A COMPARATIVE STUDY OF SIMPLE AND COMPLEX ART INTERPRETATIONS IN LINKED OPEN DATA USING ICON ONTOLOGY

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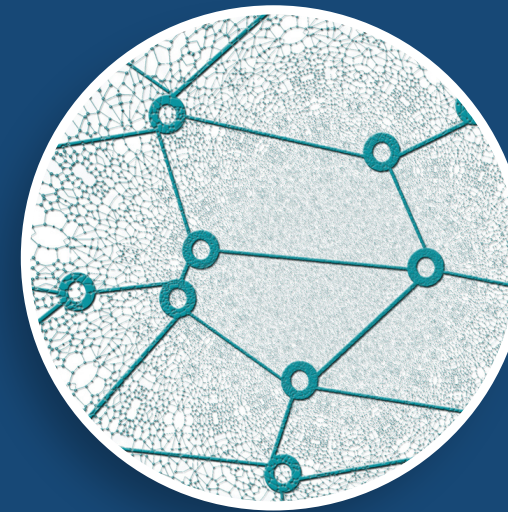
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INTRODUCTION

Iconography and iconology

Iconography focuses on subject recognition and comprehension.

Iconology concerns the understanding of iconographic subjects as documents of socio-cultural phenomena.

Semantic web

Semantic Web technologies offer an opportunity to formalize complex statements on this domain
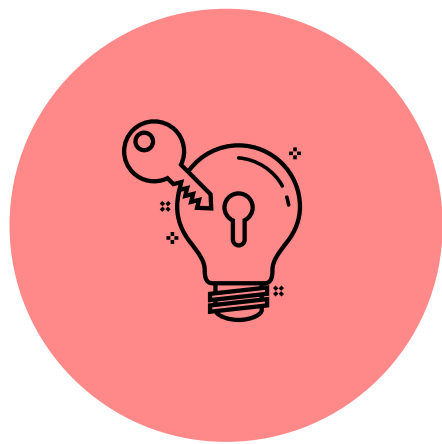
PANOFSKY'S INTERPRETATION ACT

Level 1
Natural elements (e.g. actions, people, objects) and expressional qualities (e.g. emotions)
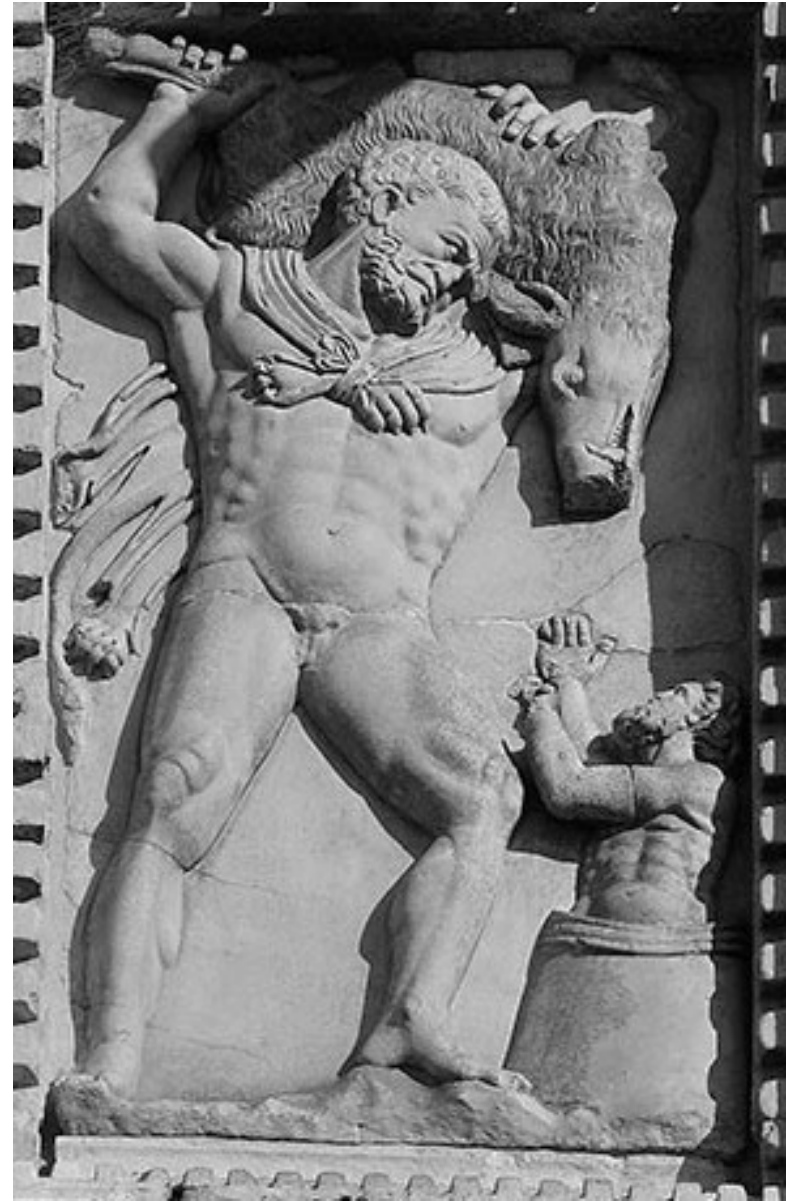
Level 2
Characters, themes, stories, allegories, symbols, etc.

Level 3
Cultural phenomena, attitude of a person or of the time

E. Panofsky, F. Saxl, Classical mythology in mediaeval art, Metrop. Mus. Stud. 4 (1933) 228–280

Hercules carrying the Erymanthian Boar, III Century, Venice, St. Mark's Basilica, external wall

Allegory of Salvation, XIII Century, Venice, St. Mark's Basilica, external wall

stag

stag-human soul

drapery

Stand upon

Allegory of Christ conquering evil and saving the souls of the Faithful

Dragon

Evil

mediaeval Western art was unable to retain a classical prototype without destroying its original meaning.

ICON ONTOLOGY

https://w3id.org/icon/docs/

Recognition — **Subject manifested in the specific artwork considered** — **Subjects as described by vocabularies**

cites as evidence — carried out by — Pre-Iconographical Recognition — Artistic motif or Composition — Level 1 subject — 1:1

cites as evidence — carried out by — Iconographical Recognition — Image — Level 2 subject — 1:1
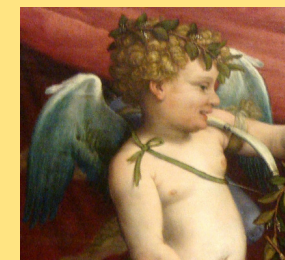
cites as evidence — carried out by — Iconological Recognition — Intrinsic meaning — Level 3 Subject — 1:1
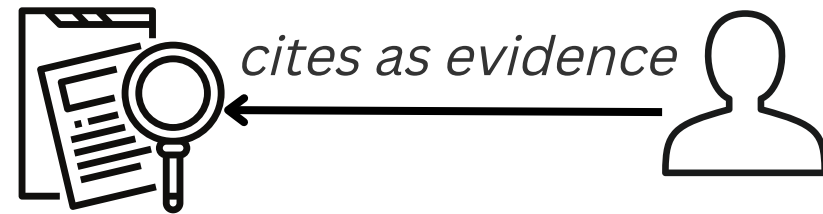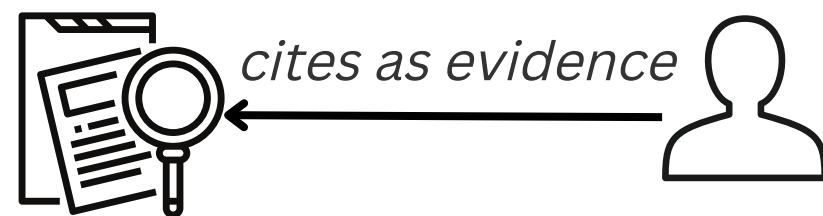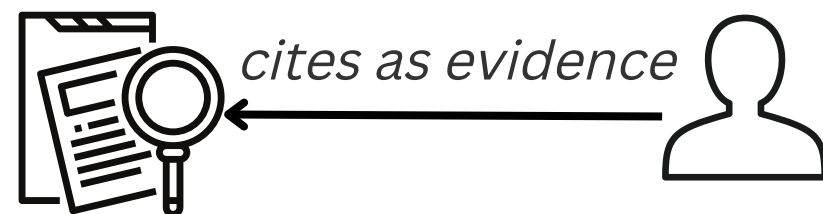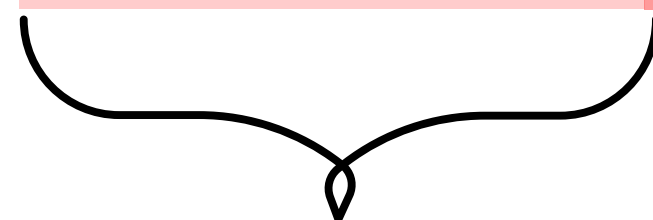
Interpretation

RESEARCH AIMS AND APPROACH

Problem

ICON ontology only allows fully described interpretations of artworks

Aims

- *Avoid redundant triples created by N-ary relationships when not needed*
- *Improve efficiency in information retrieval*

Approach

- *Identifying concrete examples of issues through two motivating scenarios*
- *Extending the ontology by adding property chains*
- *Testing the extended ontology by describing two examples from the motivating scenarios*

TWO SCENARIOS

- *Free text subject description in artworks catalogue entries*

- *Art historians' interpretations*

SCENARIO 1

Free text subject description in artwork catalogue entries

Subject description with no further indications on

- *information provenance*
- *how the subjects relate with each other*
- *alternative interpretations*

Requirement: *Simple subject description and retrieval*

Example: Hohenstein Adolf, *Manifest with walking allegorical figures*, century XIX (extracted from ArCo (Carriero et. al., 2019))
https://w3id.org/arco/resource/HistoricOrArtisticProperty/0500671662

"**Iconographic reading**: *male figures; female figures; allegorical figures; Work; Art; Sculpture; Painting; Music; trumpet; standard; palm branch; laurel branch; hammer, palette; brushes; lira; work tools; heraldic crests; shield.* **Merchandise category/Type of event**: *cultural events; celebrations; the fiftieth anniversary of the statute.* **Names**: *50th Anniversary of the Albertine Statute.* **Places**: *Turin*"*

*authors' English translation

SCENARIO 2

Art historians' interpretations

Subject description with indications on
- *information provenance*
- *how the subjects relate with each other*

Requirement*: Thorough description, simple core subject retrieval*

Example: *Hercules carrying the Erymanthian Boar*, III Century; *Allegory of Salvation*, c. XIII A.D. Venice, St. Mark's Basilica (extracted from the Iconology dataset (Baroncini et. al, 2023))
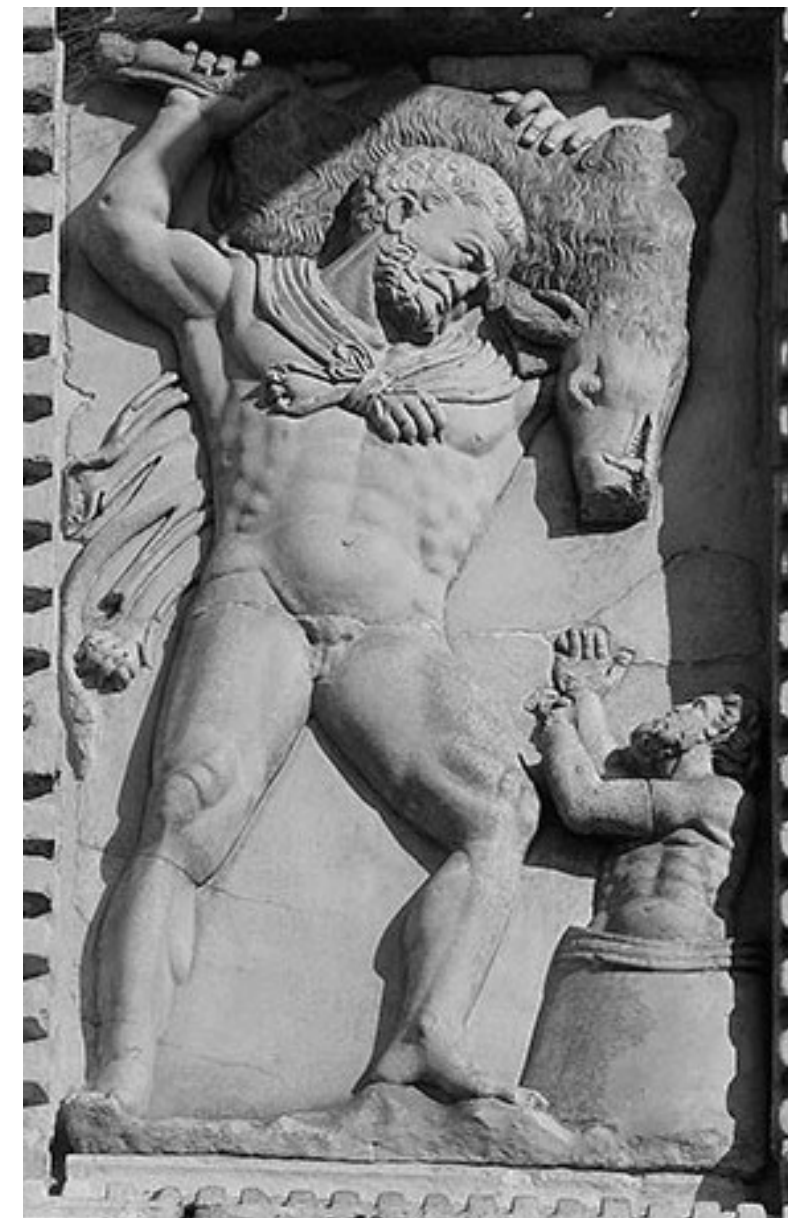
*«[...] an antique relief of Hercules could not be imitated without changing its mythological subject (figs. 4, 5). The lion's skin was replaced by a **fluttering drapery**, the boar became a **stag**, the **terrified Euristheus** was left out, and the hero was made to stand upon a vanquished **dragon**. As the **human soul was often symbolized by a stag**, the result of these changes was that the classical hero had been transformed into the **Saviour conquering evil and saving the souls of the Faithful**. From this example we learn that **mediaeval Western art was unable, or, what comes to the same thing, was unwilling, to retain a classical prototype without destroying either its original form, or, as here, its original meaning**.»* (Panofsky and Saxl, 1933, p.228)

ICON EXTENSION
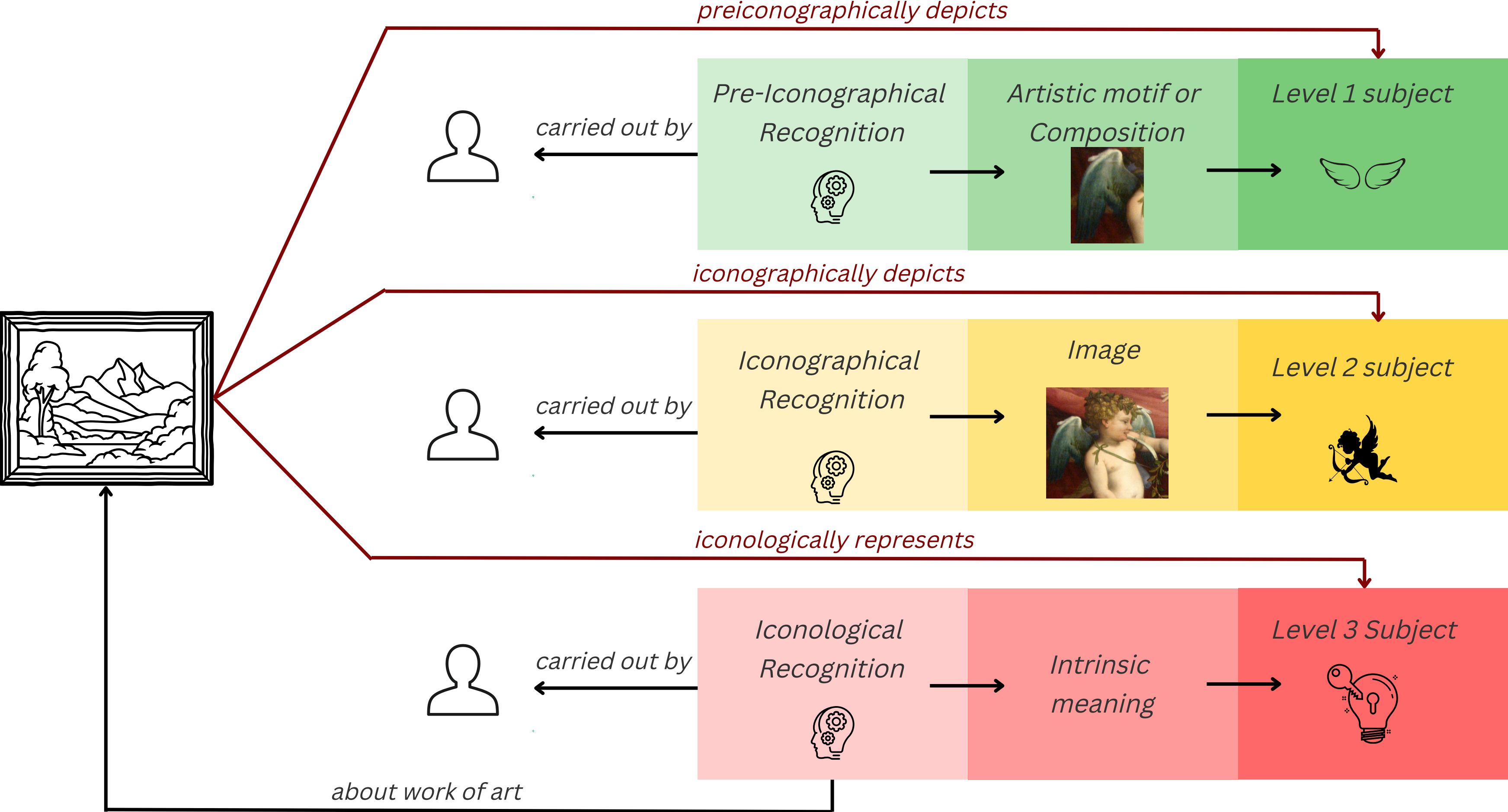
PROPERTY CHAINS

Description: Pre-iconographically Depicts

SuperProperty Of (Chain) ➕

- 'Has Recognition' o 'Recognized Composition' o 'Has Part (ICON)' o 'Has Expressional Meaning' SubPropertyOf: 'Pre-iconographically Depicts'
- 'Has Recognition' o 'Recognized Artistic Motif' o 'Has Expressional Meaning' SubPropertyOf: 'Pre-iconographically Depicts'
- 'Has Recognition' o 'Recognized Composition' o 'Has Part (ICON)' o 'P138 represents' SubPropertyOf: 'Pre-iconographically Depicts'
- 'Has Recognition' o 'Recognized Artistic Motif' o 'Has Factual Meaning' SubPropertyOf: 'Pre-iconographically Depicts'
- 'Has Recognition' o 'Recognized Composition' o 'Has Part (ICON)' o 'Has Factual Meaning' SubPropertyOf: 'Pre-iconographically Depicts'
- 'Has Recognition' o 'Recognized Artistic Motif' o 'P138 represents' SubPropertyOf: 'Pre-iconographically Depicts'

Description: Iconologically Represents

SuperProperty Of (Chain) ➕

- 'Has Recognition' o 'Recognized Intrinsic Meaning' o 'Recognized Cultural Phenomenon' SubPropertyOf: 'Iconologically Represents'
- 'Has Recognition' o 'Recognized Intrinsic Meaning' o 'Recognized Concept' SubPropertyOf: 'Iconologically Represents'

Description: Iconographically Depicts

- 'Has Recognition' o 'Recognized Image' o 'Has Character' SubPropertyOf: 'Iconographically Depicts'
- 'Has Recognition' o 'Recognized Image' o 'Has Personification' SubPropertyOf: 'Iconographically Depicts'
- 'Has Recognition' o 'Recognized Image' o 'Has Event' SubPropertyOf: 'Iconographically Depicts'
- 'Has Recognition' o 'Recognized Image' o 'Has Place' SubPropertyOf: 'Iconographically Depicts'
- 'Has Recognition' o 'Recognized Image' o 'Has Symbol' SubPropertyOf: 'Iconographically Depicts'
- 'Has Recognition' o 'Recognized Invenzione' SubPropertyOf: 'Iconographically Depicts'
- 'Has Recognition' o 'Recognized Image' o 'Has Named Object' SubPropertyOf: 'Iconographically Depicts'
- 'Has Recognition' o 'Recognized Invenzione' o 'Composed Of' SubPropertyOf: 'Iconographically Depicts'

EXAMPLES DESCRIPTIONS

Scenario 1

```
@prefix icon: <https://w3id.org/icon/ontology/> .
@prefix arco-p: <https://w3id.org/arco/resource/
HistoricOrArtisticProperty/> .
@prefix ex: <https://example.org/>

arco-p:0500671662 icon:preiconographicallyDepicts ex:male-figures,
ex:female-figures, ex:standard, ex:palm-branch, ex:laurel-branch,
ex:hammer, ex:palette, ex:brushes, ex:lira, ex:work-tools,
ex:heraldic-crests, ex:shield,
ex:50th-anniversary-of-the-albertine-statute;
    icon:iconographicallyDepicts ex:allegorical-figures, ex:Work,
    ex:Art, ex:Sculpture, ex:Painting, ex:Music;
    icon:iconologicallyRepresents ex:cultural-events, ex:celebrations,
    ex:the-fiftieth-anniversary-of-the-statute.
```

Subjects fully described by property chains
no further interpretation description

✓ simple subject description

Scenario 2

Subjects partially described with property chains
Further thorough interpretation description

✓ simple subject retrieval of complex interpretations

```
@prefix d: <https://w3id.org/icon/data/>

d:ART1004 icon:preiconographicallyDepicts d:carrying-on-shoulders,
d:stepping-on, d:man, d:cloth, d:deer, d:dragoon;
    icon:iconographicallyDepicts d:deer-souls,
    d:carrying-on-shoulders-saving-souls,
    d:stepping-on-defeating-devil, d:dragoon-devil;
    icon:iconologicallyRepresents d:CF1181.
d:CF1181 rdfs:label "Medieval Western art was unable to retain a
classical prototype without destroying its original meaning".
```

SPARQL QUERY OPTIMISATION

Query: retrieve all the recognised subjects at each level of interpretation

```
SELECT DISTINCT ?subj1 ?subj2 ?subj3 WHERE {
 VALUES ?rel {icon:hasCharacter icon:hasEvent icon:hasNamedObject icon:hasPlace icon:hasPersonification icon:hasSymbol}

    d:ART1004 ^icon:aboutWorkOfArt ?rec.
    {?rec icon:recognizedArtisticMotif /
     (icon:hasFactualMeaning | icon:hasExpressionalMeaning | crm:P138_represents) ?subj1.
    }

    UNION
    {?rec icon:recognizedComposition / icon:hasPart /(icon:hasFactualMeaning | icon:hasExpressionalMeaning | crm:P138_represents) ?subj1.
    }
    UNION
    {?rec icon:recognizedImage ?img.
     ?img ?rel ?subj2.
    }
    UNION
    {?rec icon:recognizedInvenzione ?subj2
    }
     UNION
    {?rec icon:recognizedIntrinsicMeaning / (icon:recognizedConcept | icon:recognizedCulturalPhenomenon) ?subj3.
    }
 }
```

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**Previous
ontology version**

VS

</div>

```
PREFIX d: <https://w3id.org/icon/data/>
PREFIX icon: <https://w3id.org/icon/ontology/>

  SELECT DISTINCT ?subj1 ?subj2 ?subj3 WHERE {
    VALUES ?art {d:ART1004}
    {?art icon:preiconographicallyDepicts ?subj1
    } UNION
    ?art icon:iconographicallyDepicts ?subj2
    } UNION
    ?art icon:iconologicallyRepresents ?subj3
    }
 }
```

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**Last ontology
version**

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VERSION COMPARISON

Requirement	Motivating scenario	ICON 1.0	ICON2.0
Simple subject description	Scenario 1		✓
Core subjects direct retrieval	Scenario 1, 2		✓
Thorough subject description	Scenario 2	✓	✓

CONCLUSIONS

The extended version of ICON ontology introduces three new properties aimed at directly identifying the depicted subjects according to the level of interpretation. This allow us to:

- provide simple descriptions of subjects at each level of interpretation, avoiding verbose descriptions
- improve efficiency in information retrieval of complex interpretation descriptions by querying the core subjects through the property chains

Limitations:

- Quality features of recognized subjects cannot be captured by the property chains

THANK YOU
ANY
QUESTIONS?

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REFERENCES

- S. Baroncini, M. Daquino, F. Tomasi, Exploring iconographical and iconological content in semantic data through art historians' interpretations, in: La memoria digitale. Forme del testo e organizzazione della conoscenza. Atti del XII convegno annuale AIUCD, Siena, 2023, pp. 9–14
- V. A. Carriero, A. Gangemi, M. L. Mancinelli, L. Marinucci, A. G. Nuzzolese, V. Presutti, C. Veninata, Arco: The italian cultural heritage knowledge graph, in: C. Ghidini, O. Hartig, M. Maleshkova, V. Svátek, I. Cruz, A. Hogan, J. Song, M. Lefrançois, F. Gandon (Eds.), The Semantic Web – ISWC 2019, Springer International Publishing, Cham, 2019, pp. 36–52
- E. Panofsky, Meaning in the visual art : papers in and on art history, Doubleday Anchor book, 59, Anchor Books, New York, 1955
- E. Panofsky, F. Saxl, Classical mythology in mediaeval art, Metrop. Mus. Stud. 4 (1933) 228–280
- B. Sartini, S. Baroncini, M. van Erp, F. Tomasi, A. Gangemi, Icon: An ontology for comprehensive artistic interpretations, J. Comput. Cult. Herit. 16 (2023). doi:10.1145/3594724