Answering Visuo-semantic Queries with IMGpedia

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MOTIVATION

Can we combine image analysis & semantics to do better than Google Image search?

Fig. 1: Google's results for *given a picture of a European cathedral, retrieve images of museums that are visually similar.*

IMGPEDIA

Images
- IMGpedia contains information about 14.7M images from the Wikimedia Commons dataset

Descriptors
- For each image we compute 3 different visual descriptors, capturing either brightness, shape or color information

Similarity Relations
- For every image, we provide similarity links to each of its 10 nearest neighbors

Context
- We provide links to DBpedia resources if an image is used in the respective Wikipedia article

Publishing
- Load the RDF data to a public SPARQL endpoint and provide data IRIs. 15M images, 450M similarity links. 3B total triples

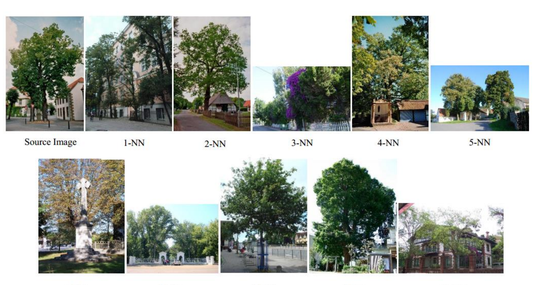

Fig. 2: 10-NN of an image using a shape-based descriptor

ONTOLOGY

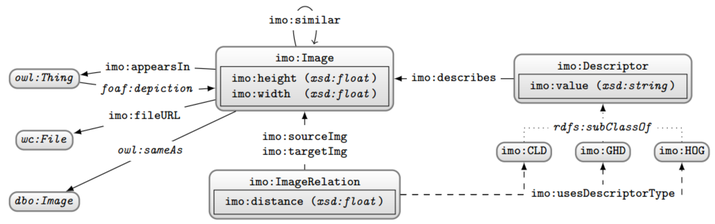

Fig. 3: The IMGpedia Ontology.

SEMANTIC IMAGE QUERIES

Find relevant images that fit with semantic information.

Fig. 4: Results of a query requesting the paintings of the 16th century on display at the Louvre.

```
SELECT DISTINCT ?img ?label WHERE{
  SERVICE <http://dbpedia.org/sparql>{
    ?res a yago:Wikicat16th-centuryPaintings ;
         dcterms:subject dbc:Paintings_of_the_Louvre ;
         rdfs:label ?label .
    FILTER(LANG(?label)='en')}
  ?img imo:appearsIn ?res .
}
```

IMGpedia

VISUO-SEMANTIC QUERIES

Find images based on visual similarity and semantic information.

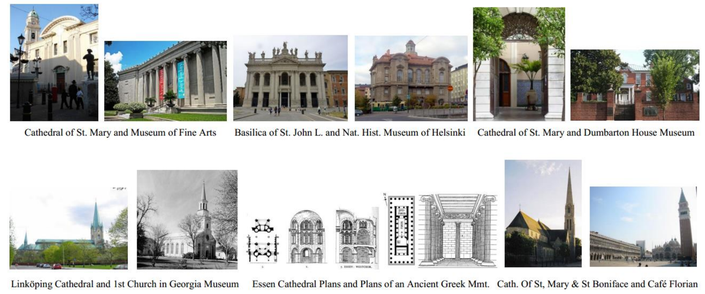

Fig. 5: Results of the query requesting museums similar to European cathedrals

```
SELECT DISTINCT ?source ?target WHERE{
  SERVICE <http://dbpedia.org/sparql>{
    ?sres dcterms:subject/skos:broader*
                dbc:Roman_Catholic_cathedrals_in_Europe .}
  ?source imo:appearsIn ?sres ;
          imo:similar ?target.
  ?target imo:appearsIn ?tres .
  SERVICE <http://dbpedia.org/sparql>{
    ?tres dcterms:subject ?sub
    FILTER(CONTAINS(STR(?sub), "Museum"))}}
```

FUTURE WORK

- Develop a user-friendly interface
- Add more visual descriptors
- Improve our similarity criteria
- Use context information to train a CNN
- Explore more relations among images

If you want to contribute and/or suggest new features for the coming versions of IMGpedia, please open a new issue in our GitHub. Links scanning the QR!