DOES AI PERFORM BETTER?

METADATA ENHANCEMENT THROUGH DEEP LEARNING

BY CHRISTIAN STUBER AND MANUEL KOCHER, STUDENTS AT BERN UNIVERSITY OF APPLIED SCIENCES
GOAL

• Which techniques and methods of deep learning can be practically applied to support heritage institutions in recognizing objects in digital images and publishing them on the open semantic web?
PROCESS

Acquire images → Object detection → Filter tags → Matching Wikidata items → Select unclear matches → Upload depicts

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Category: ETH-BIB Leo Wehrli

Service conditions:
- Format (.jpg, .jpeg)
- Size < 4 MB
- no west-european accents (ä, ö, ü, é, è, ë …)
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Acquire images → Object detection → Filter tags → Matching Wikidata items → Select unclear matches → Upload depicts

∑

IBM Watson

MS Azure

Clarifai

Tag  | Confidence
---|---
grass | 1.96
tree  | 1.86
nature | 1.70
water | 1.70
lake  | 1.54
text  | 1.00
landscape | 0.99
no person | 0.98
river | 0.95
outdoors | 0.95
pool  | 0.94
pale yellow color | 0.92
travel | 0.91
...

≥ 1.66
• Query is performed using a python script on the SPARQL endpoint of Wikidata

1. Returns item with wikipedia article and the most sitelinks
2. If the input tag matches the item label or its alias, the tag will be used automatically
3. Otherwise a new query is performed: Returns all matched results (For manual selection)

<table>
<thead>
<tr>
<th></th>
<th>clear match</th>
<th>no clear match</th>
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</thead>
<tbody>
<tr>
<td>Item semantically correct</td>
<td>Can be used automatically</td>
<td>Manual selection needed: Data can be used</td>
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<tr>
<td>Item semantically wrong</td>
<td>Wrong data will be used</td>
<td>Manual selection needed: Data is lost</td>
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• Data enrichment on wikimedia commons

• The data enrichment was made using «Quickstatements V2»
  • # Tags: 835 / # Images: 295

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<tr>
<th>Media Item</th>
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Source: https://commons.wikimedia.org/wiki/File:ETH-BIB-Andelfingen_Gross-See_von_S%C3%BCden_Dia_247-13333.tif

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RESULT

Acquire images

Object detection

Filter tags >= 1.66

Matching Wikidata items

Select unclear matches

Upload depicts

Wehrli:
374 Images
37 Tags/Image
2.9 Tags/Image
15.1% semantically wrong
missing tags
0.4% false picks
6.8% manual mapping
2.2 Tags/Image
15.1% semantically wrong
missing tags
0.4% false picks
6.8% manual mapping

Mittelholzer:
338 Images
40 Tags/Image
2.6 Tags/Image
12.9% semantically wrong
missing tags
5.7% false picks
7.8% manual mapping
not uploaded

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OUTLOOK

“general model” approach

Acquire images ➔ Object detection ➔ Filter tags $\geq 1.66$ ➔ Matching Wikidata items ➔ Select unclear matches ➔ Upload depicts

“custom model” approach

Acquire images ➔ Object detection ➔ “tree\_Q10884” “water\_Q283” ➔ Check results ➔ Adjust model ➔ Upload depicts

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QUESTIONS

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IMAGE SOURCES

- https://ga1.imgix.net/logo/o/130043-1580197345-7764952?auto=format&qu=50&fit=fill (Logo Clarifai)
- https://idownloader.org/_media/knowledge/wiki/idownloader.png?cache= (Logo JDownloader)
- https://upload.wikimedia.org/wikipedia/commons/c/c3/Python-logo-notext.svg (Logo Python)
- https://www.flaticon.com/de/kostenloses-icon/csv-dateierweiterung_28842 (Logo csv)
- https://upload.wikimedia.org/wikipedia/commons/7/7f/Microsoft_Office_Excel_%282018%E2%80%93present%29.svg (Logo Excel)
- https://commons.wikimedia.org/wiki/File:SparQL_-_Wikidata_-_%C3%89cole_de_Biblioth%C3%A9caires_Documentalistes_-_2016-04-04.pdf (Logo SparQL)
- https://www.wikidata.org/wiki/Help:QuickStatements/de (Logo Quickstatements)

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