

MULTIMATCH

A Vertical Search Engine for European Cultural Heritage

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<http://www.multimatch.org>

MultiMatch: The Initial Idea

Problem:

- The Web contains a wealth of fragmented CH information stored in web pages as well as in Digital Libraries managed by cultural institutions.
- This information is dispersed and fragmented
- Users are left to discover, interpret, and aggregate it.

A user perspective

- Information needed is likely to be available on the Internet but to access it **language, media, and source boundaries** need to be overcome
- Key ideas underlying the MultiMatch vision
 - **Multiplicity**
 - » Queries and retrieved items in multiple languages
 - » Queries and retrieved items in multiple media
 - » Items selected from multiple sources
 - **Aggregation**
 - » Presentation of aggregated results
 - » Relationships between retrieved items
 - **Personalization**

What is supported by existing systems?



- Google-like search
 - Pros
 - » Large content-base
 - » High recall
 - Cons
 - » Low precision
 - » No multilingual support
 - » Single media search
 - » No relationship between items
- Access to Specialized CH sites
 - Very precise results but limited to a single site
 - Results are presented in an attractive way, but cannot be adapted to specific user requests

MultiMatch Objectives

- Develop a **search engine** that provides **targeted, enriched access** to **heterogeneous** CH objects
 - Across all media types and language boundaries
 - Gathering information from the web and from CH sites and digital libraries
 - Enable the interoperability of CH Digital Libraries based on existing standards
 - Supporting various user classes and offering personalized access
 - with aggregate views on complex task scenarios
- Assist CH institutions to **raise visibility** and **disseminate content**

What MM intends to achieve

- MultiMatch is developing a **Web search engine** specialized in the **cultural heritage** domain.
- Queries can be expressed in **multiple languages**
- **Multilingual** and **multimedia retrieval**
- Access to **multiple sources of information**
 - Web sites containing authoritative cultural heritage data (e.g. museums, cultural institutions, CH educational sites, tourist information portals)
 - IPR protected CH material, provided by content providers (e.g. Alinari, Sound and Vision, Biblioteca Virtual de Cervantes)
 - Other OAI compliant resources

Results for "flowers": 15 web pages | 6 authors | 5 artworks | 2 news

Categorized Results

Sort by Category Sort by Concept edit

Web Pages

Tate Modern | Current Exhibitions | Fischli & Weiss
Fischli and Weiss: **Flowers** & Questions. A
Retrospective · About Visiting information Book tickets
Events & Education Room Guide Films Further
Resources ...
www.tate.org.uk/modern/exhibitions/fischliandweiss/default.shtm - 20k - Cached - Similar pages - Source
Category: Cultural Heritage Institution

Daniel Brown - 40 artists, 40 days
From the **Flower** Series 1999-present. In Olympic
Colours ... Originally started in 1999, Daniel Brown's
Flower Series uses advanced mathematics to
generate ...
www.tate.org.uk/40artists40days/daniel_brown.html -
6k - Cached - Similar pages - Source Category:
Cultural Heritage Institution







Tate Collection | Roses by Leonard McComb
Leonard McComb from Blossoms and **Flowers**, Roses
1975-9 - © Leonard McComb. from Blossoms and
Flowers (P07501-P07506; complete). Roses 1975-9 ...
www.tate.org.uk/servlet/ViewWork?cgroupid=99999999961&workid=9069&searchid=10770 - 16k - Cached -
Similar pages - Source Category: Cultural Heritage
Institution

The Vincent van Gogh Gallery
The scroll "Birds and **Flowers** of the Four Seasons"
(1808) is one of his most highly regarded works, as is
the screen "Stream amid Summer and Autumn
Flowers" ...
www.vangoghgallery.com/artistbios/Sakai_Hoitsu.html
- 12k - Cached - Similar pages - Source Category:
Cultural Heritage Institution






Anales galdosianos [Publicaciones periódicas]. Año
XXVI, 1991 ...
This manuscript contains more examples of Galdós's
art work than any other: drawings of **flowers** and an
elaborate sketch of a human head (f. ...
www.cervantesvirtual.com/servlet/SirveObras/12615097557815940765657/p0000003.htm - 59k - Cached -
Similar pages - Source Category: Cultural Heritage
Institution

Result Page: 1 | 2 | 3 Next

Authors

-  Vincent Van Gogh (1853-1890)
Painter - Holland
-  Leonard McComb (1930)
Painter - United Kingdom
-  Daniel A. Brown (1950)
Art and technology - USA
-  Benito Perez Galdós (1843-1920)
Literature - Spain
-  Peter Fischli (1952)
Sculptor - Switzerland
-  David Weiss (1946)
Sculptor - Switzerland

Artworks

-  Title: Sunflowers
Collection: Unknown
Vincent Van Gogh
-  Title: Flowers
Collection: Unknown
Vincent Van Gogh
-  Title: Tulips
Collection: From Blossoms and Flowers
Leonard McComb
-  Title: Roses
Collection: From Blossoms and Flowers
Leonard McComb
-  Title: Unknown
Collection: Flower series (1999 - present)
Daniel Brown

Sites

- Tate Gallery
United Kingdom
- Van Gogh Museum
Amsterdam

News

- Van Gogh dispute is coming to a head
Sydney Morning Herald, Australia - Oct 11, 2006
... of Victoria, Dr Gerard Vaughan, is optimistic that
research under way in Amsterdam will confirm the
authenticity of the gallery's only Van Gogh painting,
Head ...
- Van Gogh exhibit focuses on wheat, harvest
themes
KSWO, OK - Oct 21, 2006
DALLAS A vibrant painting Vincent Van Gogh
finished weeks before his death is the centerpiece
of a new exhibit at the Dallas Museum of Art. ...

The Project

- **VI FP Project**
- **Technology-enhanced Learning and Access to Cultural Heritage**
- **Started: May 2006**
- **First prototype: August 2007**
- **Second Prototype: July 2008**
- **Evaluation and field trials: October 2008**

MultiMatch Partners

■ Cultural Heritage

- Fratelli Alinari Istituto Edizioni Artistiche SpA (Alinari)
- Netherlands Institute for Sound and Vision (Sound and Vision)
- University of Alicante – Biblioteca Miguel de Cervantes (UA-BVMC)

■ Industry

- OCLC PICA (FDI)
- WIND Telecomunicazioni S.p.A. (WIND)

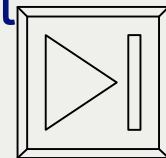
■ Academia

- Istituto di Scienza e Tecnologie dell'Informazione (ISTI-CNR)
- University of Sheffield (USFD)
- Dublin City University (DCU)
- University of Amsterdam (UvA)
- University of Geneva (UniGE)
- Universidad Nacional de Educación a Distancia (UNED)

Main Research Challenges

From document to **complex objects retrieval**

- **Focused crawling** for acquisition of CH-related information from heterogeneous MM resources
- Semantic indexing of CH content and relation extraction using information extraction and text mining techniques
- Multimedia search and mixed media search
- Multilingual management with support for query formulation, cross-language retrieval and summarization
- Integration and representation of **related objects**
- Presentation of **aggregated search results**
- **User support** (e.g. search history, annotation facilities, personalised presentation of results, etc.) for different communities of users



Metadata modelling and interoperability



- Definition of a **MultiMatch conceptual reference framework** suitable for Cultural Heritage
 - Metadata schema
 - Thesauri for artists names and descriptions, geospatial information
- Simple to use (interoperability)
- Suitable to the application of automatic population techniques

Indexing and information extraction

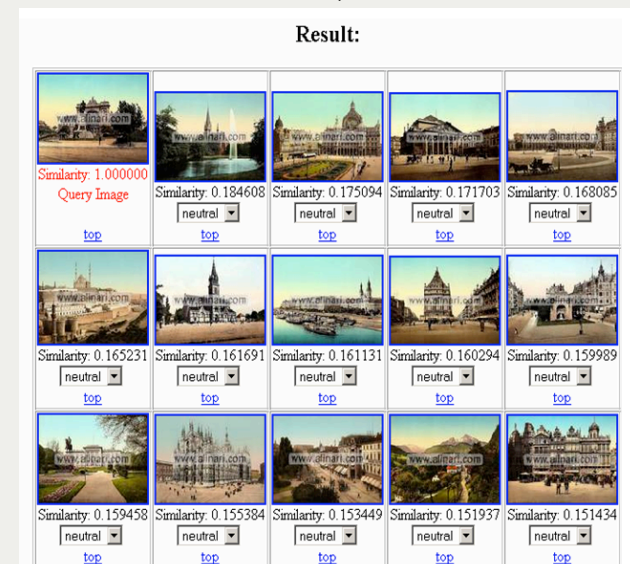
- Automatic extraction of indexing features for all media (text, speech, images, video) and crawled data
- Text indexing for four languages (Italian, Spanish, Dutch, and English, plus others)
- Automatic generation of inter-document links
- Development of algorithms for classification and information extraction
 - Creators, type/genre, subject, place/time, art objects/works
- Semantic enrichment of documents
- Linking information sources
 - Thesauri from outside the system
 - Documents within the system

Multilingual support

- Provide system with monolingual and multilingual search functionalities (initially four languages, to be extended)
- Provide effective translation strategies e.g. multilingual dictionaries, machine translation, thesaurus term expansion
- Multilingual query expansion
- Dynamic summarization

Multimedia search

- Similarity search based on visual features (low level and high level – faces, objects, etc.)
- Efficient retrieval
- Support of relevance feedback and interactive search
- Combined text and visual search



User interaction and interface design



- User-centred design process
 - Evaluate and refine the interface based on empirical evaluation and usability testing
- Interface supporting multilingual and multimedia search
- Default search on all types of content
- Specialized search on metadata fields and on different media
- Use of semantic structures for search and browse

Project achievements

- First project phase completed
 - User requirements analysis
 - MultiMatch conceptual reference framework for Cultural Heritage
 - First prototype of the MultiMatch search engine
 - » Baseline for experimentation, user feedback and second prototype development
 - » Limited content
 - » Based on manually associated semantic concepts
 - » No relationship between retrieved objects

Research issues for the second project phase



- Automatic document labeling, enrichment and linking and automatic document classification
- Combination of cross media query results
- Translation and summarization of results
- Innovative User Interface
 - Multimedia search and browse
 - Presentation of video material
 - Multilingual interaction
 - Optimized search and browse based on semantic structures

Conclusions

- Further evolutions of MultiMatch
 - Use of MultiMatch technologies to build large scale Digital Libraries and a large scale search engine specialized for Cultural Heritage
 - » Enlarge the content base through the access to a complete set of CH sites and crawling of a significant part of the web
 - » Enlarge the number of languages managed (possibly to cover all EU languages)
 - » Invest on system efficiency, system scalability, and robustness

Conclusions

- Significant investment in dissemination of project results, in order to attract cultural heritage institutions
- Dissemination of MultiMatch technology into other related application fields
- Further investment on the key research topics addressed in MultiMatch

Further information

- MultiMatch Web site
 - <http://www.multimatch.org>
- Project coordination: Carol Peters
 - carol@isti.cnr.it
- Technical coordination: Pasquale Savino
 - pasquale.savino@isti.cnr.it
- User group coordination: Sam Minelli
 - sam@alinari.it

Results for "van gogh" : 4 biography pages | 4 artworks related pages | 6 reviews pages | 2 news | 2 Not categorized sites

Classified Web Pages Author Space Artworks Sites More

Categorized Results

Sort by Category Sort by Concept edit (i) [] [x]

Profile edit (i) [] [x]



Name: Vincent Van Gogh
 Birth: 1853
 Death: 1890
 Country: Holland
 Category: Painter

News edit (i) [] [x]

Van Gogh dispute is coming to a head
 Sydney Morning Herald, Australia - Oct 11, 2006
 ... of Victoria, Dr Gerard Vaughan, is optimistic that research under way in Amsterdam will confirm the authenticity of the gallery's only Van Gogh painting, Head ...

Van Gogh exhibit focuses on wheat, harvest themes
 KSWO, OK - Oct 21, 2006
 DALLAS A vibrant painting Vincent Van Gogh finished weeks before his death is the centerpiece of a new exhibit at the Dallas Museum of Art. ...

Biographical Data edit (i) [] [x]

WebMuseum: Gogh, Vincent van
 His father was a Protestant pastor, and van Gogh first trained for the ministry, ... for the 20th-century vogue in romanticized psychological biography. ...
www.ibiblio.org/wm/paint/auth/gogh/ - 13k - Cached - Similar pages

Vincent van Gogh Online
 Biography of the artist Artcyclopedia "Tragedy and Triumph at Arles: Van Gogh and Gauguin" Artnet Magazine Peasant Woman Against a Background of Wheat, 1890 ...
www.artcyclopedia.com/artists/van_gogh_vincent.html - Similar pages

Tate Collection | Vincent van Gogh
 Vincent van Gogh 1853-1890. Dutch painter of landscapes, figures and still life. Born at Groot-Zundert, son of a parson. Entered the firm of Goupil, ...
www.tate.org.uk/servlet/ArtistWorks?cgrouppid=9999999961&artistid=1182&tabview=bio - 18k - Cached - Similar pages

ArtLex on Post-Impressionist Vincent van Gogh
 Post-Impressionist Vincent van Gogh, with images of his works, great quotations ... for the twentieth century vogue in romanticized psychological biography. ...
www.artlex.com/ArtLex/p/postimp.vangogh.html - 41k - Cached - Similar pages

Artworks edit (i) [] [x]

Vincent van Gogh Online
 Vincent van Gogh [Dutch Post-Impressionist Painter, 1853-1890] Guide to pictures of works ... Kunst Indeks Danmark - database of artworks in Danish museums ...
www.artcyclopedia.com/artists/van_gogh_vincent.html - Similar pages

Artcyclopedia: Monthly Spotlight: Vincent van Gogh
 The featured artist is Vincent van Gogh. Click here for a very complete list of sites where his artwork can be seen on the Internet. Portrait of Dr. Gachet ...
www.artcyclopedia.com/feature-mar99.html - Similar pages

Famous Artworks by Theme: Macabre Paintings
 Famous Artworks by Theme: Macabre Paintings ... Vincent van Gogh · Wheat Field with Crows (Probably van Gogh's last painting), Allposters.com ...
www.artcyclopedia.com/subjects/famous-macabre.html - Similar pages

Artcyclopedia: Featured Online Exhibits: Vincent van Gogh ...
 Vincent van Gogh Information Gallery. ... presents the artworks in a professional manner by listing the date of each work and its current location, ...
www.artcyclopedia.com/featuredexhibits-mar99.html - Similar pages

Reviews edit (i) [] [x]

Your Reviews of Art Shows and Exhibitions
 Your reviews critiques of art shows and art exhibitions you liked or didn't like. ... The myth of Van Gogh - the tormented artist shunned by society, ...
www.saatchi-gallery.co.uk/quick-critique/index.php?show_id=Van+Gogh+Musuem&-26k - Cached - Similar pages

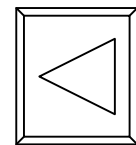
Van Gogh And Britain - Pioneer Collectors At Compton Verney ...
 A contemporary review in the Daily Chronicle asked if the artists were "maniacs or pioneers?" and described Van Gogh as "the fiery spirit of revolt". ...
www.24hourmuseum.org.uk/birmingham/news/ART35897.html - 37k - Cached - Similar pages

Result Page: 1 | 2 | 3 Next


Other edit (i) [] [x]

Vincent Van Gogh: Two Sunflowers, 1887
 Back to article Vincent Van Gogh Two Sunflowers, 1887 The Metropolitan Museum of Art.
www.artcyclopedia.com/VanGogh-TwoSunflowers.html - Similar pages

Van Gogh Museum: Press
 Van Gogh Museum offers reward for information about theft of paintings. The Van Gogh Museum is offering a substantial reward of up to euro 100000 for ...
www.vangoghmuseum.nl/1015-newsdb/nieuws?action=nieuws_view&id=111&cat_id=4 - 9k - Cached - Similar pages



Relations between authors

MultiMatch Authors 

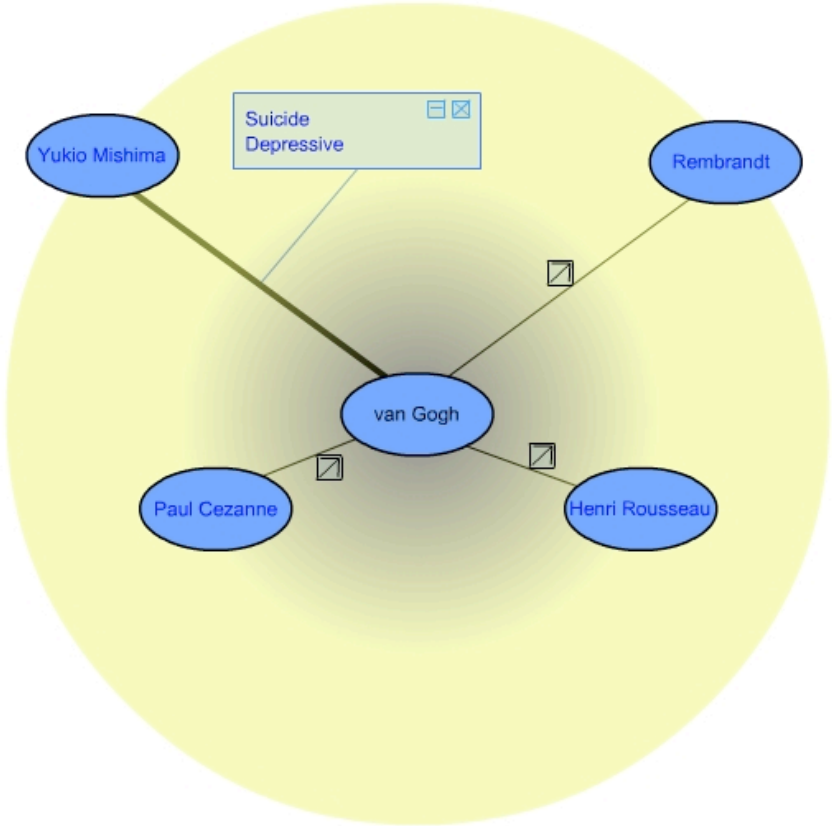
All Authors Artworks Sites News
 Author: Keywords:

Images Video Browse MultiMatch Contents Sign in >>

Results for "van gogh": 4 relations | 6 cloud terms

Classified Web Pages Author's Space Artworks Sites More


van Gogh Network edit ⓘ ☰ ☒ van Gogh Tag Cloud edit ⓘ ☰ ☒



```

  graph TD
    VG((van Gogh)) --- YM((Yukio Mishima))
    VG --- R((Rembrandt))
    VG --- PC((Paul Cezanne))
    VG --- HR((Henri Rousseau))
  
```

Tags: dutch, flowers, post-impresionism, suicide, sunflowers, van Gogh museum



Relations between Author and works of art



All Authors Artworks Sites News

Author: Keywords:

Sign in >>

Images Video Browse MultiMatch Contents

Results for "van Gogh" : 5 artworks

Classified Web Pages Author's Space Artworks Sites More

Artworks List

Sort by Title Sort by Date edit ⓘ ☰ ☒

Artworks Image Cloud

edit ⓘ ☰ ☒



Title: Starry Night
Date: 1889



Title: Cafe at Night
Date: 1889



Title: Sunflowers
Date: 1889



Title: Starry Night Over the Rhone
Date: 1889



Title: Self Portrait with Grey Hat
Date: 1889



Author and related CH sites

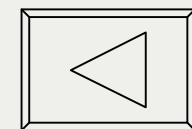
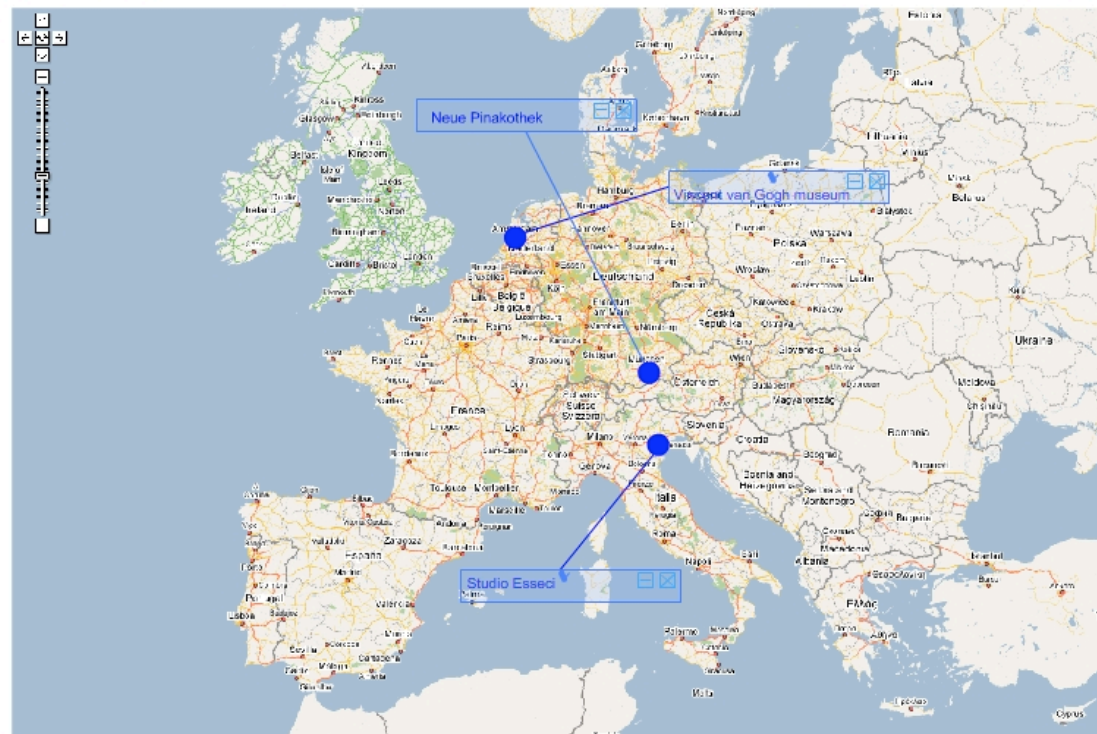
Results for "van Gogh" : 8 sites

[Classified Web Pages](#) [Author's Space](#) [Artworks](#) [Sites](#) [More](#)

Related Sites edit ⓘ ☒

- [Detroit Institute of Arts](#)
Michigan
- [Fine Arts Museums of San Francisco](#)
San Francisco
- [Fitzwilliam Museum at the University of Cambridge](#)
United Kingdom
- [Guggenheim Museum](#)
New York
- [Hermitage Museum](#)
Saint Petersburg
- [Vincent van Gogh at the Rijksmuseum](#)
Amsterdam
- [Neue Pinakothek](#)
Munich
- [Studio Esseci](#)
Padua

Geographical Location edit ⓘ ☒



Specialized image search

Untitled Document - Windows Internet Explorer provided by Yahoo!

U:\demos3\MM VERSION 6\imgs_en_details.html

Google

search Go advanced Workspace

Target language : All English Spanish Italian Dutch Help

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BROWSE MULTIMATCH: Random Overview Tag Cloud

Results for query: "picasso"

OVERVIEW TEXTS (56) **IMAGES (67)** VIDEO (0) AUDIO (1)

EN

ES

IT

NL

Filter by collection:
 Cultural heritage websites
 Wikipedia
 Alinari

Filter by file type:
 .jpg
 .gif
 .png

Still life with bucranium...

Lamentation for the death of Pablo Picasso

Lady with a fan...

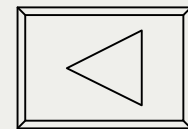
Find visually similar*

Find visually similar

Find visually similar

TITLE: Still life with bucranium, Emilio Jesi Collection, Brera Gallery, Milan
CREATOR: Picasso, Pablo (1881-1973)
YEAR: 1942
PHOTOGRAPHER: Alinari
REFERENCE: Alinari Archives/Bridgeman
KEYWORDS: Table, Window, Skull

Local intranet 100%



Multilingual Search (1)



Untitled Document - Windows Internet Explorer provided by Yahoo!

U:\demos3\MM VERSION 6\hamlet_overview.html

Google

MultiMatch

search




Target language : All English Spanish Italian Dutch Help

Workspace
Search History

BROWSE MULTIMATCH: Random Overview Tag Cloud

Results for query: "hamlet"

OVERVIEW TEXTS (128) IMAGES (58) VIDEO (0) AUDIO (0)

EN	IT	NL
Abbeydale Industrial Hamlet Sheffield Industrial Museums Trust - Kelham Island Museum, Abbeydale Industrial Hamlet, Shepherd Wheel - Kelham Island Section http://www.simt.co.uk/kelham/index.html	Abbeydale Industrial Hamlet 	Edouard Manet, Faure als Hamlet 
Little Woodham the hamlet of Little Woodham was initially created in 1984 as a temporary exhibition http://en.wikipedia.org/wiki/Little_Woodham	Abbeydale industrial Hamlet 	
Tony Wilson Seeing a production of Hamlet extinguished Wilson's ambition to be a nuclear physicist http://en.wikipedia.org/wiki/Tony_Wilson		
Nicholas Pegg His work as a director includes Hamlet, Twelfth Night and Diary of a Somebody		

Done

Local intranet

100%



Multilingual Search (2)

Untitled Document - Windows Internet Explorer provided by Yahoo!

U:\demos3\MM VERSION 6\dir_hamlet.html




Google Workspace

Target language : All English Spanish Italian Dutch Search History

BROWSE MULTIMATCH: Random Overview Tag Cloud

Results for query: "hamlet"

Your query was translated as: **piccolo villaggio**
 Not quite right? [See alternatives](#)

OVERVIEW	TEXTS (178)	IMAGES (28)	VIDEO (0)	AUDIO (0)
EN	Ivan Generalic scuola di Hlebine, dal nome del piccolo villaggio ai confini con l'Ungheria...	Primavera nel Villaggio 		
ES	http://it.wikipedia.org/Ivan_Generalic			
IT		Veduta di un Villaggio 		
NL	Georges-Pierre Seurat una vacanza trascorsa a Port-en-Bessin-Huppain, un piccolo villaggio di pescatori...	Veduta di un villaggio di campagna in Germania 		
	Little Woodham the hamlet of Little Woodham was initially created in 1964 as a temporary exhibition...			

Done Local intranet 100%

Multilingual Search (3)

Untitled Document - Windows Internet Explorer provided by Yahoo!

U:\demos3\MM VERSION 6\clr_hamlet_alts.html

Google

search Go advanced Workspace

Target language : All English Spanish Italian Dutch Help Search History

BROWSE MULTIMATCH: Random Overview Tag Cloud

Results for query: "hamlet"

Your query was translated as: Choose an alternative and click "search again."

- Amleto (Hamlet) Search again
- piccolo villaggio (small village)
- Amleto (Hamlet)

OVERVIEW TEXTS (178) IMAGES (28) VIDEO (0) AUDIO (0)

Language	Texts	Images
EN	Ivan Generalic scuola di Hlebine, dal nome del piccolo villaggio ai confini con l'Ungheria...	Primavera nel Villaggio
ES	http://it.wikipedia.org/Ivan_Generalic	
IT	Georges-Pierre Seurat una vacanza trascorsa a Port-en-Bessin-Huppain, un piccolo villaggio di pescatori...	Veduta di un Villaggio
NL	http://it.wikipedia.org/wiki/Georges_Pierre_Seurat	
	Little Woodham the hamlet of Little Woodham was initially created in 1984 as a temporary exhibition...	Veduta di un villaggio di campagna in Germania
	http://en.wikipedia.org/wiki/Little_Woodham	
	Mouloud Feranin	

Done

Local intranet

100%

Multilingual Search (4)



Untitled Document - Windows Internet Explorer provided by Yahoo!

U:\demos3\MM VERSION 6\dir_hamlet_alt2.html

Google

search Go advanced

Target language: All English Spanish Italian Dutch Help

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Workspace
Search History

BROWSE MULTIMATCH: Random Overview Tag Cloud

Results for query: "hamlet"

Your query was translated as: **Amleto**
Not quite right? See alternatives

OVERVIEW TEXTS (178) IMAGES (28) VIDEO (0) AUDIO (0)

Language	Texts	Images
EN	Amleto Amleto (The Tragical History of Hamlet, Prince of Denmark) è una delle tragedie shakespeariane più conosciute e più citate... http://it.wikipedia.org/Amleto	Amleto e Orazio, Parigi 
ES		
IT		
NL	Shakespeare nella cinematografia Amleto e di gran lunga l'opera sospiriana che è stata rappresentata al cinema con maggior frequenza e successo... http://it.wikipedia.org/wiki/Shakespeare_nella_cinematografia	Amleto con il teschio di Yorick 
	Riccardo III (Shakespeare) Dopo Amleto, questa è l'opera teatrale più lunga di Shakespeare... http://en.wikipedia.org/wiki/Riccardo_III	Amleto ed Orazio di fronte allo spettro... 

Done Local intranet 100%

