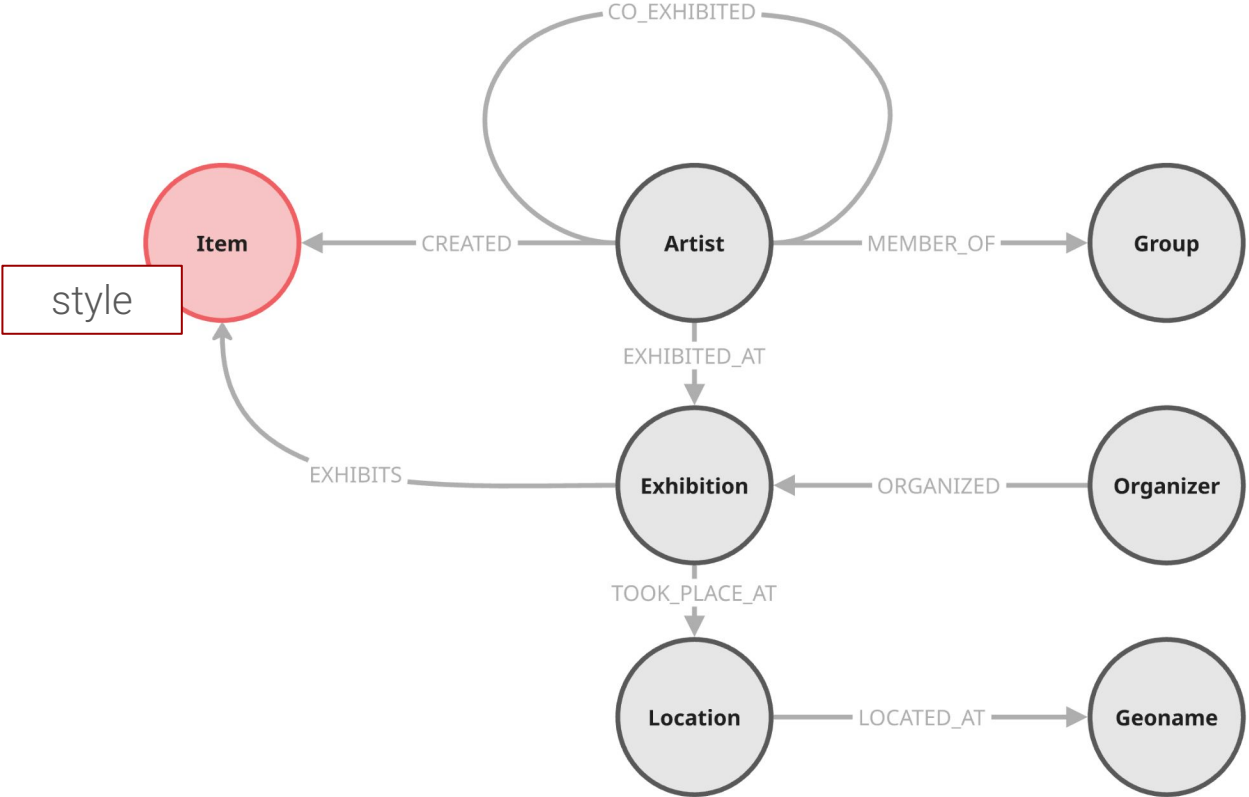
- Only **26.97%** of artists linked to ≥ 1 image*
- Image-based style attribution requires **sufficient temporal coverage**:
 - **~10%** have ≥ 11 images (incl. duplicates and artworks produced outside our timeframe)
 - **~6.8%** have ≥ 33 images

Artprice.com (more than 19 million auction sale results):

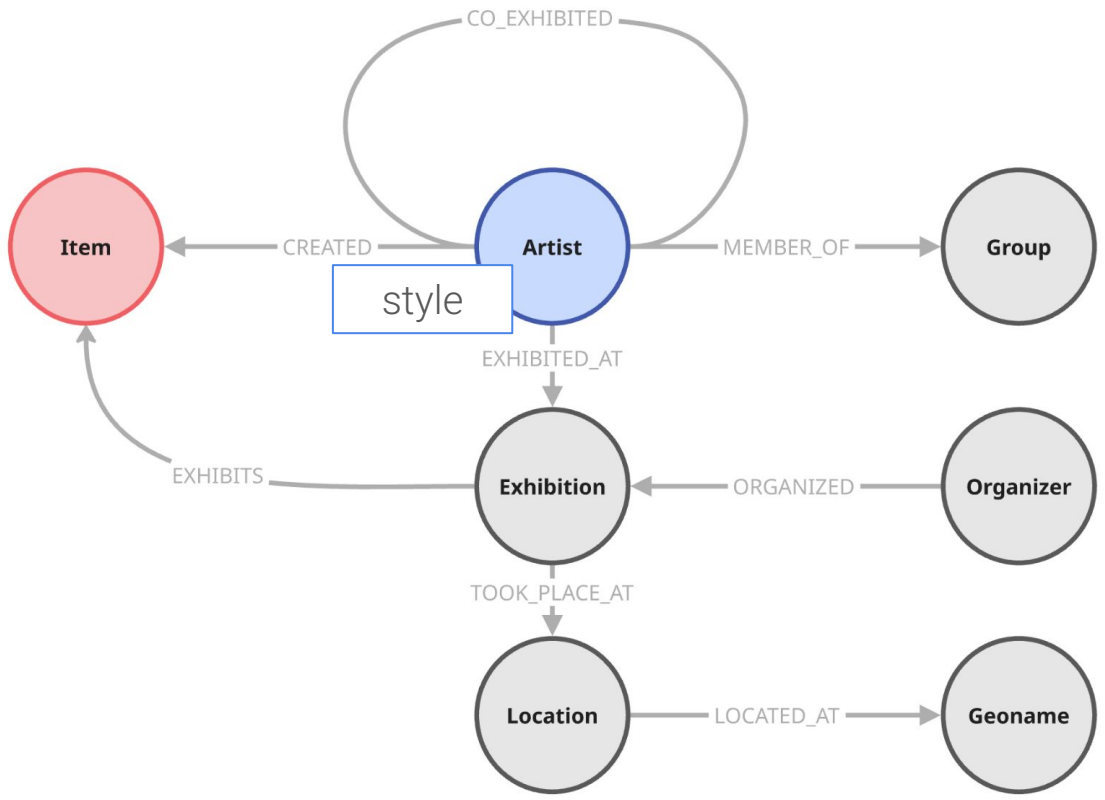
- ≥ 1 image for **~65%** of DoME artists (promising but limited systematic access; again duplicates and artworks produced outside our time frame included)
- **We manually analysed a sample of 300 artists: seemingly no correlation** between the number of images in Prometheus and the number of auction results on artprice

→ Image availability is limited and structurally uneven

DoME - Graph Database schema



DoME - Graph Database schema



Artist ↔ Style

Gabriele Münter

🌐 33 languages ▾

Article Talk

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From Wikipedia, the free encyclopedia

Gabriele Münter (19 February 1877 – 19 May 1962) was a German expressionist painter who was at the forefront of the [Munich avant-garde](#) in the early 20th century.^[1] She studied and lived with the painter [Wassily Kandinsky](#) and was a founding member of the expressionist group *Der Blaue Reiter*.

Gabriele Münter



Münter, c. 1903

Born 19 February 1877
Berlin, German Empire

Died 19 May 1962 (aged 85)
Murnau am Staffelsee, Bavaria,
West Germany

Known for Painting

Movement Expressionism

Wikipedia, "Gabriele Münter"
(https://en.wikipedia.org/wiki/Gabriele_M%C3%BCnter [10/04/26])

Artist ↔ Style: WikiArt

Home / Artists / **Expressionism** / Wassily Kandinsky



Portrait of Wassily Kandinsky - Gabriele Münter

Wassily Kandinsky

Василий Кандинский

Born: December 16, 1866; Moscow, Russian Federation ⓘ

Died: December 13, 1944; Neuilly-sur-Seine, France ⓘ

Active Years: 1896 - 1944

Nationality: Russian

Art Movement: Expressionism, Abstract Art

Painting School: Blue Rose, Der Blaue Reiter (The Blue Rider), Bauhaus, Degenerate art (exhibition, held by the

Genre: abstract

Field: painting, engraving, art theory

Influenced by: Edvard Munch, Aristarkh Lentulov, Robert Delaunay, Paul Cezanne, Claude Monet

Influenced on: Josef Albers, Egon Schiele, Georgia O'Keeffe, Karl Otto Gotz, Nasreen Mohamedi, William

Pupils: Milița Petrașcu

Art institution: Akademie der Bildenden Künste München (Munich Academy), Munich, Germany

Friends and Co-workers: Paul Klee, Franz Marc, Alexej von Jawlensky, Vadym Meller

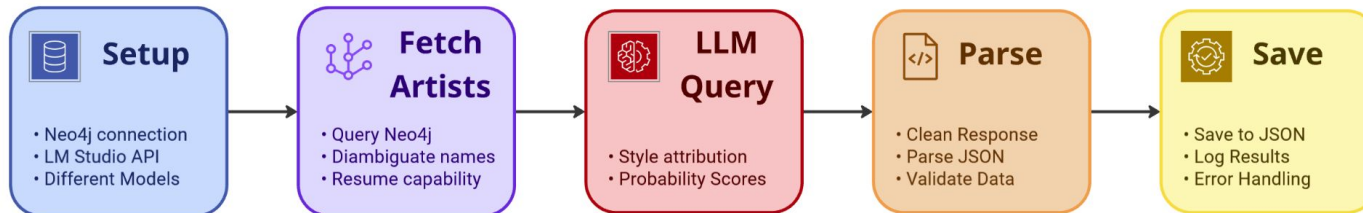
Wikipedia: [en.wikipedia.org/wiki/Wassily_Kand...](https://en.wikipedia.org/wiki/Wassily_Kandinsky) ⓘ

Wassily Kandinsky on WikiArt
(<https://www.wikiart.org/en/wassily-kandinsky>
[13/04/26])

How to **automatically infer** Style as dynamic and relational: 2nd try

Considerations:

- **Year-by-year attribution** instead of fixed style labels
- **Artist-level modelling** in the absence of systematically identifiable artworks
- **Probabilistic style assignments** rather than fixed classification
- **Comparative modelling** across multiple LLMs



You are an expert in art history.

Given the artist [Firstname, Lastname], born YYYY, return a valid JSON object only (no explanations, no markdown code fences, no extra text), listing the most specific artistic style (not genre) for each year from 1905-1915 associated with the artist. For each year, assign the most fitting artistic style based on the artist's career and historical context.

Only use specific artistic styles (such as realism, abstract painting, expressionism, impressionism, rayonism, cubism, art nouveau, jugendstil, or other recognized styles) to artists.

Do not assign genres (e.g., "Landscape Painting," "Genre Painting," "Portraits," "Cityscapes") or groups/collectives/movements (e.g., "Der Blaue Reiter," "UNOVIS," "Jack of Diamonds") as styles. If the most plausible style is not explicitly available, infer the most likely style grounded in art history, but never use a genre or group name as a style.

Each style must have a "style" name and a "probability" number from 0 to 100, reflecting your confidence in the assignment.

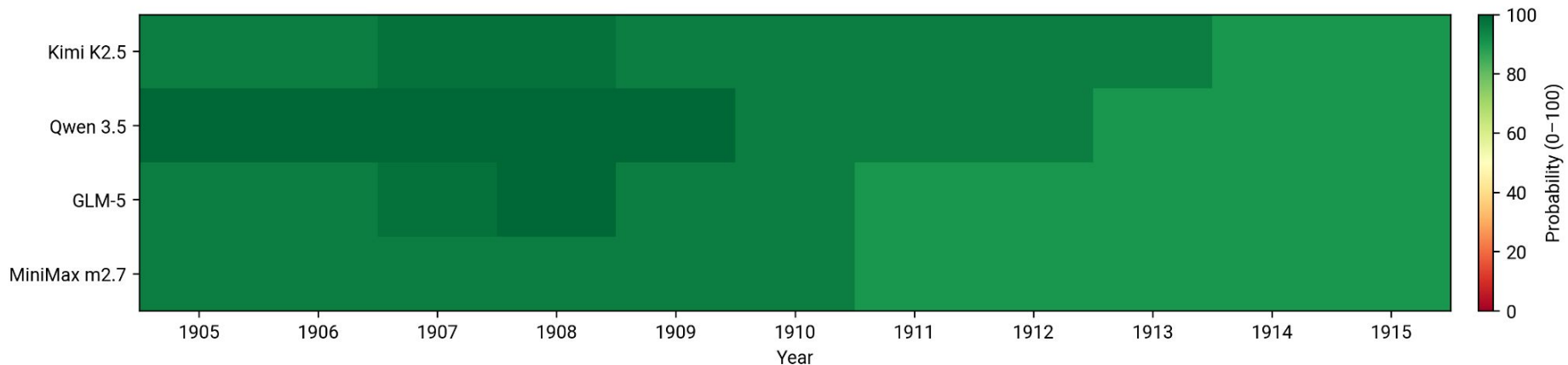
The JSON format must be exactly as in this example (do not include comments or ellipsis):

```
{
  "artist": "Vassily Kandinsky, born 1866",
  "styles": [
    {"year": 1905, "style": "Style", "probability": Number (0-100) },
    {"year": 1906, "style": "Style", "probability": Number (0-100) },
    {"year": 1907, "style": "Style", "probability": Number (0-100) },
    {"year": 1908, "style": "Style", "probability": Number (0-100) },
    {"year": 1909, "style": "Style", "probability": Number (0-100) },
    {"year": 1910, "style": "Style", "probability": Number (0-100) },
    {"year": 1911, "style": "Style", "probability": Number (0-100) },
    {"year": 1912, "style": "Style", "probability": Number (0-100) },
    {"year": 1913, "style": "Style", "probability": Number (0-100) },
    {"year": 1914, "style": "Style", "probability": Number (0-100) },
    {"year": 1915, "style": "Style", "probability": Number (0-100) }
  ]
}
```

Results: Gustav Klimt

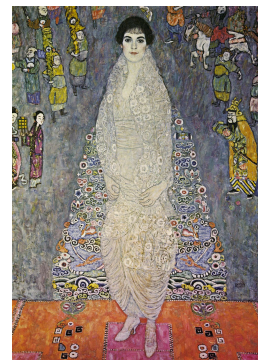
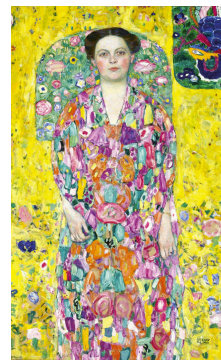
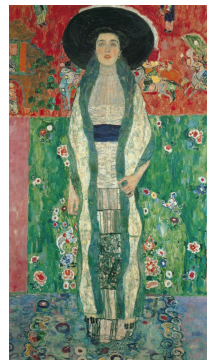
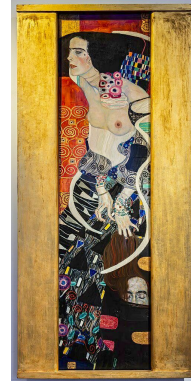
Year	Kimi K2.5	Qwen 3.5	GLM-5	MiniMax m2.7
1905	Art Nouveau (95)	Art Nouveau (100)	Art Nouveau (95)	Art Nouveau (95)
1906	Art Nouveau (95)	Art Nouveau (100)	Art Nouveau (95)	Art Nouveau (95)
1907	Art Nouveau (98)	Art Nouveau (100)	Art Nouveau (98)	Art Nouveau (95)
1908	Art Nouveau (98)	Art Nouveau (100)	Art Nouveau (100)	Art Nouveau (95)
1909	Art Nouveau (95)	Art Nouveau (100)	Art Nouveau (95)	Art Nouveau (95)
1910	Art Nouveau (95)	Art Nouveau (95)	Art Nouveau (95)	Art Nouveau (95)
1911	Art Nouveau (95)	Art Nouveau (95)	Art Nouveau (90)	Art Nouveau (90)
1912	Art Nouveau (95)	Art Nouveau (95)	Art Nouveau (90)	Art Nouveau (90)
1913	Art Nouveau (95)	Art Nouveau (90)	Art Nouveau (90)	Art Nouveau (90)
1914	Art Nouveau (90)	Art Nouveau (90)	Art Nouveau (90)	Art Nouveau (90)
1915	Art Nouveau (90)	Art Nouveau (90)	Art Nouveau (90)	Art Nouveau (90)

Gustav Klimt = Art Nouveau



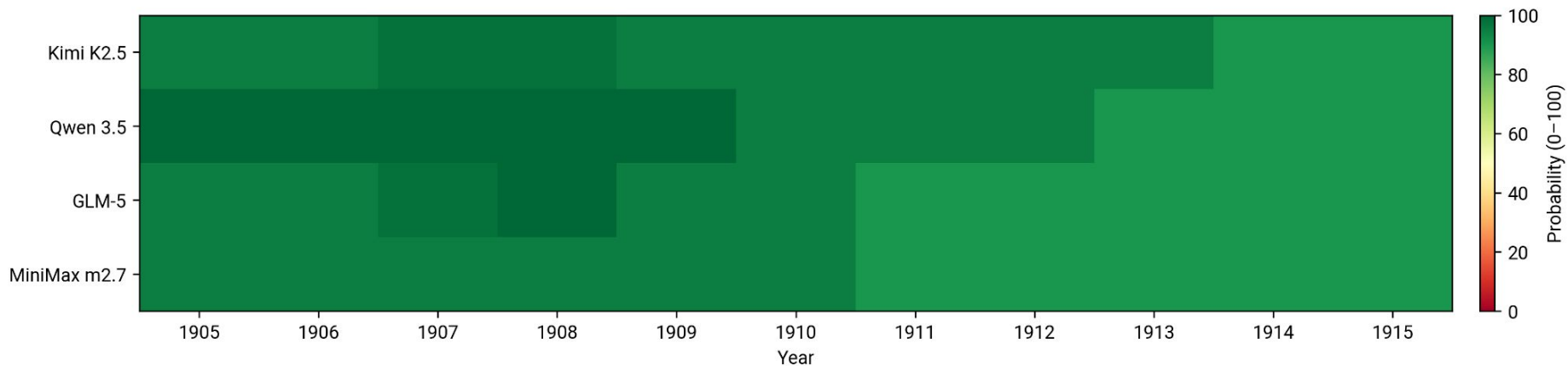
Self-generated probability of style attribution ($90 \leq n \leq 100$) for Gustav Klimt across various models ("Art Nouveau", 1905-1915). Colour coded by Probability Score.

Gustav Klimt = Art Nouveau



Gustav Klimt:
Margarethe Stonborough-Wittgenstein, 1905
Fritza Riedler, 1906
Adele Bloch-Bauer I, 1907/1908
Danae, 1908
Judith II (Salome), 1909
Die Erfüllung (Stoclet-Frieze), 1910
Tod und Leben, from 1911
Adele Bloch-Bauer II, 1912
Eugenia Primavesi, 1913
Elisabeth Lederer, 1914-1916

Gustav Klimt = Art Nouveau?

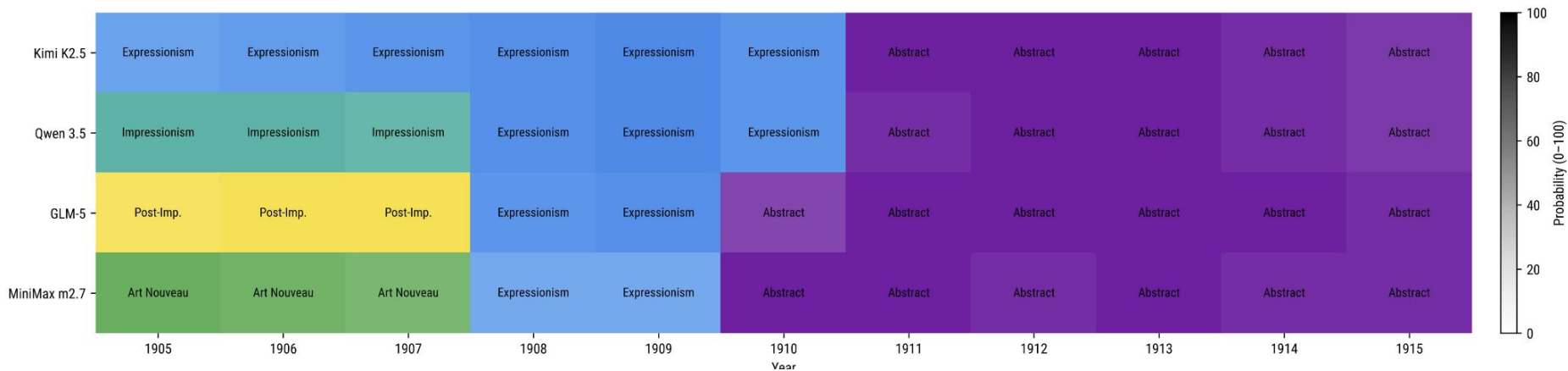


Gustav Klimt, *Tod und Leben*, from 1911
Oil on Canvas, 180 x 200 cm
Leopold Museum, Vienna

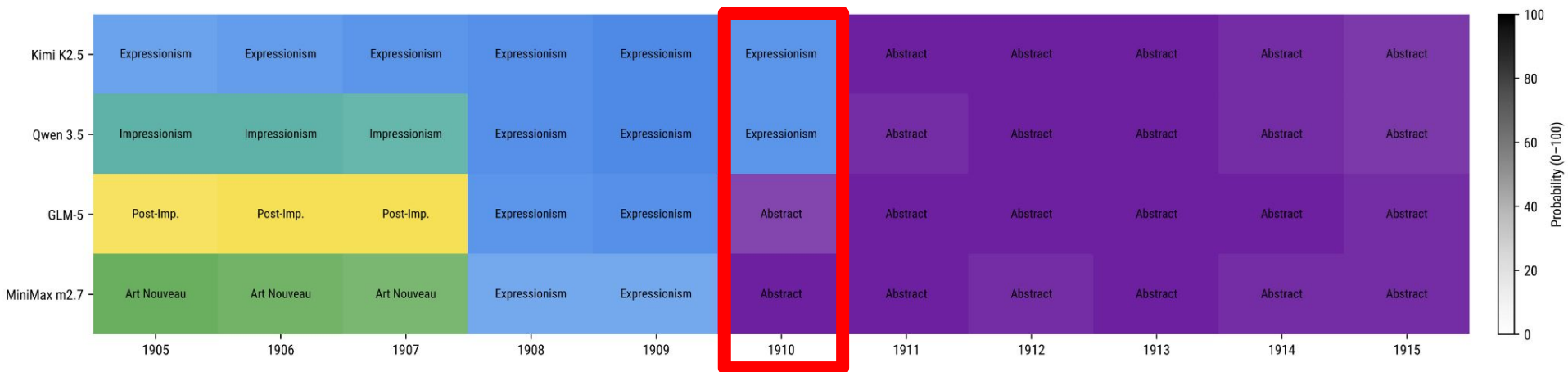
- “The work seems to have dragged on well into 1910 and 1911; this is linked to a **creative crisis** Klimt experienced following his trip to Paris, which he describes in his writings.” (Weidinger et al. 2007)
- “The fact that the work then dragged on is likely the result of the **artistic crisis** that has been noted on several occasions, triggered by the trip to Paris in 1909.” (Natter 2012)
- Expressionist qualities, esp. in choice of theme (Munch, Schiele)



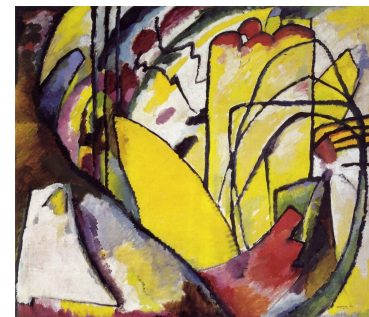
Egon Schiele, *Tod und Mädchen*, 1915
Oil on Canvas, 150 x 180 cm
Österreichische Galerie Belvedere, Vienna



Style attribution and its probability ($70 \leq n \leq 95$) for Wassily Kandinsky across various models (1905-1915). Colour coded by predicted style (hue) and probability score (intensity).



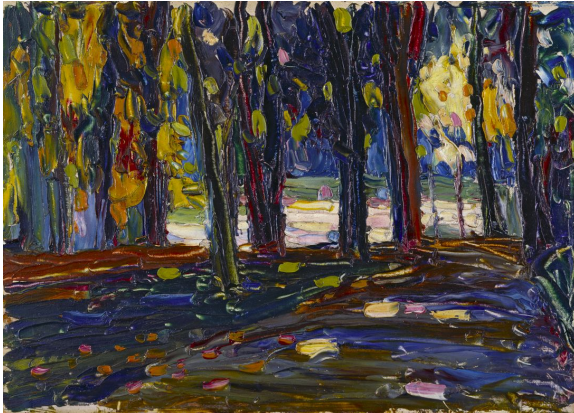
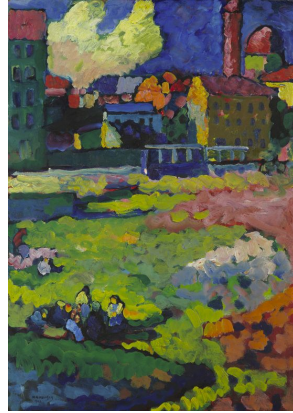
- Kandinsky created and exhibited both figurative as well as abstract paintings in 1910



(f.l.t.r.) *Winterlandschaft*, *Improvisation 13*, *Improvisation 9*, *Improvisation 10*

There are lots of ways to get it almost right...

Kimi K2.5	Expressionism	Expressionism	Expressionism
Qwen 3.5	Impressionism	Impressionism	Impressionism
GLM-5	Post-Imp.	Post-Imp.	Post-Imp.
MiniMax m2.7	Art Nouveau	Art Nouveau	Art Nouveau
	1905	1906	1907



Weiss, Peg. *Kandinsky in Munich: The Formative Jugendstil Years*. Princeton 1979.

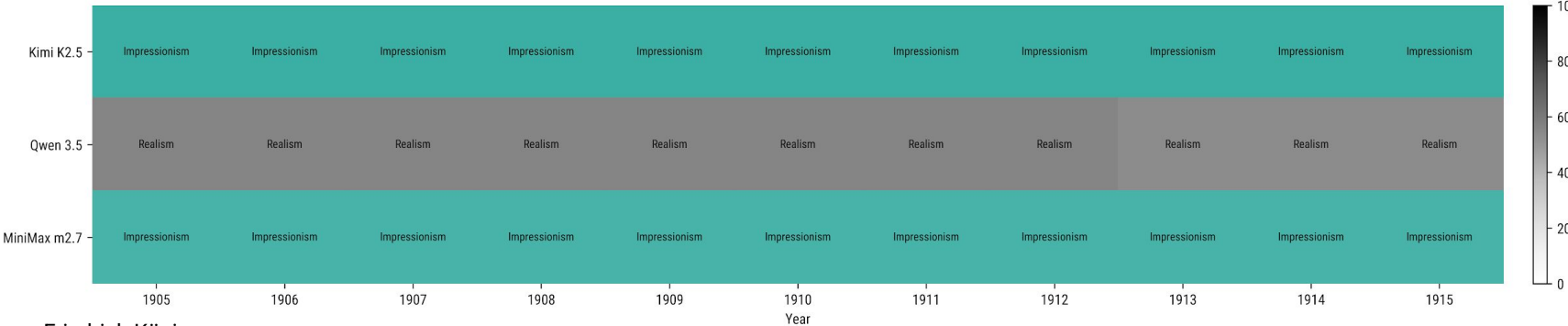
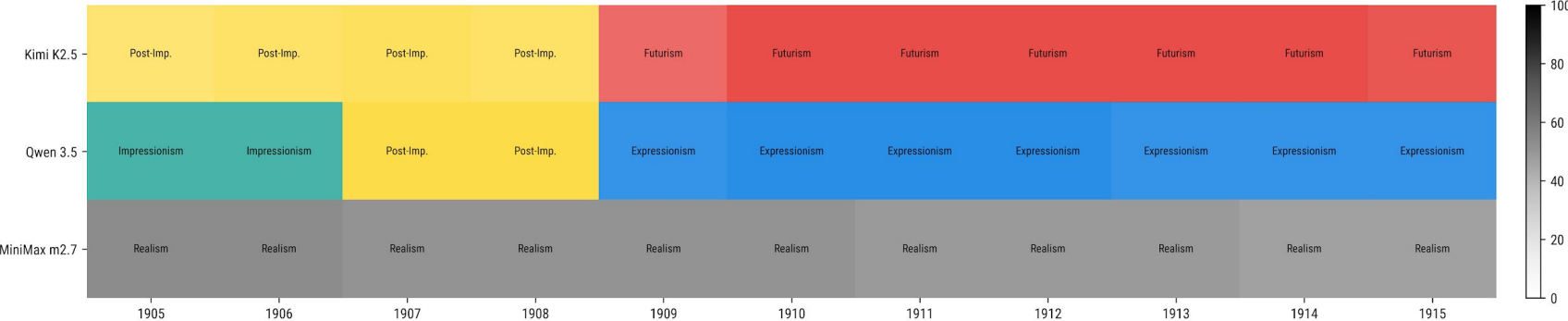
Draguet, Michel. "De Paris à Berlin: Kandinsky entre fauvisme et expressionnisme". In: *Fauves et expressionnistes*. Musée Marmottan Monet, Paris 2009.

Moeller, Magdalena M. et al. (Ed.). *Der frühe Kandinsky: 1900–1910*. München 1994.

Im Park von St. Cloud – Herbst II (1906), München - Vor der Stadt (1905), Tunis – Karthago (1905), Reitendes Paar (1906/1907), Das bunte Leben (1907)

But...

Erma Bossi



Friedrich König

Learnings, Challenges, and Future Work

→ Can AI meaningfully infer year-by-year stylistic attributions for artists in the DoME database?

Yes and no!

The case studies suggest that, where strong canonical associations exist, **LLM-based style attribution can produce reliable results.**

However...

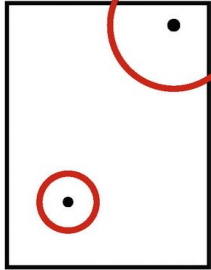
Learnings, Challenges, and Future Work

- **Canonical bias**
 - Reinforcing an already exclusionary canon (e.g., what happens to lesser-known artists?)
- **Discretisation**
 - Can we even determine **one** style per year?
- **Black box problem**
 - Training data? Finetuning?
- **Confidence rating**
 - Are models overconfident? Does the score mean anything?
- **Data access limitations**
 - Missing APIs/export options, bot blockers
- **Need for human / expert evaluation**
 - Validation and refinement

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ArtVis. Dynamic Network Perspectives
on Digital Art History

