

Sampo-UI Framework for Semantic Portal User Interfaces

Digital Humanities in Action: Sampo Model and Portals
for Cultural Heritage, 29.10.2020

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Outline

- **Satisfying information needs**
 - Faceted search
 - Faceted search + Ontologies + Linked Data
- **A tool for building user interfaces for semantic portals**
 - Sampo-UI framework



Faceted Search

**= de facto approach for accessing
information in digital libraries and
e-commerce**



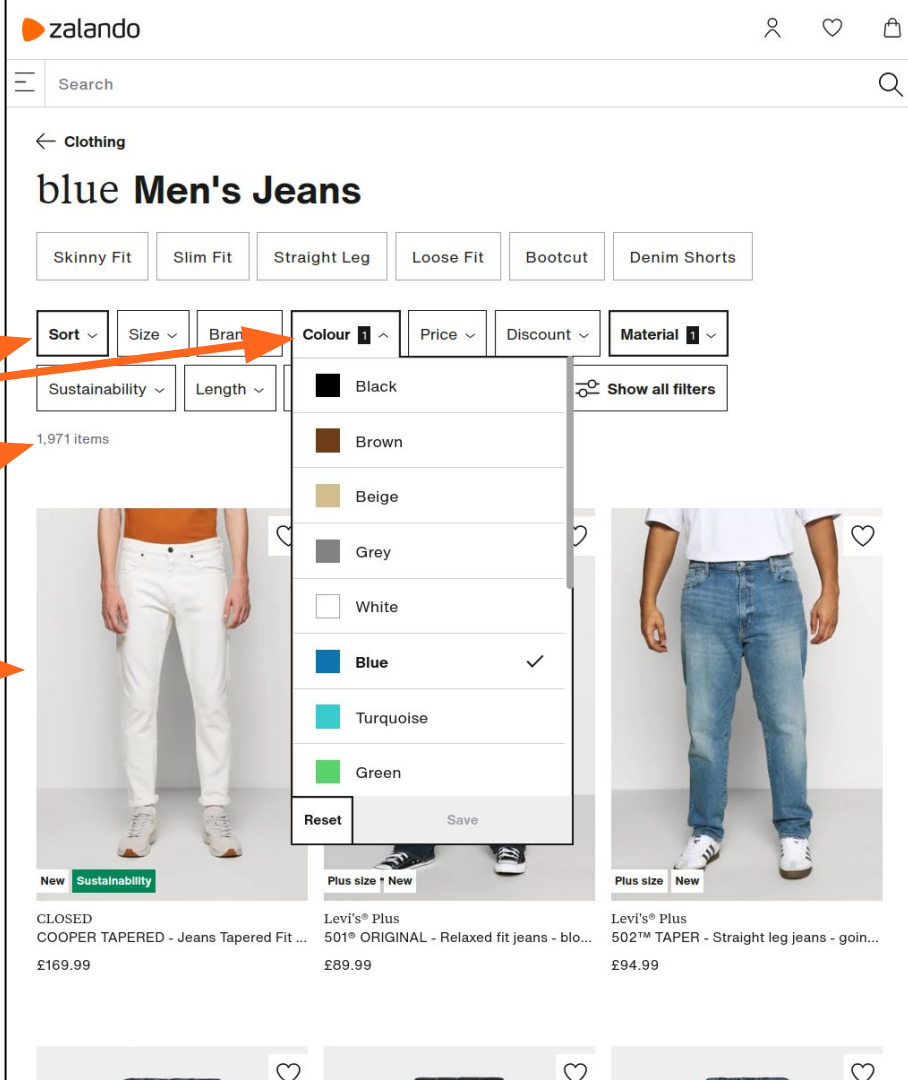
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Department of
Computer Science



Elements of Faceted Search

1. Filters / facets
2. Sorting
3. Result count
4. Results view



Elements of Faceted Search

1. Filters / facets
2. Sorting
3. Result count
4. Results view

The screenshot shows an Amazon search results page for 'Men's Jeans'. The page is divided into a left sidebar with filters and a main content area with product listings. Orange arrows from the numbered list point to the following elements:

- Arrow 1 (Filters / facets):** Points to the 'Department' filter (Men's Fashion > Clothing > Jeans), the 'Avg. Customer Review' filter (4 stars & up), the 'Amazon Fashion' filter (Popular Brands), the 'Brand' filter (Wrangler, Urban Star, Buffalo David Bitton, Lee, Lucky Brand, Southpole, 5.11), the 'Price' filter (Under \$25, \$25 to \$50, \$50 to \$100, \$100 to \$200, \$200 & Above), the 'New Arrivals' filter (Last 30 days, Last 90 days), the 'Special Sizes' filter (Big & Tall), the 'Regular Size' filter (26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 38, 40, 42, 44), and the 'Inseam' filter.
- Arrow 2 (Sorting):** Points to the 'Sort by: Featured' dropdown menu in the top right corner.
- Arrow 3 (Result count):** Points to the text '1-48 of 390 results for Men's Fashion : Clothing : Jeans : Dark Wash'.
- Arrow 4 (Results view):** Points to the product listings in the main content area.

The product listings include:

- Wrangler Men's 13MWZ Cowboy Cut Original Fit Jean (4 stars, \$19.00)
- Lucky Brand Men's 221 Straight Jean (4 stars, \$73.99)
- Lucky Brand Men's 361 Vintage Straight Jean (4 stars, \$73.13)
- Wrangler Men's 0936 Cowboy Cut Slim Fit Jean (4 stars, \$27.00)
- Carhartt Men's Relaxed Fit Tapered Leg Jean (Regular and Big and Tall Sizes) (4 stars, \$34.98)
- Wrangler Authentics Men's Classic 5-Pocket Relaxed Fit Cotton Jean (4 stars, \$22.45)

Elements of Faceted Search

1. Filters / facets
2. Sorting
3. Result count
4. Results view

Help Sign in or register Daily Deals Help & Contact

Shop by category Men's Jeans Advanced

eBay > Clothing, Shoes & Accessories > Men > Men's Clothing > Men's Jeans


Men's Jeans

Shop by Category


Men's Clothing

- Jeans
- Activewear
- Coats, Jackets & Vests
- Pants
- Shirts
- Shorts
- Sleepwear & Robes
- Socks
- Suits & Suit Separates
- Sweaters
- Swimwear
- Underwear


Shop by Inseam




32 in



30 in



34 in



36 in

[See All →](#)

Shop by Size

[Size](#) [see all](#)

2XS	XS	S	M	L
XL	2XL	3XL	24	25
26	27	28	29	30
31	32	33	34	35
36	37	38	39	40
42	44	46	48	50

[Size Type](#) [see all](#)

☐ Regular

☐ Big & Tall

☐ Not Specified

[Inseam](#) [see all](#)

☐ 29 in

☐ 30 in

☐ 31 in

☐ 32 in

☐ 33 in

☐ 34 in

☐ 36 in

[Fit](#) [see all](#)


☐ Slim

☐ Regular

[All Listings](#) [Auction](#) [Buy It Now](#)

1-48 of 1,893,057 Results

Sort: [Best Match](#) [View](#)




MEN'S LEVI'S 501 JEANS GRADE A VINTAGE STRAIGHT LEG...

EUR 27.54

EUR 8.82 shipping

106 sold




LEVI'S 501 Original Fit Jeans Denim Straight fit Stonewash...

EUR 36.36

EUR 7.70 shipping

22 watching



VINTAGE LEVI'S 501 JEANS GRADE A JEANS W30 W32 W3...

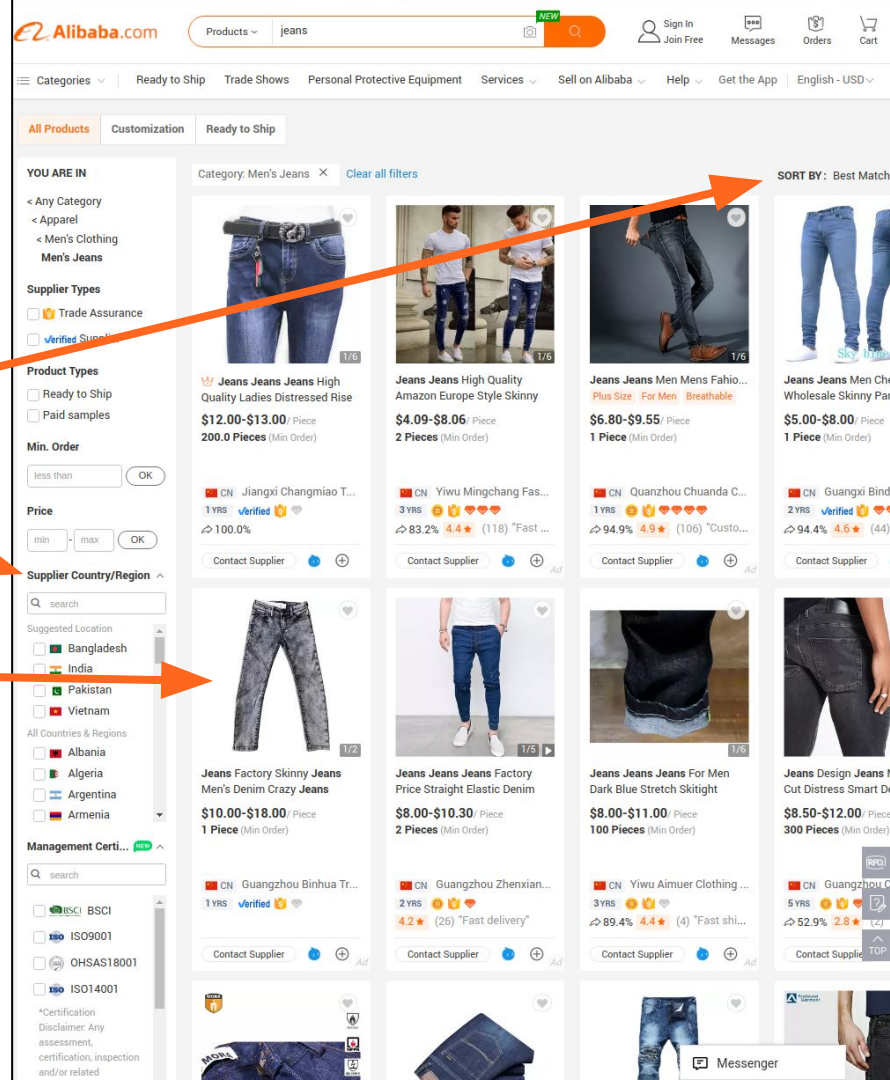
EUR 30.80

EUR 17.42 shipping

22 watching

Elements of Faceted Search

1. Filters / facets
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4. Results view



Challenges of Traditional Faceted Search



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Missing or Unharmonized Data

1. Facets

- Cannot filter jeans by style, probably because the suppliers have not provided that information uniformly

The screenshot shows the Alibaba.com interface for searching 'jeans'. The top navigation bar includes the Alibaba logo, search bar, and user account options. The left sidebar contains several filter sections:

- YOU ARE IN**:< Any Category< Apparel< Men's ClothingMen's Jeans
- Supplier Types**:☐ Trade Assurance☐ Verified Supplier
- Product Types**:☐ Ready to Ship☐ Paid samples
- Min. Order**: less than OK
- Price**: min max OK
- Supplier Country/Region**: search
 - Suggested Location:
 - ☐ Bangladesh
 - ☐ India
 - ☐ Pakistan
 - ☐ Vietnam
 - All Countries & Regions:
 - ☐ Albania
 - ☐ Algeria
 - ☐ Argentina
 - ☐ Armenia
- Management Certi...**: search
 - ☐ BSCI
 - ☐ ISO9001
 - ☐ OHSAS18001
 - ☐ ISO14001

*Certification Disclaimer: Any assessment, certification, inspection and/or related

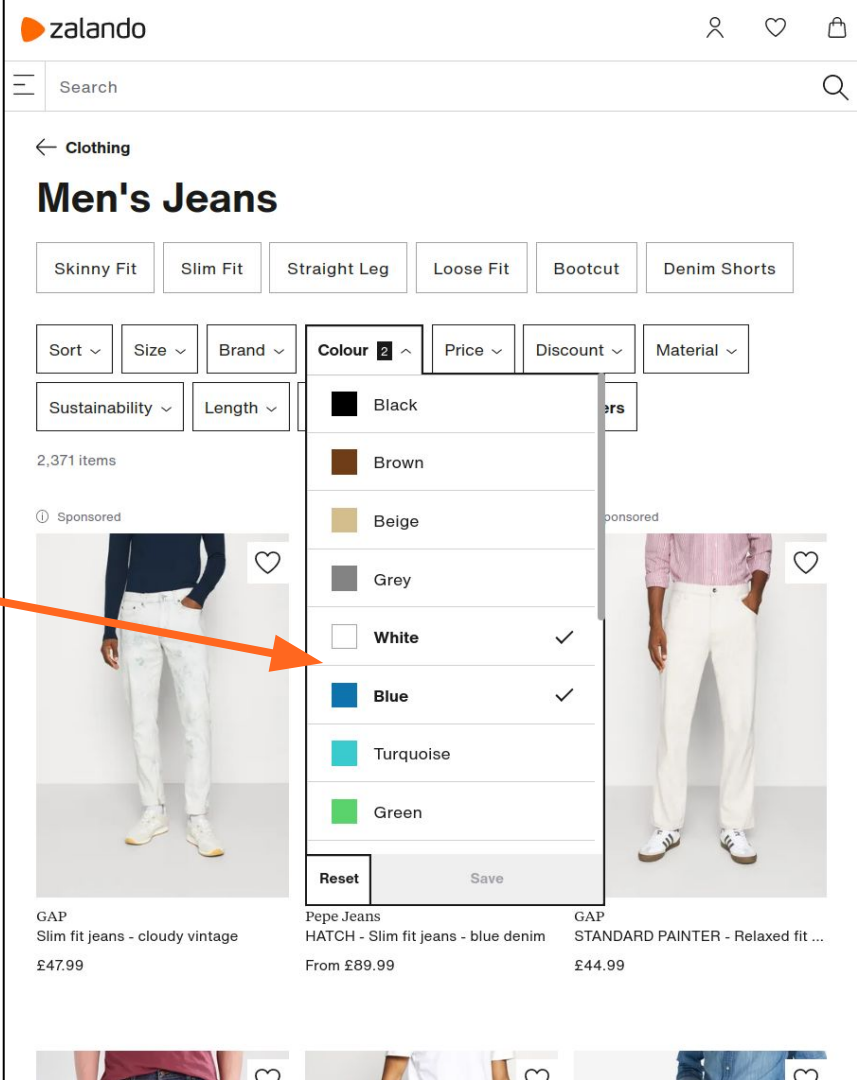
The main product grid displays various men's jeans listings, each with a product image, title, price range, and supplier information. The listings are sorted by 'Best Match'.

Product Image	Product Title	Price Range	Min Order	Supplier
	Jeans Jeans High Quality Ladies Distressed Rise	\$12.00-\$13.00	200.0 Pieces	Jeans Jeans High Quality Amazon Europe Style Skinny
	Jeans Jeans High Quality Amazon Europe Style Skinny	\$4.09-\$8.06	2 Pieces	Jeans Jeans Men Mens Fahio... Plus Size For Men Breathable
	Jeans Jeans Men Mens Fahio... Plus Size For Men Breathable	\$6.80-\$9.55	1 Piece	Jeans Jeans Men Ch Wholesale Skinny Pa
	Jeans Jeans Men Ch Wholesale Skinny Pa	\$5.00-\$8.00	1 Piece	Jeans Jeans Men Ch Wholesale Skinny Pa
	Jeans Jeans Men Ch Wholesale Skinny Pa	\$5.00-\$8.00	1 Piece	Jeans Jeans Men Ch Wholesale Skinny Pa

Handling Multiple Selections in Facets

1. Facets

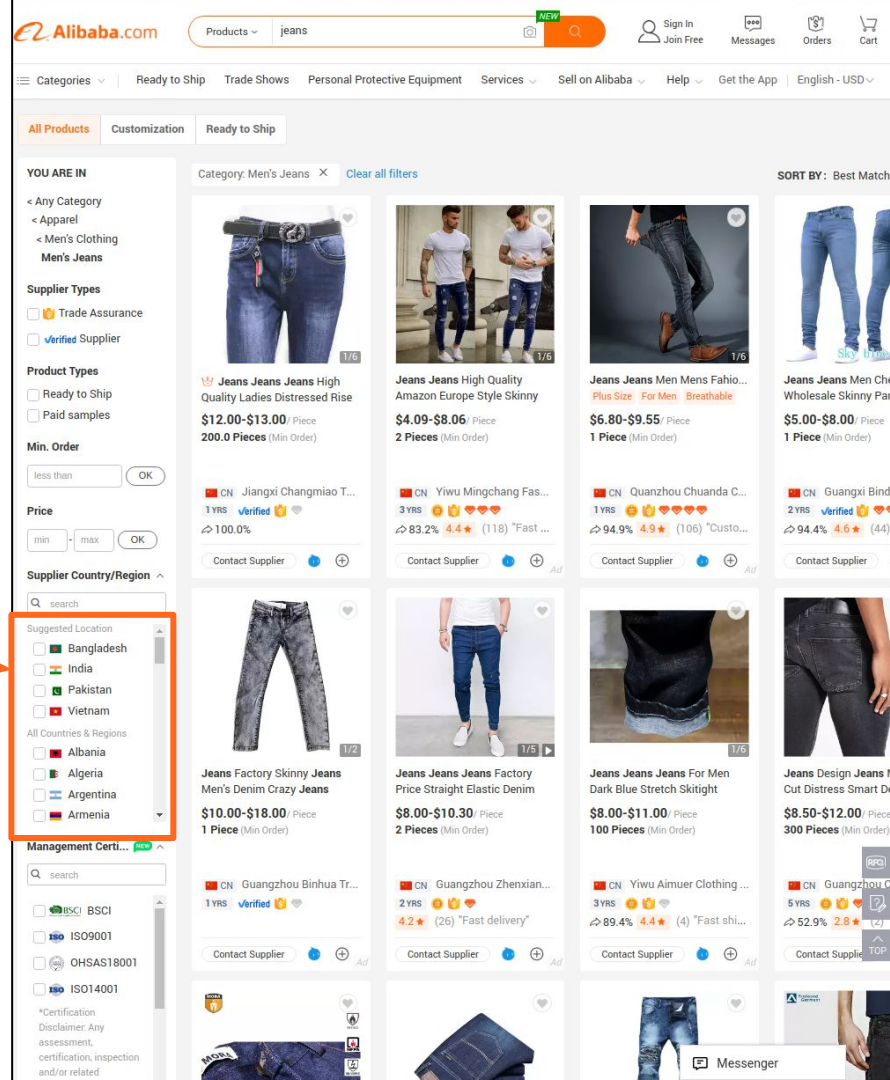
- a. blue OR white?
- b. blue AND white?



Need for Hierarchical Facets

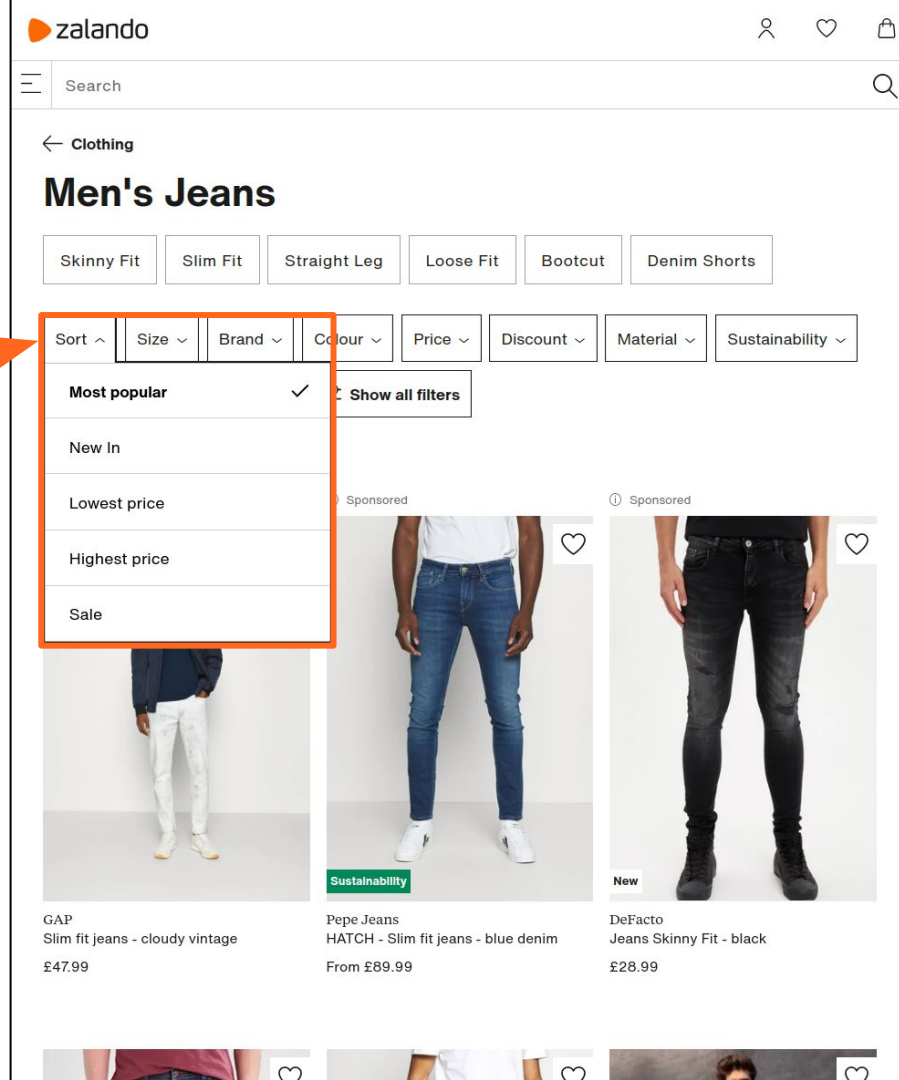
1. Facets

- Cannot filter by subcategories, e.g. by a certain city within India.



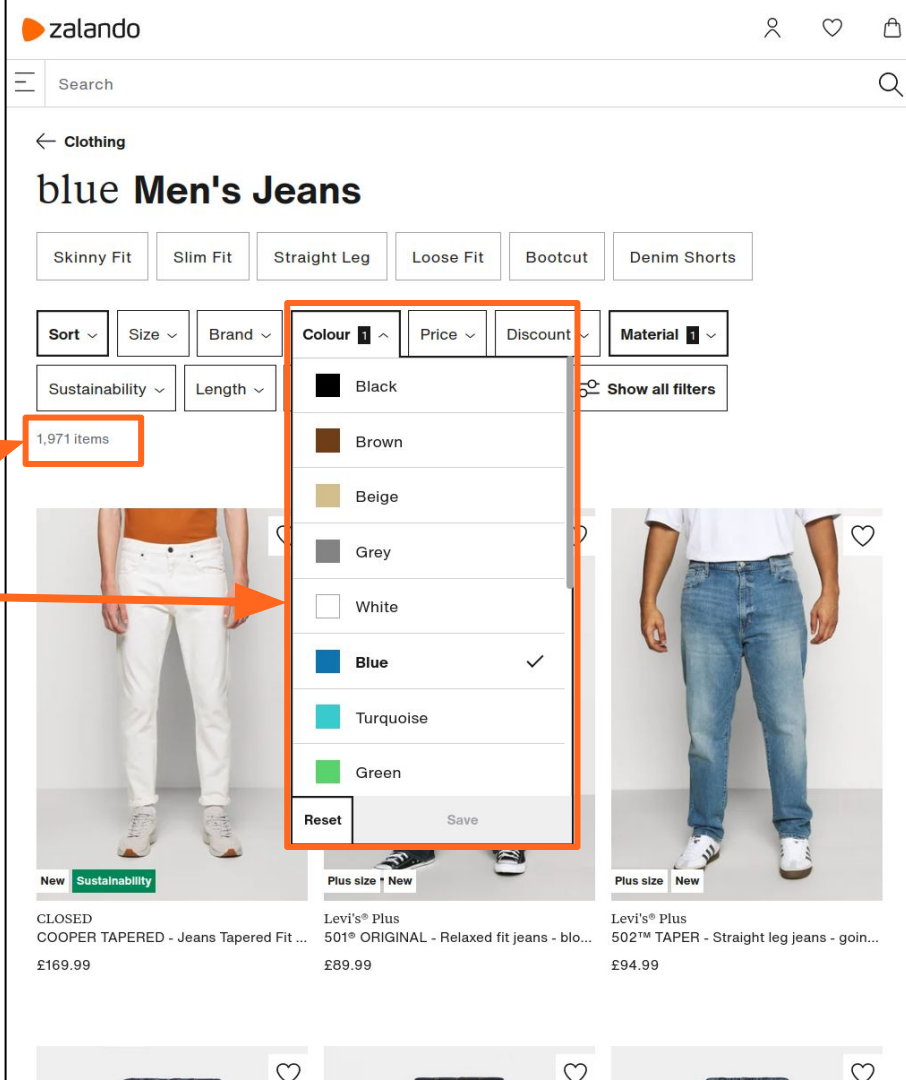
Limited Sorting Options

1. Facets
2. Sorting
 - a. Cannot sort by style or material



Hit Counts Not Available

1. **Filters / facets**
2. **Sorting**
3. **Result count**
 - a. Got 1 971 results after selecting “Blue”. What about the number of results for other colours?



Solutions Based on Linked Data Infrastructure



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Semantic Faceted Search

1. Facets based on domain ontologies

Manuscripts

Results: 2029 manuscripts

Active filters:
Author: Aristotle

Narrow down by:

Label

Search

Author

Search...

- ☐ Unknown [136012]
- ☐ Augustine, Saint, Bishop of H...
- ☐ Jerome, Saint, -419 or 420 [3:
- ☐ Cicero, Marcus Tullius [2575]
- ☐ Anonymous [2327]
- ☒ Aristotle [2029]
- ☐ Gregory, I, Pope, approximate
- ☐ Bernard, of Clairvaux, Saint, 1
- ☐ John Chrysostom, Saint, -407
- ☐ Aquinas, Thomas, Saint, 122?

Work

Production place

Production date

Note

Language

Owner

Collection

TABLE

PRODUCTION PLACES

LAST KNOWN LOCATIONS

MIGRATIONS

EXPORT

Rows per page 10 1-10 of 2029

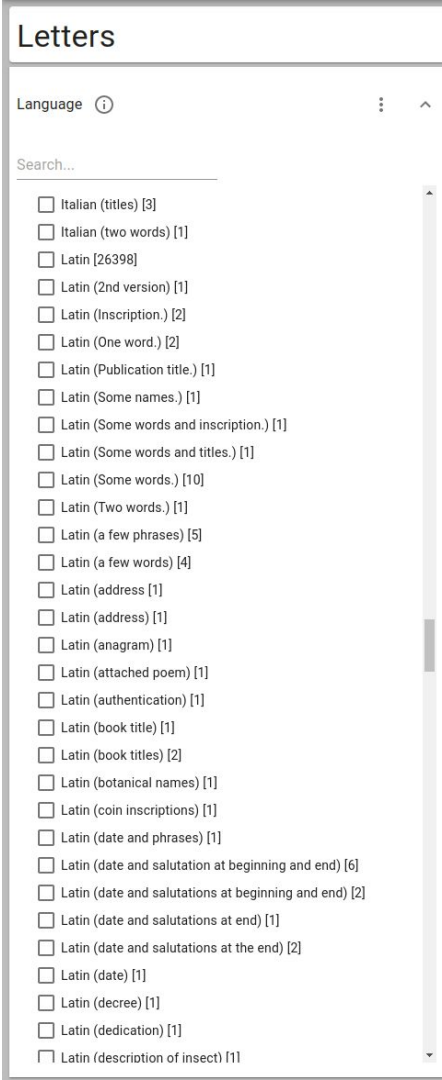
Label	Author	Work	Production place
Paris (F), Bibliothèque nationale de France, Manuscrits, lat. 12950	Aristotle	Aristotelis libri topicorum, elencorum, priorum, posteriorum, et ethicorum	-
PARIS, Bibliothèque nationale de France, Manuscrits, lat. 06309	Argyropoulos, Ioánnēs, -1486 ...	Ethica	Florence
Paris (F), Bibliothèque nationale de France, Manuscrits, lat. 06299	Aristotle	Metaphysicorum libri duodecim ...	-
Paris (F), Bibliothèque nationale de France, Manuscrits, lat. 16022	Aristotle ...	Guido de Columnis : Historia destructionis Troiae (1272-1287) ...	-
MS. Auct. F. 5. 27 ...	Aristotle ...	Aristotle: Politics (tr. Leonardo Bruni) [Latin]	England ...
Paris (F), Bibliothèque nationale de France, Manuscrits, lat. 12949	Alcuin, 735-804 ...	Apuleii periermeniae, cum Boetii commentariis ...	-
PARIS, Bibliothèque nationale de France, Manuscrits, lat. 12951	Aristotle	Aristotelis de metaphysica libri XII, et liber de causis	-
PARIS, Bibliothèque nationale de France, Manuscrits, lat. 12952	Aristotle	Aristotelis physica	-
Paris (F), Bibliothèque nationale de France, Manuscrits, lat. 12953	Alfredus Anglicus (12e-13e s.) ...	De anima ...	-
PARIS, Bibliothèque nationale de France, Manuscrits, lat. 12955	Aristotle	Simplicius in Aristotelis praedicamenta	-

Semantic Faceted Search

1. Facets based on domain ontologies

a. Using domain ontologies
requires plenty of manual
or programmatic
harmonization

i. *A facet with unharmonized
data is unusable*

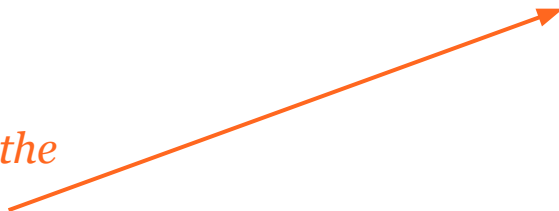


Semantic Faceted Search

1. Facets based on domain ontologies

a. The hierarchical structures in domain ontologies can be used for creating hierarchical facets

i. *An example based on the Getty Thesaurus of Geographic Names*



Production place ⓘ

Search...

- ☐ Unknown [140278]
- ▼ ☐ World [94226]
 - ☐ Abbasid Caliphate [8]
 - ▶ ☐ Africa [2245]
 - ☐ Almohad Caliphate [4]
 - ▼ ☐ Asia [4020]
 - ▶ ☐ Afghanistan [114]
 - ☐ Arabian Peninsula [23]
 - ▶ ☐ Armenia [130]
 - ☐ Assyria [1]
 - ▶ ☐ Azerbaijan [4]
 - ▶ ☐ Central Asia [15]
 - ☐ Chagatai Khanate [2]
 - ▶ ☐ China [68]
 - ▶ ☐ Cyprus [2]
 - ☐ Cyprus [22]
 - ☐ Dutch East Indies [1]
 - ☐ Georgia [1]
 - ☐ Ghaznavid Empire [1]
 - ☐ India [120]
 - ▼ ☐ India [74]
 - ▶ ☐ Andhra Pradesh [1]
 - ▶ ☐ Bihār [3]
 - ☐ Delhi [3]
 - ▶ ☐ Goa [1]
 - ▼ ☐ Gujarāt [12]
 - ☐ Ahmadābād [4]
 - ☐ Jammu and Kashmir [4]
 - ▶ ☐ Karnātaka [13]
 - ☐ Mughal Empire [35]
 - ▶ ☐ Uttar Pradesh [2]
 - ▶ ☐ Indonesia [3]

Semantic Faceted Search

1. Facets based on domain ontologies
2. Sorting by any property

Manuscripts

Results: 2029 manuscripts

Active filters: Author: Aristotle

Narrow down by:

Label

Author

Work

Production place

MS. Gr. class. d. 76 (P) Aristotle: Protreptikos (Greek) Al Bahnasā ...

SDBM_MS_24369 Aristotle ... Kitab Sirr al-Asrar (Secret of Secrets) ... Al-Mawsil

SDBM_MS_orphan_202388 Aristotle ... Letter on astrology to the sages of Montpellier ... Anagni

SDBM_MS_24425 Aristotle ... Al-Siyasa Fi Tahrir Al-Ritasa-Politics-Secreta Secretorum, Or, on the Government of Rulers ... Andalusia

SDBM_MS_orphan_39905 Aristotle ... Al-Siyasa Fi Tahrir Al-Ritasa-Politics-Secreta Secretorum, Or, on the Government of Rulers ... Andalusia

SDBM_MS_9339 Abraham ibn Ezra, 1092-1167 ... Commentaries on Aristotle ... Ashkenaz ...

SDBM_MS_5794 Aristotle ... Algorithmus Arithmetica ... Austria ...

SDBM_MS_orphan_12769 Aristotle ... Animalium ... Austria ...

SDBM_MS_19598 Aristotle ... Aristotle ... Bavaria

SDBM_MS_6518 Aristotle ... Quaestiones Logicales Morales Elementorum Logicialium Categoricaperihermenias Posteriorum ... Bavaria

Semantic Faceted Search

1. Facets based on domain ontologies
2. Sorting by any property
3. Result count + hit counts

The screenshot displays a web application for searching manuscripts. The interface is divided into several sections:

- Search Bar:** Located at the top, with a search icon and the text "Search all MMM content".
- Manuscripts Header:** A section with a dropdown menu and a search icon.
- Facets:** A list of filters on the left side, including Author, Work, Production place, Production date, Note, Language, Owner, Collection, Transfer of Custody Place, Transfer of Custody Date, Last known location, Material, Height, Width, and Folios. Each facet has a dropdown arrow.
- Material Facet:** A list of material types with checkboxes and hit counts, including Parchment [96262], Unknown [78310], Paper [50583], Palm leaf [677], Mixed [232], Papyrus [161], Silk [91], Wood [55], Clay [50], and Other [40].
- Table View:** A table showing search results. The table has columns for Label, Author, Work, and Production place. The first row shows "Montpellier (F), BU Historique de Médecine, H 069". The second row shows "Montpellier (F), BU Historique de Médecine, H 073". The third row shows "Paris (F), Bibliothèque nationale de France, Manuscrits, Coll. Dupuy 653". The fourth row shows "Paris (F), Bibliothèque nationale de France, Manuscrits, lat. 04950". The fifth row shows "Montpellier (F), BU Historique de Médecine, H 075". The sixth row shows "Montpellier (F), BU Historique de Médecine, H 076". The seventh row shows "Montpellier (F), BU Historique de Médecine, H 077". The eighth row shows "Montpellier (F), BU Historique de Médecine, H 078". The ninth row shows "Montpellier (F), BU Historique de Médecine, H 079". The tenth row shows "Montpellier (F), BU Historique de Médecine, H 080".
- Table Controls:** A section above the table with a "TABLE" tab, a "Rows per page" dropdown set to 10, and a "1-10 of 222602" result count. There are also navigation arrows for the table.

Semantic Faceted Search

1. Facets based on domain ontologies
2. Sorting by any property
3. Result count + hit counts
4. Result view

The screenshot displays a web application for searching manuscripts. At the top, a purple header contains a logo, a search bar with the text 'Search all MMM content', and a menu icon. Below the header, the main section is titled 'Manuscripts'. On the left, a sidebar shows 'Results: 2029 manuscripts' and 'Active filters: Author: Aristotle'. Under 'Narrow down by:', there are sections for 'Label' and 'Author'. The 'Author' section is expanded, showing a list of authors with checkboxes; 'Aristotle [2029]' is selected. Below this, a list of facets (Work, Production place, Production date, Note, Language, Owner, Collection) is visible. On the right, a table displays the search results. The table has columns for 'Label', 'Author', 'Work', and 'Production place'. It includes a 'Table' tab and navigation controls for rows per page (10) and page number (1-10 of 2029). The table lists 10 rows of manuscript data, each with a dropdown arrow in the 'Label' column.

Label	Author	Work	Production place
MS_Gr_class_d_76 (P)	Aristotle	Aristotle: Protreptikos (Greek)	Al Bahnasā ...
SDBM_MS_24369	Aristotle ...	Kitab Sirr al-Asrar (Secret of Secrets) ...	Al-Mawsil
SDBM_MS_orphan_202388	Aristotle ...	Letter on astrology to the sages of Montpellier ...	Anagni
SDBM_MS_24425	Aristotle	Al-Siyasa Fi Tahrir Al-Ritasa-Politics-Secreta Secretorum, Or, on the Government of Rulers ...	Andalusia
SDBM_MS_orphan_39905	Aristotle	Al-Siyasa Fi Tahrir Al-Ritasa-Politics-Secreta Secretorum, Or, on the Government of Rulers	Andalusia
SDBM_MS_9339	Abraham ibn Ezra, 1092-1167 ...	Commentaries on Aristotle ...	Ashkenaz ...
SDBM_MS_5794	Aristotle ...	Algorithmus Arithmetica ...	Austria ...
SDBM_MS_orphan_12769	Aristotle ...	Animalium ...	Austria ...
SDBM_MS_19598	Aristotle ...	Aristotle ...	Bavaria
SDBM_MS_6518	Aristotle ...	Questiones Logicales Morales Elementorum Logicialium Categoricaperihermenias Posteriorum ...	Bavaria

Semantic Faceted Search + Data Analysis

1. Facets based on domain ontologies
2. Sorting by any property
3. Result count + hit counts
4. Result views
 - a. Table / Grid
 - b. Map
 - c. Statistics
 - d. Network
 - e. Animation
 - f. CSV download
 - g. ...

The screenshot displays a web application for searching manuscripts. The top navigation bar is purple with a search icon and the text "Search all MMM content". The main header is "Manuscripts". Below it, the results are for "2029 manuscripts". The "Active filters" section shows "Author: Aristotle" with a remove button. The "Narrow down by:" section has a search bar and a list of authors with checkboxes. The "Author" list includes: Unknown [136012], Augustine, Saint, Bishop of H..., Jerome, Saint, -419 or 420 [3..., Cicero, Marcus Tullius [2575], Anonymous [2327], Aristotle [2029] (checked), Gregory, I, Pope, apostolic..., Bernard, of Clairvaux, Saint, 1..., John Chrysostom, Saint, -407..., Aquinas, Thomas, Saint, 1224... An orange arrow points from the "Aristotle [2029]" checkbox to the "Table" view in the results section. The results are shown in a table view with columns: Label, Author, Work, and Production place. The table lists 10 rows of results, each with a dropdown arrow in the Label column. The "Table" view is highlighted with an orange border.

Manuscripts

Results: 2029 manuscripts

Active filters:

Author: Aristotle

Narrow down by:

Label

Search

Author

Search...

- ☐ Unknown [136012]
- ☐ Augustine, Saint, Bishop of H...
- ☐ Jerome, Saint, -419 or 420 [3...
- ☐ Cicero, Marcus Tullius [2575]
- ☐ Anonymous [2327]
- ☒ Aristotle [2029]
- ☐ Gregory, I, Pope, apostolic...
- ☐ Bernard, of Clairvaux, Saint, 1...
- ☐ John Chrysostom, Saint, -407...
- ☐ Aquinas, Thomas, Saint, 1224...

Work

Production place

Production date

Note

Language

Owner

Collection

Table

PRODUCTION PLACES

LAST KNOWN LOCATIONS

MIGRATIONS

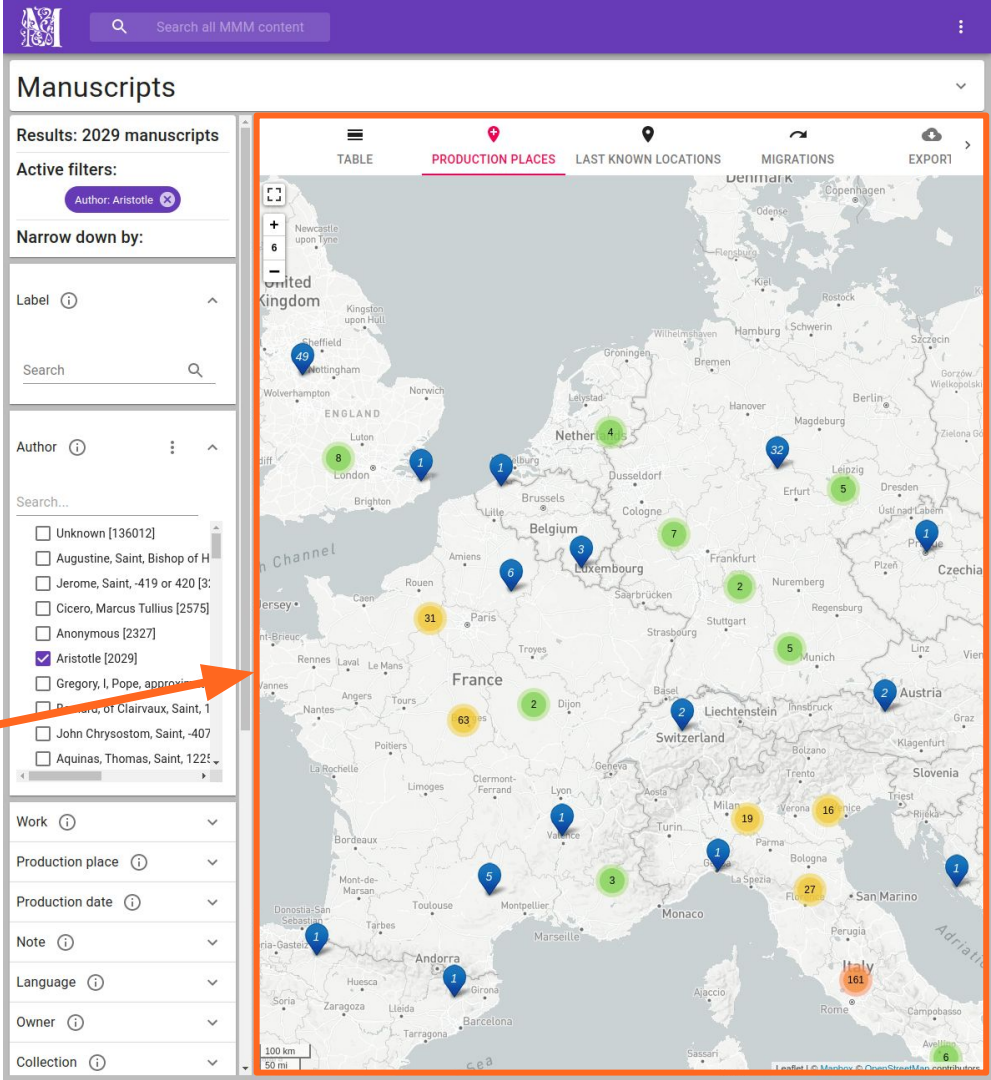
EXPORT

Rows per page 10 1-10 of 2029

Label	Author	Work	Production place
MS_Gr.class.d.76(P)	Aristotle	Aristotle: Protreptikos (Greek)	Al Bahnasā ...
SDBM_MS_24369	Aristotle ...	Kitab Sirr al-Asrar (Secret of Secrets) ...	Al-Mawsil
SDBM_MS_orphan_202388	Aristotle ...	Letter on astrology to the sages of Montpellier ...	Anagni
SDBM_MS_24425	Aristotle	Al-Siyasa Fi Tahrir Al-Ritasa-Politics-Secreta Secretorum, Or, on the Government of Rulers ...	Andalusia
SDBM_MS_orphan_39905	Aristotle	Al-Siyasa Fi Tahrir Al-Ritasa-Politics-Secreta Secretorum, Or, on the Government of Rulers	Andalusia
SDBM_MS_9339	Abraham ibn Ezra, 1092-1167	Commentaries on Aristotle ...	Ashkenaz ...
SDBM_MS_5794	Aristotle ...	Algorithmus Arithmetica ...	Austria ...
SDBM_MS_orphan_12769	Aristotle ...	Animalium ...	Austria ...
SDBM_MS_19598	Aristotle ...	Aristotle ...	Bavaria
SDBM_MS_6518	Aristotle ...	Questiones Logicales Morales Elementorum Logicialium.Categoricaperihermenias Posteriorum	Bavaria

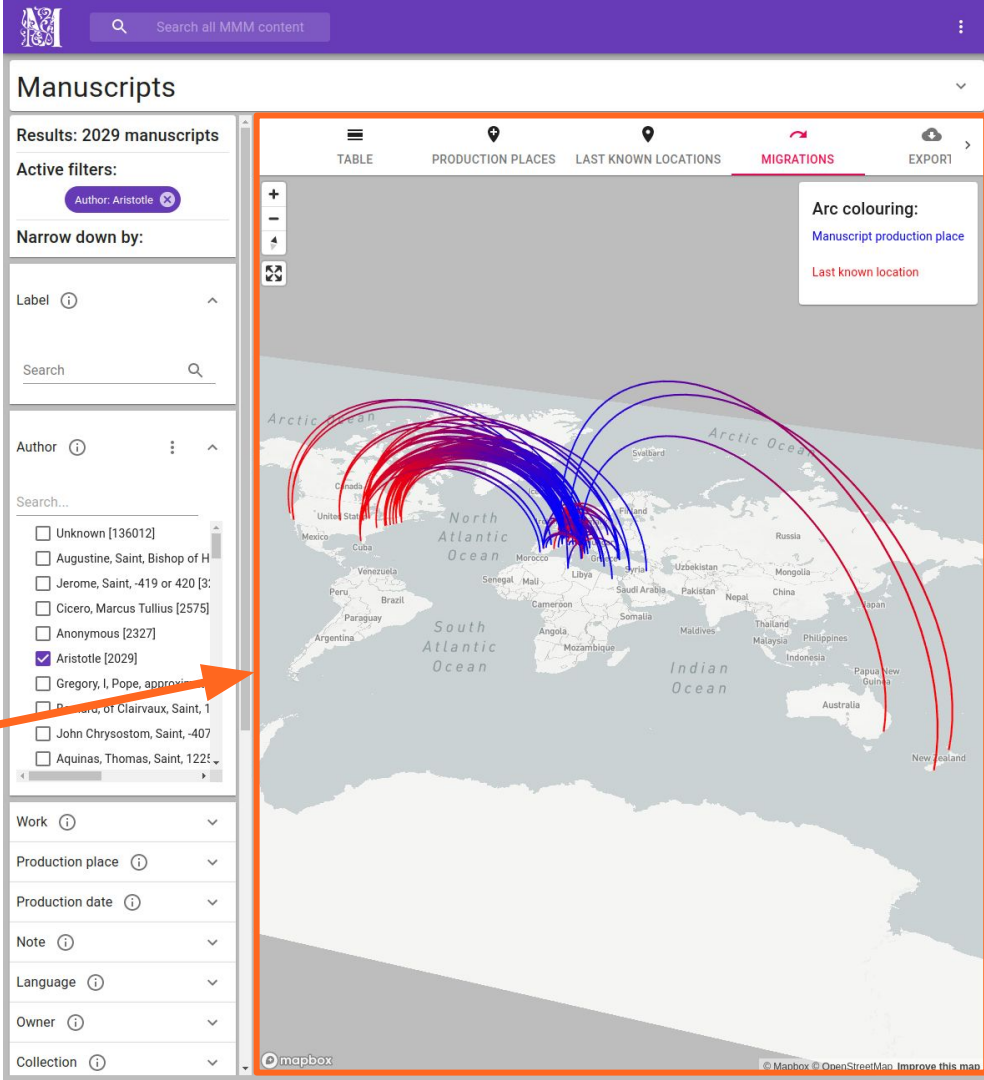
Semantic Faceted Search + Data Analysis

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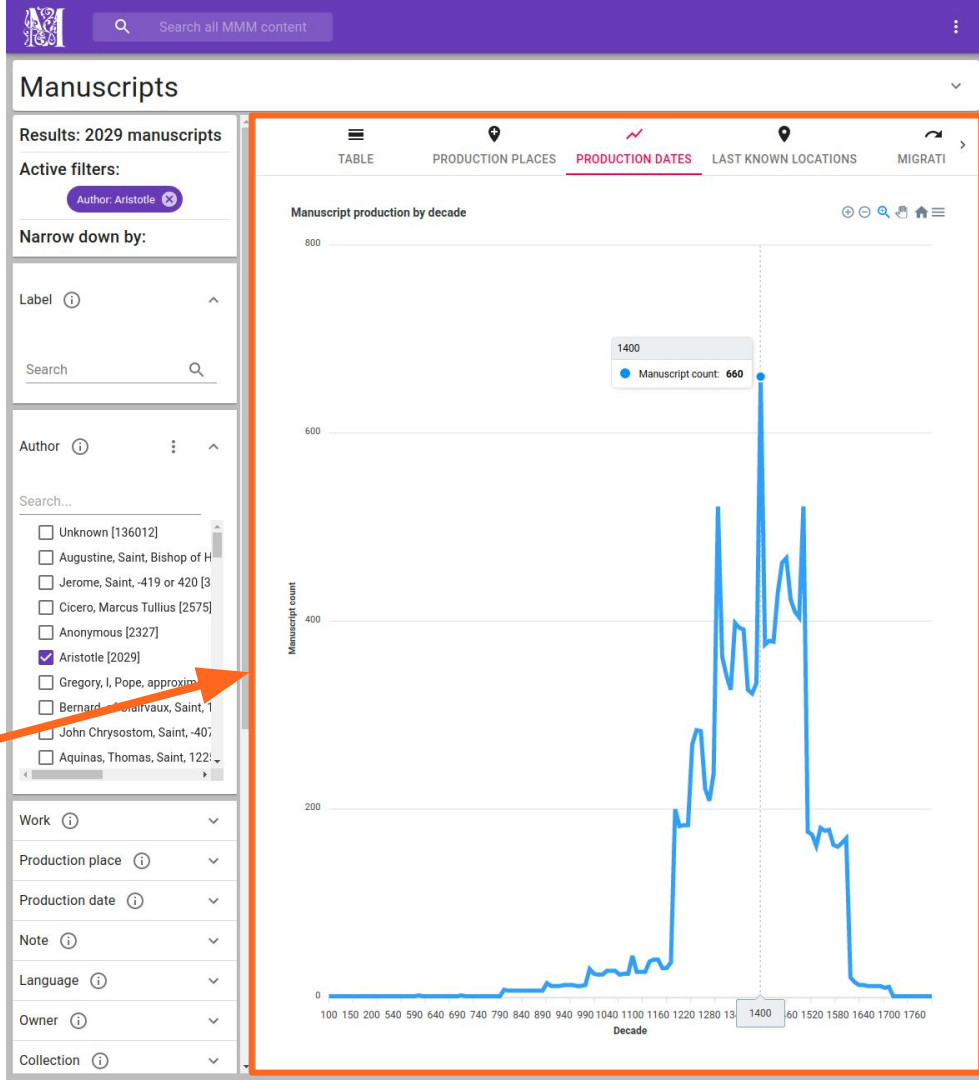
Semantic Faceted Search + Data Analysis

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Semantic Faceted Search + Data Analysis

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Generic Tool for Building User Interfaces for Semantic Portals: Sampo-UI Framework



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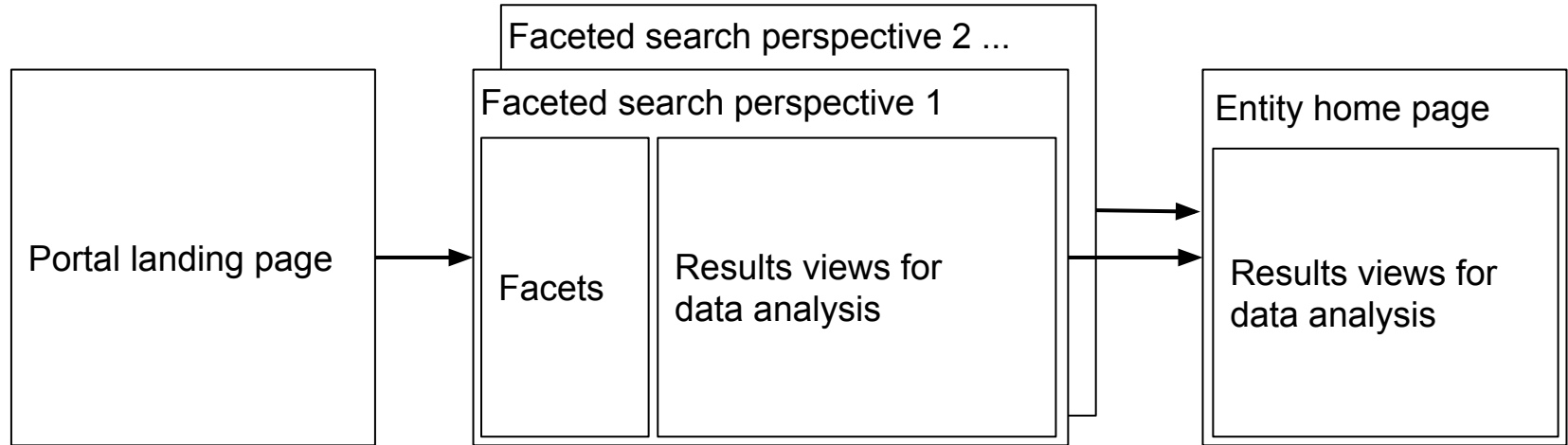
Department of
Computer Science



Requirements Based on Experiences in Developing the Sampo Portals Since 2002

- **Distinct perspectives to the underlying data**
- **Multiple search paradigms**
 - Semantic faceted search
 - Free text search
 - Geospatial search
- **Data analysis for result sets**
- **A homepage for each entity of interest**
- **Integration of external raster and vector data sources**

Main Views of a Semantic Portal



These views can be built with a selection of ~120 ready-to-use Sampo-UI components.

Sampo-UI Technical Details

- **Targeted to software developers**
 - a “starting base” of a modern JavaScript web application complemented with a read-only API for accessing Linked Data
- **Code and documentation available on GitHub**
 - Open source license
 - Design philosophy
 - Developer guide
 - Issue tracker

Portals Built Using the Sampo-UI Framework

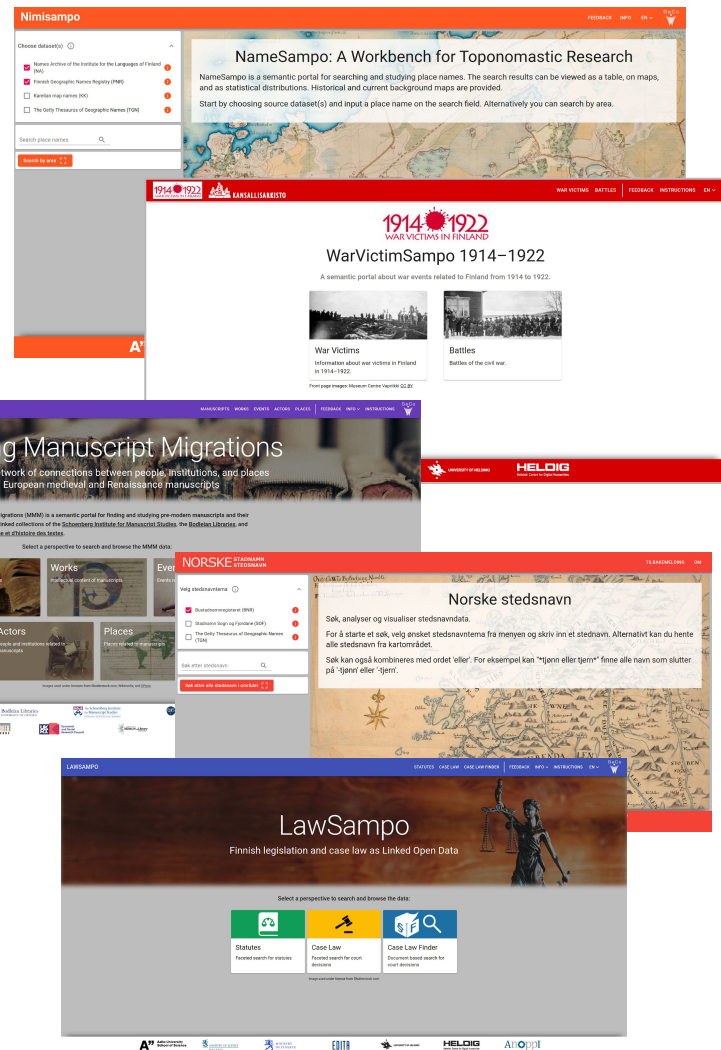
Sampo series

1. [NameSampo](#) (2018)
2. [WarVictimSampo 1914-1922](#) (2019)
3. [Mapping Manuscript Migrations](#) (2020)
4. [LawSampo](#) (TBA)
5. [AcademySampo](#) (TBA)
6. [FindSampo](#) (TBA)
7. [HistorySampo](#) (TBA)
8. [LetterSampo](#) (TBA)
9. [ParliamentSampo](#) (TBA)

External portals

1. [Norske stadnamn](#) (*University of Bergen and Norwegian Mapping Authority*, 2019)
2. Staff portal (*Lingsoft Ltd.*, 2019)

More comprehensive list: <https://seco.cs.aalto.fi/applications/sampo>



Thank you!

Questions?



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