LinkedQR: Improving Tourism Experience through Linked Data and QR Codes

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Tourism experience at art galleries



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Related Work



Tourism experience at art galleries

Related Work

Linked Data



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Related Work

Linked Data

System Architecture



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Experimentation



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Conclusions and Future Work



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Traditional experience



Usually, inside an art gallery we can find few information elements as:

Information cards with minor information.

Traditional experience



Usually, inside an art gallery we can find few information elements as:

- Information cards with minor information.
- Audioguides with extended information.

Limitations



- The area of the information cards is limited.
- ► The hardware of audioguides is limited to audio and few text characters.
 - Deaf people can not use them.

How can we **enrich** the information received inside an art

gallery?

Our proposal



Including the capabilities of the **smartphones** in the environment of the museums.



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Smartphones into art galleries



There are some art galleries that have their own mobile applications:

- Orsay's Museum (Paris).
- MoMA (New York).
- Museo de reproducciones (Bilbao).

MoMu



10 / 33

MoMu (Mobile Museum) offers additional information about the pieces of art, using TRIP codes [López-de-Ipiña02].



Fifteen Sunflowers by Van Gogh (512311)

MoMu does not offer any innovation in the information recovery process.

Related Work

Our solution



- Usage of QR Codes to identify the pieces of art.
- ▶ **Linked Data** to manage the recovery of information.

Related Work



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Experimentation

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What is Linked Data?



Linked Data is a set of best practices enunciated by Tim Berners-Lee and promoted by W3C to publish data on the Web. There are **four** principles to publish our data as Linked Data [Berners-Lee06].

- 1. Use URIs as names for things.
- 2. Use HTTP URIs so that people can look up those names.
- 3. When someone looks up a URI, provide useful information using the standards (RDF*, SPARQL).
- 4. Include links to other URIs so that they can discover more things.

Linked Data 13 / 33



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Related Work

Linked Data

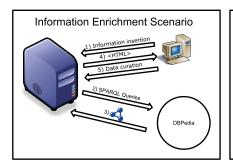
System Architecture

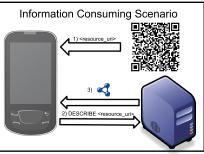
Experimentation

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Architecture Overview







Information Enrichment Scenario



A web application to ease the work of the data curator of the art gallery.

- 1. The data curator inserts the title and the author of the piece of art.
- 2. This input data is queried against DBPedia.
- 3. The data curator filters the information given by DBPedia.
- 4. At last, the data curator can add information manually.

These Linked Open Data can be reused by another museums! :-)

TourSpheres Logged as de



Omphalos II (Delphi) Miguel Ángel CAMPANO 🗳 (1957A DELEOCIÓN)









NZ

Deskribapena

Mitse galreiko olioa 195 x 286 cm

Description

TourSpheres Logged as deux



David HOCKNEY

Datos posiblemente relacionados

Si: No: Borrar

Si: No: Borrar

Datos del autor

¿Está relacionado?

Description (en)

¿Está relacionado?

Label (es) David Hockney ¿Está relacionado? No: Borrar Label (fr) David Hockney No: Borrar ¿Está relacionado? Comment (fr) David Hockney, né en 1937 à Bradford au Royaume-Uni, est un peintre et photographe anglais habitant dans la ville californienne de Los Angeles, ¿Está relacionado? Si: No: Borrar Comment (es) David Hockney, es un artista inglés, que vive en Los Ángeles, California. Es un importante contribuyente del Pop Art inglés de los años 1960. Pint ¿Está relacionado? Si: No: Borrar Comment (en) David Hockney, CH, RA, (born 9 July 1937) is an English painter, draughtsman, printmaker, stage designer and photographer, who is based in Brid Si: No: Borrar ¿Está relacionado? Description (fr) David Hockney, né en 1937 à Bradford au Royaume-Uni, est un peintre et photographe anglais habitant dans la ville californienne de Los Angeles. ¿Está relacionado? Si: No: Borrar Resumen (es) David Hockney, es un artista inglés, que vive en Los Ángeles, California, Es un importante contribuyente del Pop Art inglés de los años 1960. Pint

David Hockney, CH. RA, (born 9 July 1937) is an English painter, draughtsman, printmaker, stage designer and photographer, who is based in Brid

Information Consuming Scenario



Enables the user to access enriched information about a concrete piece of art.

- 1. The user accesses to the application of the museum.
- 2. Scans the QR Code of the piece of art.
- 3. The information is shown at his/her smartphone.







TourSpheres





QR









Exit

A QR

Name: Henry MOORE

Title: Two studies for seated mother and child

Height: 25.0 Width: 31.7 Year: 1981

Audio guide

Play Stop

Text of the audio guide

Some notes



The workflow of our system requires many HTTP requests and data transmission...

The DBPedia can return ambiguous results...



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System Architecture

Experimentation

Conclusions and Future Work

Experimentation



- Performance on administration side.
 - Accuracy of given results.
- Performance on user side.
 - Retrieving data.
 - Visualizing data.

"Arte como vida" exposition (Sala Kubo art gallery (Kursaal), Donostia/San Sebastián).

Performance on administration side I



Authors				Triples			
	Found	Not found	Total	Depth 1	Depth 2	Total	
	57	30	87	885	871	1756	
	(67.51%)	(32.59%)	(100%)	(50.39%)	(49.61%)	(100%)	
Authors				Triples			
True	False	True	False	True	False	True	False
positives	positives	negatives	negatives	positives	positives	negatives	negatives
51	6	29	1	1612	144	-	-

There are many unknown authors!

Performance on administration side II



$$Precision = \frac{T_{positives}}{T_{positives} + F_{positives}} = \frac{51}{51 + 6} = 89.47\%$$
 (1)

$$Recall = \frac{T_{positives}}{T_{positives} + F_{negatives}} = \frac{51}{51 + 1} = 98.07\%$$
 (2)

$$True_negative_rate = \frac{T_{negatives}}{T_{negatives} + F_{positives}} = \frac{29}{29 + 1} = 96.66\%$$
(3)

Experimentation

Performance on administration side III

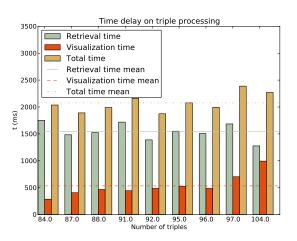


$$Accuracy = \frac{T_{positives} + T_{negatives}}{T_{positives} + T_{negatives} + F_{positives} + F_{negatives}} = \frac{51 + 29}{51 + 29 + 6 + 1} = 91.95\%$$
(4)

$$F_1 = 2 * \frac{Precision * Recall}{Precision + Recall} = 2 * \frac{0.8947 * 0.9807}{0.8947 + 0.9807} = 93.57\%$$
 (5)

Performance on user side I





The maximum bearable delay for an user interaction is near 10 seconds, according to [Nielsen94].



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Conclusions



- ► The synergy between QR Codes and Linked Data increases the tourism experience in art galleries.
 - QR Codes can identify everyday objects and Linked Data can enrich the information about these objects.
- The proposed solution is easily deployable and no special hardware is needed.
- User interface can be adapted to the needs of different users.
- Our system can be migrated to many tourism infrastructures.

Future Work



- We have tested the system at Sala Kubo (Kursaal, Donostia/San Sebastián).
 - CICTourgune is analysing the system in terms of usage and usability.
- Improve the percentage of authors found adding more semantic resources like Amsterdam Museum semantic repository or GoogleArt wrapper.
- ► Increase the user experience improving the visualization of the data into the smartphone.

Bibliography



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