



Über die Entwicklung von Programmen zur Begriffsanalyse

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Ausgangslage 2006

- ▶ ToscanaJ, Siena, Elba, Galicia, ConExp, ...
- ▶ NEXT CLOSURE, TITANIC, ...
- ▶ 1. Conceptual Structures Tools Interoperability Workshop

Ausgangslage 2006

- ▶ ToscanaJ, Siena, Elba, Galicia, ConExp, ...
 - ▶ NEXT CLOSURE, TITANIC, ...
 - ▶ 1. Conceptual Structures Tools Interoperability Workshop
- nichts passendes für triadische FBA

Agenda

Triadische FBA mit TRIAS

Merkmalsexploration im Web

ConExp-NG

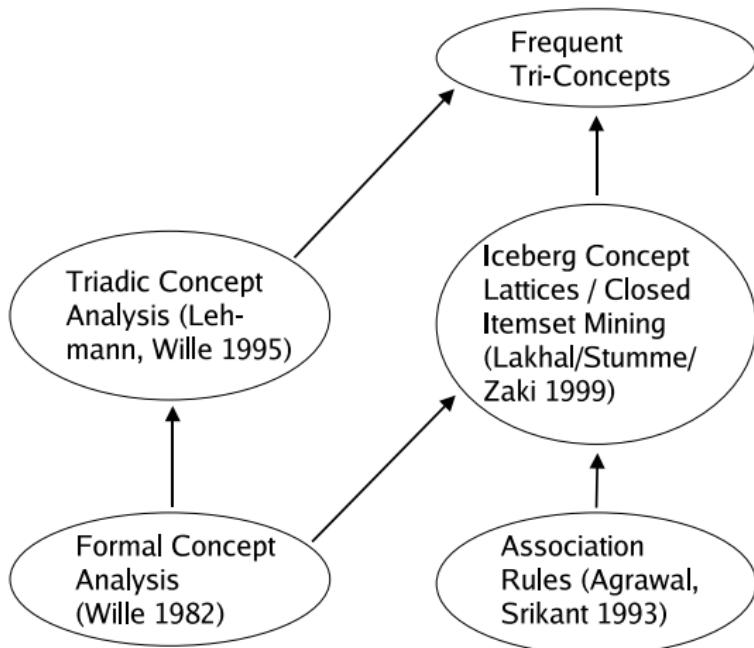
Agenda

Triadische FBA mit TRIAS

Merkmalsexploration im Web

ConExp-NG

Geschichte der Eisberg-Tri-Verbände



Motivation

The screenshot shows a Mozilla Firefox browser window displaying the BibSonomy website at <http://www.bibsonomy.org/tag/web>. The page title is "BibSonomy :: tag :: web". The top navigation bar includes links for Datei, Bearbeiten, Ansicht, Gehe, Lesezeichen, Extras, and Hilfe. Below the navigation is a toolbar with back, forward, stop, and search buttons. The URL bar shows the current address. To the right of the URL bar are search fields for "all" and "fulltext search here" with a "search" button.

The main content area displays a list of publications under the heading "publications". Each publication entry includes a thumbnail, the title, author(s), and date. For example, the first entry is "The Semantic Web" by Tim Berners-Lee and James Hendler, published in "Scientific American" (2001). The page also features a sidebar with links for "bookmarks" (RSS feed), "related tags" (a list of semantic-related terms), and a "logged in as rja" status bar.

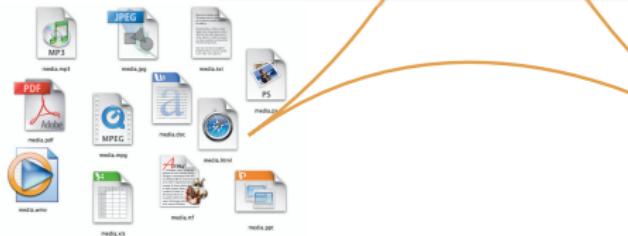
- ▶ Social Tagging: Delicious, Flickr, 43Things, BibSonomy, ...
- ▶ Benutzer annotieren Ressourcen mit Schlagwörtern (Tags)
- ▶ Beispiel: jaeschke, {fca, tools }, <https://github.com/fcatools>

Folksonomien

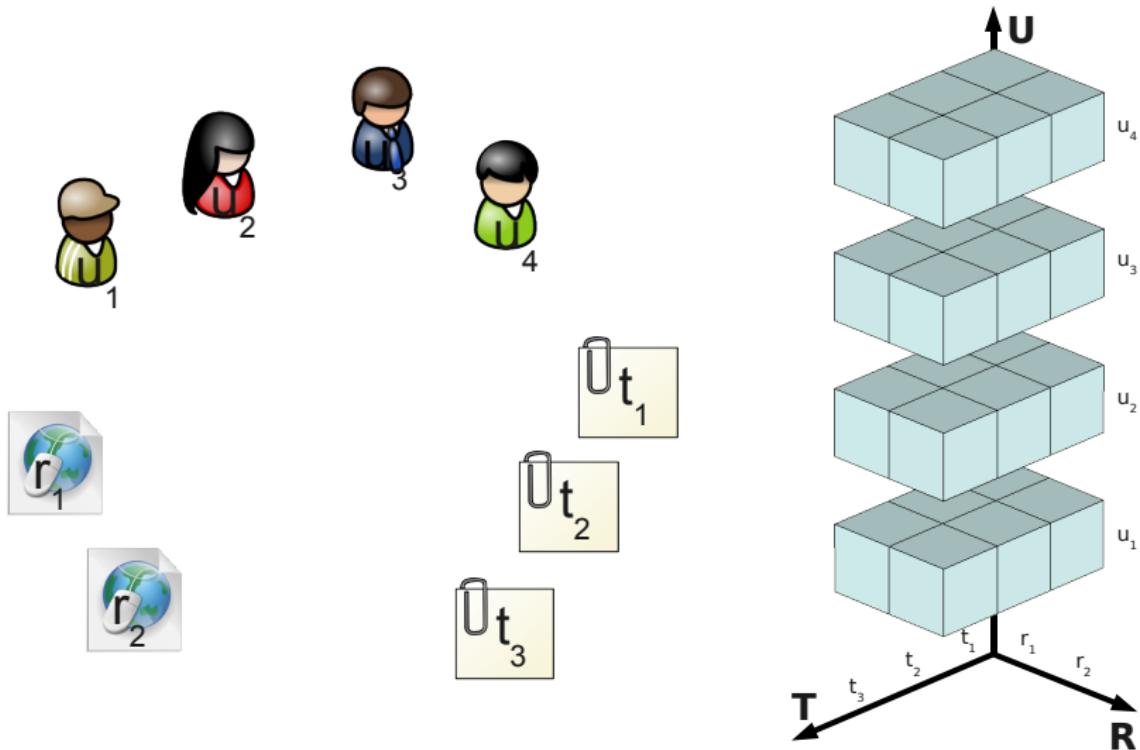
- ▶ Struktur von Social-Tagging-Systemen
 - ▶ Verknüpft Benutzer, Tags und Ressourcen
 - ▶ Begriffliche Struktur, durch Beitrag vieler Menschen erschaffen



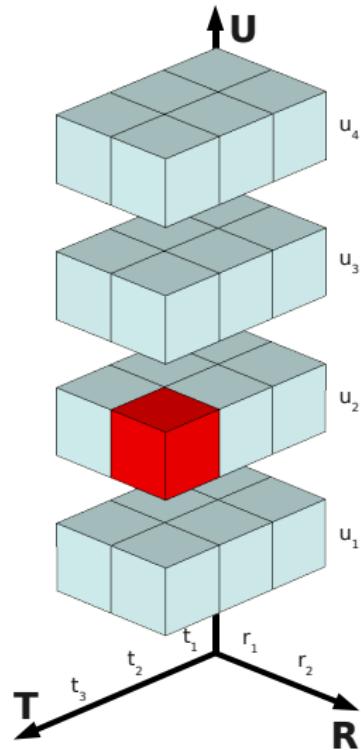
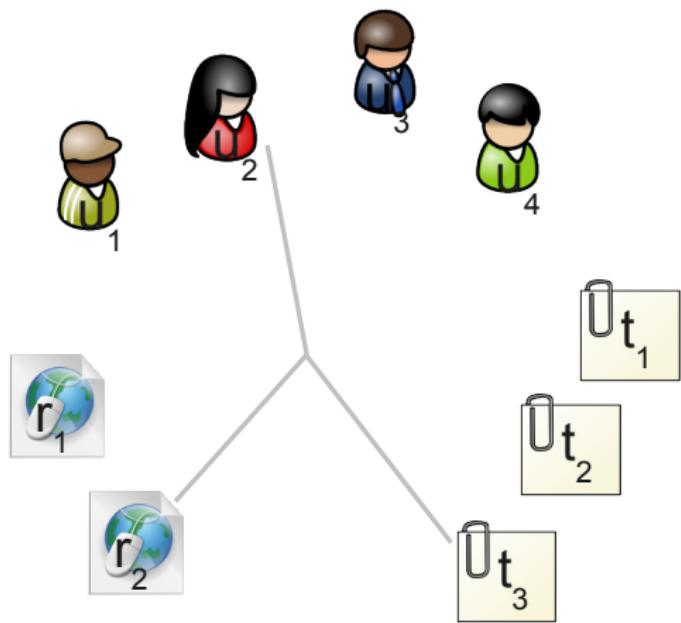
The logo consists of a blue stylized hand icon pointing upwards, with the text "Forschungszentrum L3S" and its description to its right.



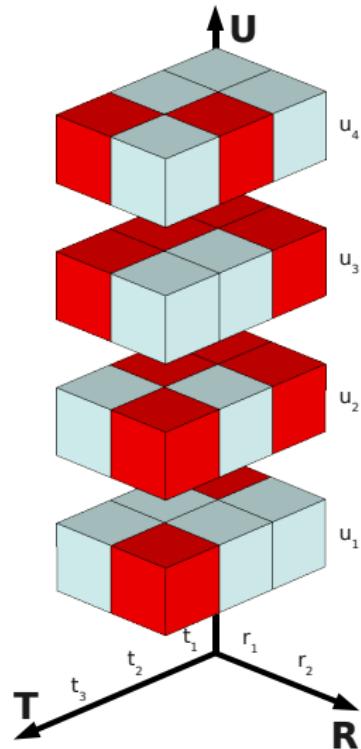
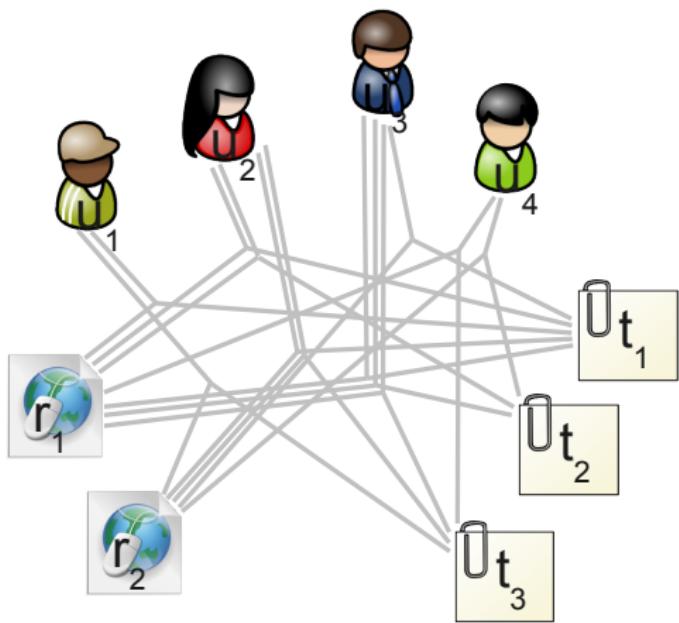
Folksonomien



Folksonomien



Folksonomien

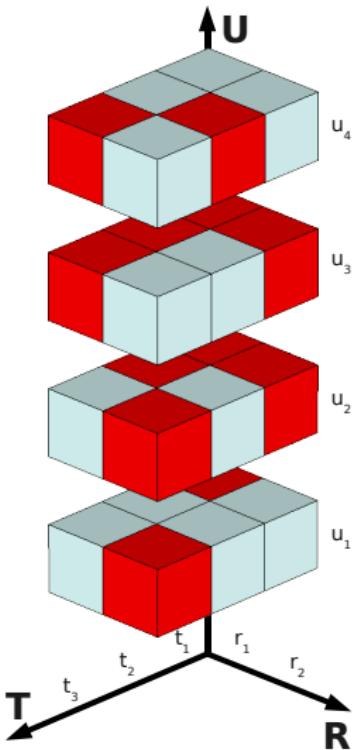
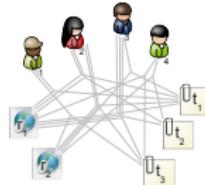


Folksonomien

Definition (Folksonomie)

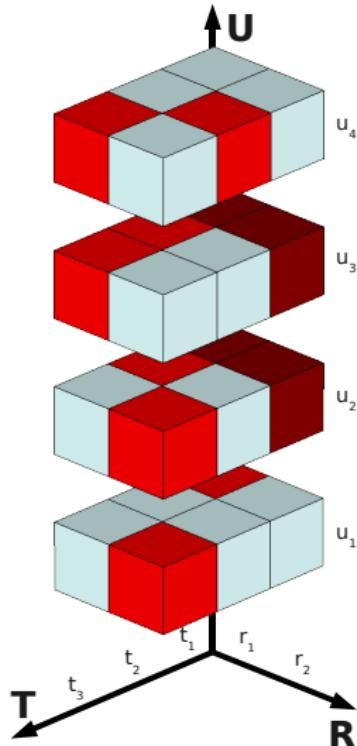
Ein Tupel $\mathbb{F} := (U, T, R, Y)$ mit

- ▶ U, T, R endliche Mengen von Benutzern, Tags und Ressourcen
- ▶ $Y \subseteq U \times T \times R$ ternäre Relation
- ▶ Tripartiter Hypergraph
- ▶ Boolescher 3-dimensionaler Tensor
- ▶ Triadischer Formaler Kontext



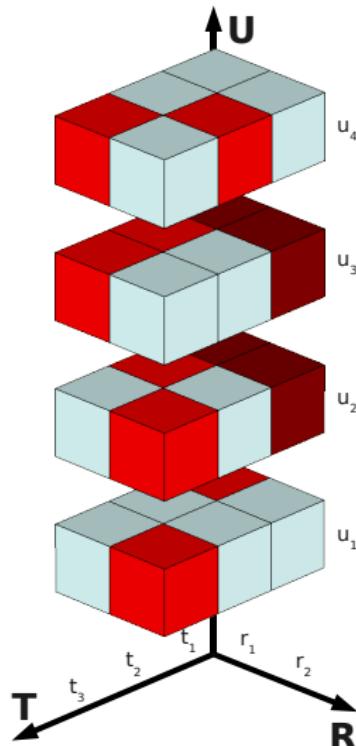
Ziele

- ▶ begriffliches Clustern von Folksonomien
 - ▶ interessante Begriffe/Cluster finden
 - ▶ Browsing, Community-Entdeckung, Empfehlungen unterstützen
 - ▶ Einblick in die Struktur der Folksonomie gewinnen



Ziele

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 - ▶ Einblick in die Struktur der Folksonomie gewinnen
 - ▶ Tri-Begriff (A, B, C): maximaler Quader, in dem jeder Nutzer aus A jede Ressource aus C mit allen Tags aus B versehen hat
- geteilte Konzeptualisierung



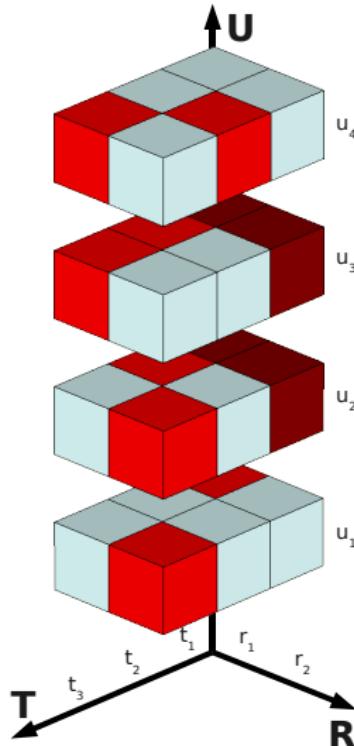
Tri-Begriff

Wir betrachten $\mathbb{F} = (U, T, R, Y)$ als triadischen Formalen Kontext.

Definition (Tri-Begriff)

Triple (A, B, C) mit $A \subseteq U, B \subseteq T, C \subseteq R$ und $A \times B \times C \subseteq Y$, so dass keine der drei Komponenten vergrößert werden kann, ohne die Bedingung $A \times B \times C \subseteq Y$ zu verletzen.

→ Natürliche Erweiterung Formaler Begriffe

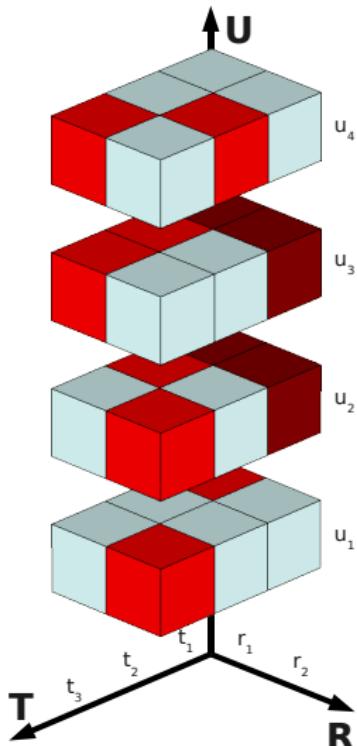


Tri-FBA

- ▶ Drei Quasi-Ordnungen $\lesssim_1, \lesssim_2, \lesssim_3$:
 $(A_1, A_2, A_3) \lesssim_i (B_1, B_2, B_3)$
 $\Leftrightarrow A_i \subseteq B_i$, für $i = 1, 2, 3$.

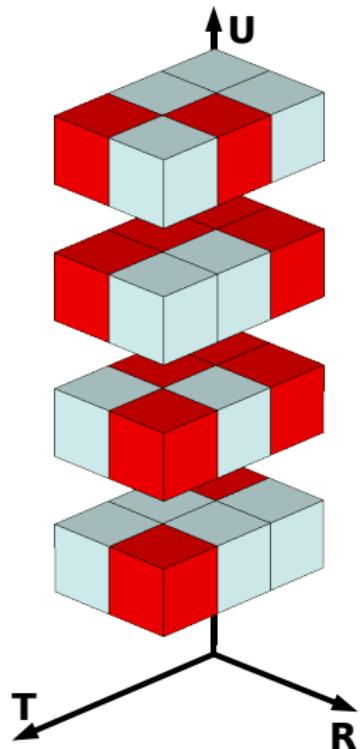
→ *Begriffs-Tri-Verband* $\mathfrak{B}(\mathbb{K})$ des triadischen Kontexts \mathbb{K}

- ▶ Gegeben Support-Schranken τ_u, τ_t, τ_r :
Tri-Begriff (A, B, C) häufig
 $\Leftrightarrow |A| \geq \tau_u, |B| \geq \tau_t$, und $|C| \geq \tau_r$
- *Eisberg-Tri-Verband*



Der TRIAS-Algorithmus

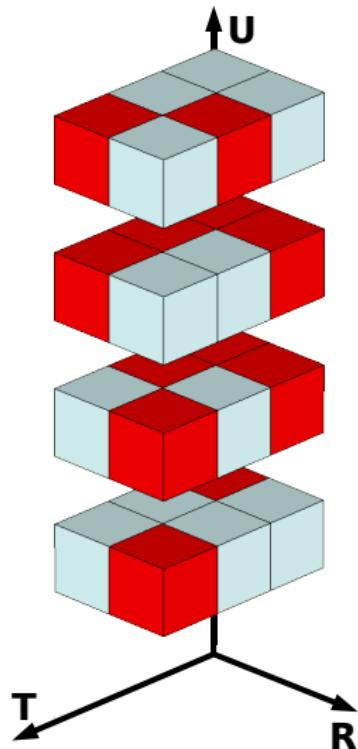
Berechnet den Eisberg-Tri-Verband eines triadischen Formalen Kontexts



Der TRIAS-Algorithmus

Berechnet den Eisberg-Tri-Verband eines triadischen Formalen Kontexts

Ablauf

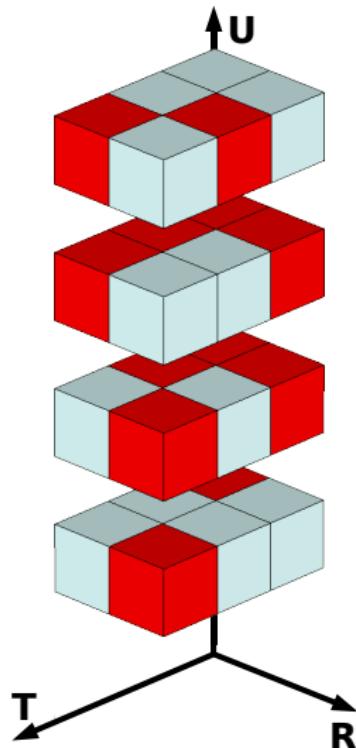


Der TRIAS-Algorithmus

Berechnet den Eisberg-Tri-Verband eines triadischen Formalen Kontexts

Ablauf

- Sei $\tilde{Y} := \{(u, (t, r)) \mid (u, t, r) \in Y\}$

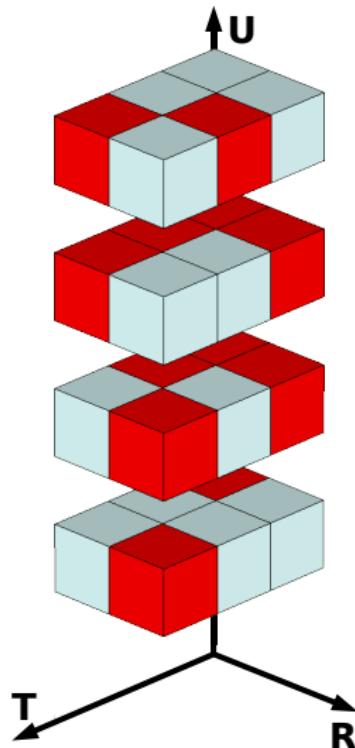


Der TRIAS-Algorithmus

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- Sei $\tilde{Y} := \{(u, (t, r)) \mid (u, t, r) \in Y\}$
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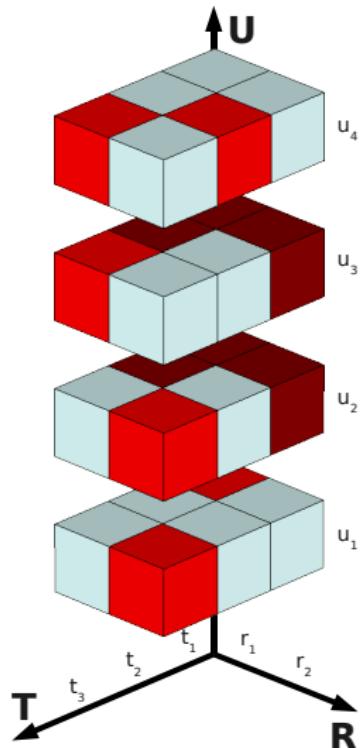
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Im Beispiel:
 $(A, I) = (\{u_2, u_3\}, \{(t_1, r_1), (t_1, r_2), (t_2, r_1)\})$



Der TRIAS-Algorithmus

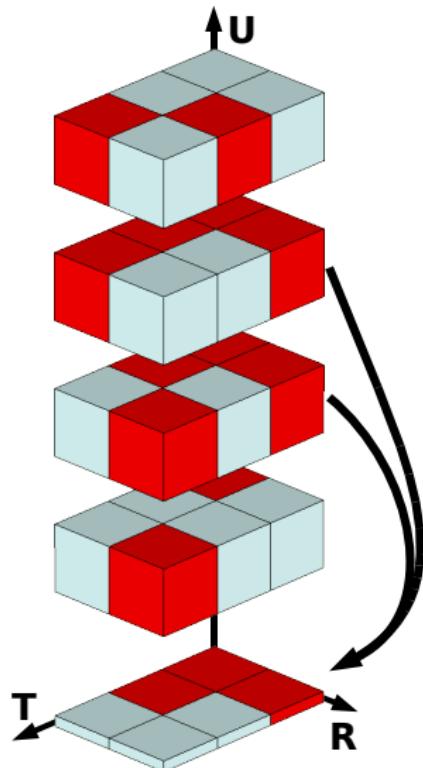
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 - ▶ Schleife: Finde (häufige) Begriffe (B, C) in (T, R, I)

Im Beispiel:

$$(T, R, I) = (T, R, \{(t_1, r_1), (t_1, r_2), (t_2, r_1)\})$$



Der TRIAS-Algorithmus

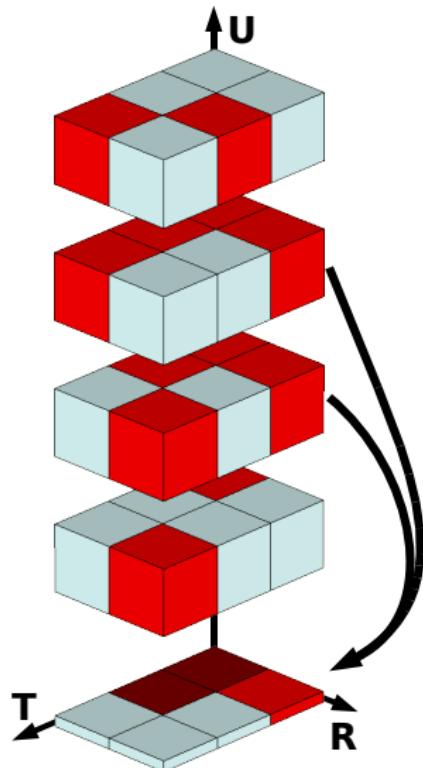
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Im Beispiel:

$$(B, C) = (\{t_1\}, \{r_1, r_2\})$$



Der TRIAS-Algorithmus

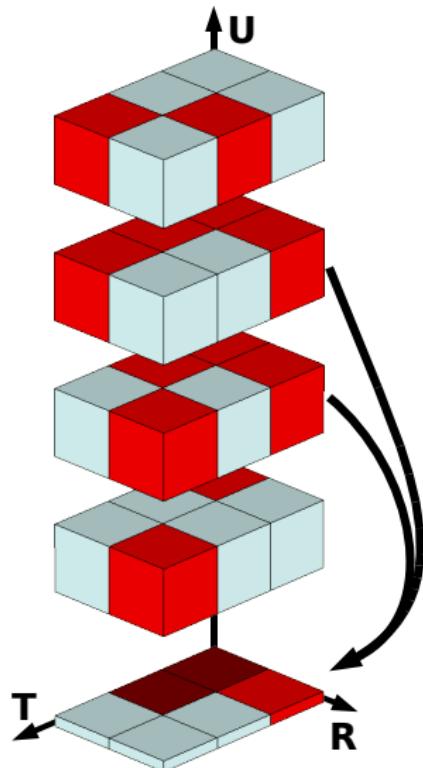
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 - ▶ Schleife: Finde (häufige) Begriffe (B, C) in (T, R, I)
 - ▶ Falls $A = (B \times C)^{\tilde{Y}}$, dann gib (A, B, C) aus

Im Beispiel:

$$(B \times C)^{\tilde{Y}} = (\{t_1\} \times \{r_1, r_2\})^{\tilde{Y}}$$



Der TRIAS-Algorithmus

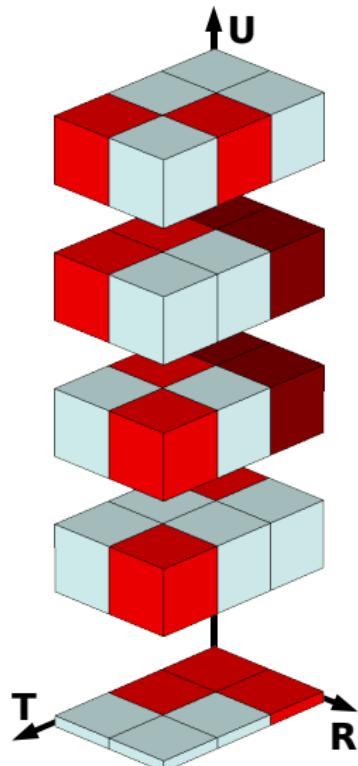
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Im Beispiel:

$$\begin{aligned}(B \times C)^{\tilde{Y}} &= (\{t_1\} \times \{r_1, r_2\})^{\tilde{Y}} \\ &= \{u_2, u_3\} = A\end{aligned}$$



Der TRIAS-Algorithmus

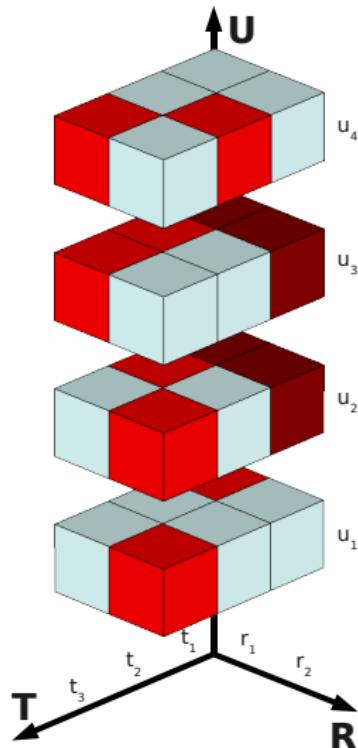
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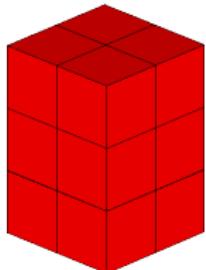
Qualitative Evaluation

BibSonomy-Datensatz:

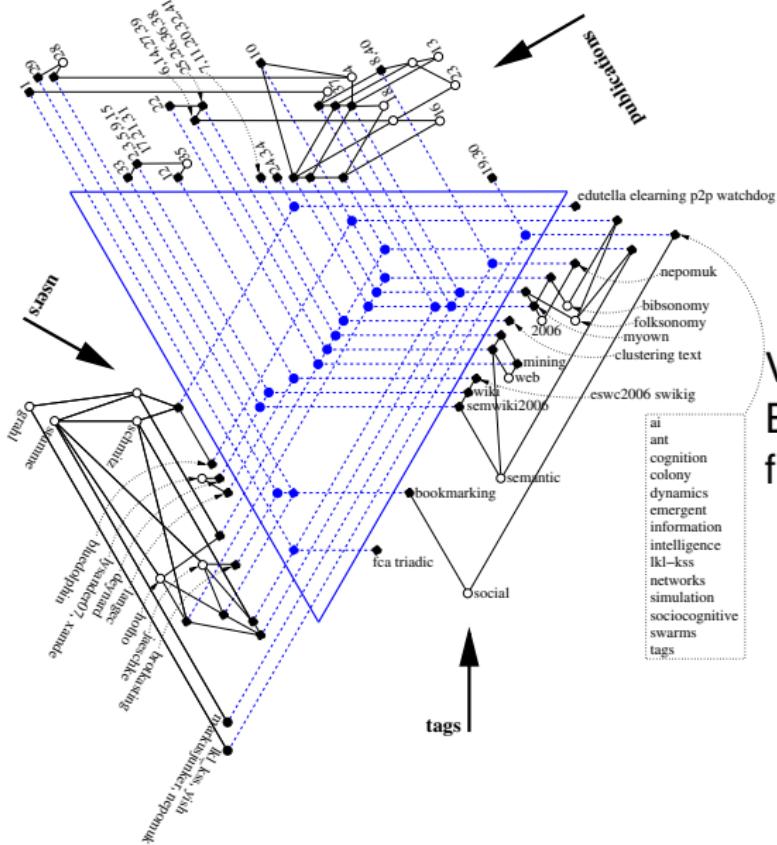
- ▶ Alle Publikationsreferenzen bis zum 23.11.2006
- ▶ Entfernt: DBLP, Posts mit dem Tag „imported“
- ▶ $|U| = 262$, $|T| = 5\,954$, $|R| = 11\,101$,
 $|Y| = 44\,944$

Ergebnis:

- ▶ 13 992 Tri-Begriffe (75 Minuten auf 2 GHz PC)
- ▶ Mit Support-Schranken $\tau_u = 3$, $\tau_t = 2$, $\tau_r = 2$:
 - ▶ 21 Tri-Begriffe
 - ▶ Enthalten 41 Publikationen, 15 Benutzer und 36 Tags

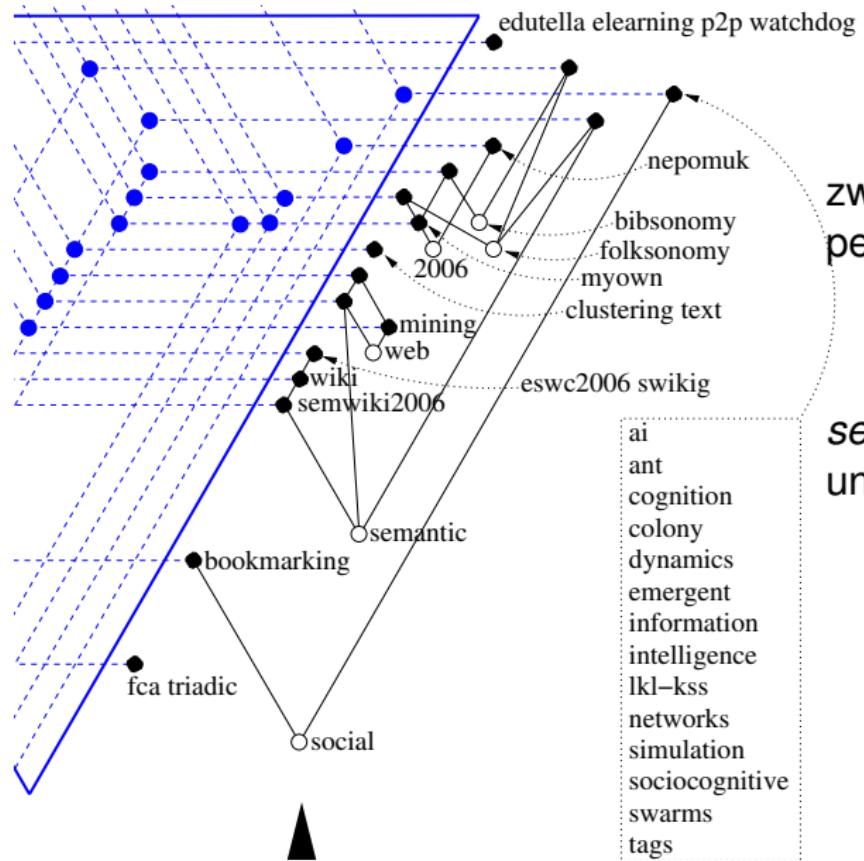


Qualitative Evaluation



Visualisierung des
Eisberg-Tri-Verbandes
für $\tau_u = 3$, $\tau_t = 2$, $\tau_r = 2$

Qualitative Evaluation



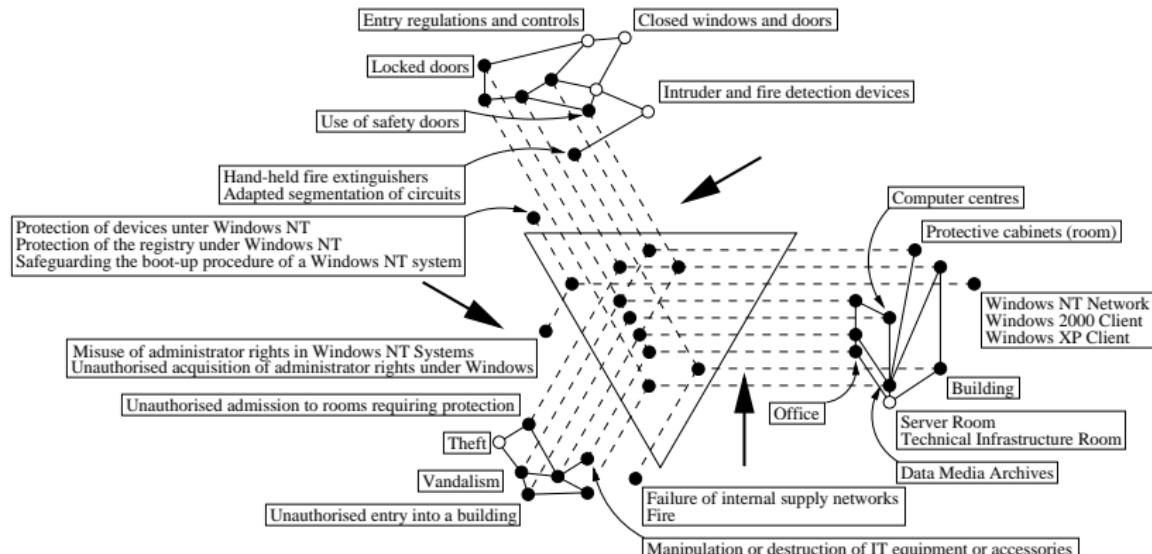
zwei Themengruppen:

- ▶ semantic
- ▶ social

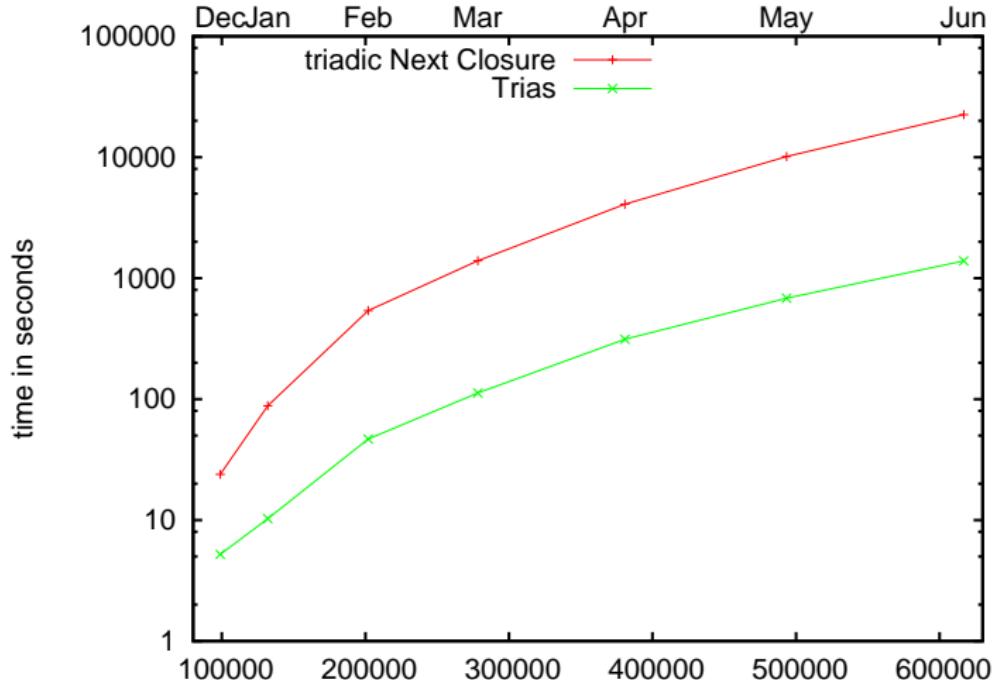
semantic weiter unterteilt:

- ▶ wiki
- ▶ web
- ▶ folksonomy

- ▶ 66 IT-Komponenten, 377 Bedrohungen, 912 Sicherheitsmaßnahmen, 3751 Tri-Begriffe
- ▶ häufige Tri-Begriffe für $\tau_u = 3, \tau_t = 2, \tau_r = 3$:



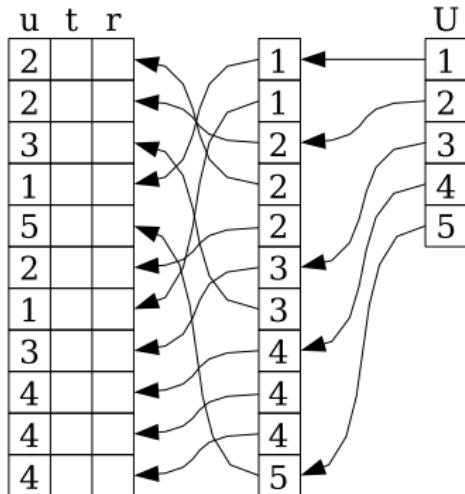
Evaluation der Laufzeit



- ▶ Daten von Delicious (bis 15. Juni, 2004)
- ▶ $|U| = 3,301, |T| = 30,416, |R| = 22,036, |Y| = 616,819$
- ▶ $\tau_u := \tau_t := \tau_r := 2$

Implementierungsdetails

- ▶ Java
- ▶ Ein-/Ausgabe: Datei, JDBC, RDF
- ▶ Konfiguration: Java, Kommandozeile, Properties-Dateien
- ▶ JUnit-Tests
- ▶ <http://github.com/fcatools/trias-algorithm>



Implementierungsdetails

- ▶ SOAP-Webinterface
- ▶ <http://github.com/fcatools/trias-webapp>
- ▶ Signatur:

```
public TriConcept<String>[] trias(  
    final Context<String> context,  
    final int minSuppObjects,  
    final int minSuppAttributes,  
    final int minSuppConditions)
```

Zusammenfassung

- ▶ Algorithmus zum Clustern triadischer Daten
- ▶ Zusammenführung von triadischer Begriffsanalyse und Frequent-Closed-Itemset-Mining
- ▶ neue Impulse zur Analyse multi-dimensionaler Daten durch Folksonomien
- ▶ fehlende Visualisierungsmöglichkeit
- ▶ weitere Referenzen:

<http://www.bibsonomy.org/tag/fca>

Agenda

Triadische FBA mit TRIAS

Merkmalsexploration im Web

ConExp-NG

Motivation

Concept Explorer

Files Help

Update: Clear dependent

Document

Countries in_E...
 Context

Parameter Value

Show arrow rel...	don't show
Compressed	<input type="checkbox"/>
Object count	3
Attribute count	4

A B C D E

	NATO	EU	Euro	Schengen
Czech Re...	X	X		X
Norway	X	X		X
Germany	X	X	X	X

Context Editor

Motivation

Concept Explorer

Files Help

Document

Countries in_E...
Context

Parameter Value
Show arrow rel... don't show
Compressed
Object count 3
Attribute count 4

A B C D E
NATO EU Euro Schengen
Czech Re... X X X
Norway X X X
Germany X X X X X

Confirm or reject implication

? Is it true, that all objects have attribute(s) NATO , Schengen?

Yes No Stop Attribute Exploration

CONTEXT EDITOR

The screenshot shows the Concept Explorer application window. In the center, there's a context editor dialog titled "Confirm or reject implication". It contains a question mark icon and the text "Is it true, that all objects have attribute(s) NATO , Schengen?". Below the question are three buttons: "Yes", "No", and "Stop Attribute Exploration". The background shows a grid of countries and their attributes: NATO, EU, Euro, and Schengen. The grid has columns labeled A through E and rows for Czech Republic, Norway, and Germany. The "NATO" column has a checkmark for Czech Republic and Norway, and an X for Germany. The "EU" column has a checkmark for all three. The "Euro" column has a checkmark for Germany. The "Schengen" column has a checkmark for Norway and Germany, and an X for Czech Republic.

Motivation

Concept Explorer

Files Help

Update: Clear dependent

Document

Countries_in_E...

Context

Parameter Value

Show arrow rel... don't show

Compressed

Object count 3

Attribute count 4

	A	B	C	D	E
NATO					
Czech Re...	X		X		X
Norway	X				
Germany	X		X	X	X
Switzerland					
Ukraine	X				
Vatican			X	X	X

Confirm or reject implication

?

Is it true, that when object has attribute(s) Euro, that it also has attribute(s) Schengen?

Yes No Stop Attribute Exploration

Context Editor

Motivation

Wie können wir Merkmalsexploration im Web unterstützen?

- ▶ Merkmalsexploration typischerweise durch Experten
- ▶ große Menge an Information im Web verfügbar
- ▶ (und auch viele Experten)
- ▶ Wie können wir diese Ressourcen zur Unterstützung der Experten nutzen?
 - ▶ beim Finden von Gegenbeispielen
 - ▶ beim Bereitstellen von Kontext

Merkmalsexploration

Grundbegriffe:

- ▶ Formaler Kontext $\mathbb{K} := (G, M, I)$
- ▶ eine *Implikation* $L \rightarrow R$ (für $L, R \subseteq M$) gilt in \mathbb{K} , gdw. jeder Gegenstand mit allen Merkmalen aus L auch alle Merkmale aus R hat
- ▶ ein Gegenstand c widerlegt eine Implikation $L \rightarrow R$, gdw. $L \subseteq c'$ aber $R \not\subseteq c'$ (d.h., es gibt ein $m \in R$ mit $m \notin c'$)

Merkmalsexploration ist dann:

- ▶ Berechnung aller geltenden Implikationen
- ▶ für jede neue Implikation $L \rightarrow R$, Experten fragen, ob $L \rightarrow R$ gilt (dann $L \rightarrow R$ hinzufügen), oder $L \rightarrow R$ durch Gegenbeispiel c widerlegt wird (dann \mathbb{K} um c erweitern)

Ansatz

1. Implikationen in Anfragen bzw. Anfragemengen umformen
2. Anfragen an System stellen und Experten Ergebnis zeigen
3. Experten entscheiden lassen, ob Implikation gilt oder nicht

Das Web ist groß, es gibt viele Möglichkeiten für Anfragen.

→ Wir fokussieren auf: Social Question Answering,
Crowdsourcing, Linked Open Data, Web-Suche.

Wie die Anfragen stellen?

Abstrakte Anfrage-Strategie

Annahme: die meisten Informationen im Web sind *faktisch*, d.h., Informationen über Gegenstände und ihre Merkmale

aber: Implikationen sind *terminologisches* Wissen, welches deutlich seltener und schwerer zu finden ist

Ansatz: Suche nach *Gegenbeispielen*, d.h., faktischem Wissen

William Shakespeare



The [Chandos portrait](#), artist and authenticity unconfirmed. National Portrait Gallery, London.

Born	Baptised 26 April 1564 (birth date unknown) Stratford-upon-Avon, Warwickshire, England
Died	23 April 1616 (aged 52) Stratford-upon-Avon, Warwickshire, England
Occupation	Playwright, poet, actor
Period	English Renaissance
Spouse	Anne Hathaway (m. 1582–1616)
Children	Susanna Hall Hamnet Shakespeare Judith Quiney
Relatives	John Shakespeare (father) Mary Shakespeare (mother)
Signature	

Abstrakte Anfragestrategie

- ▶ $\varphi[x]$: Instanz-Anfrage in einer spezifischen *Anfragesprache*
- ▶ $Ans(\varphi[x])$: Menge der Gegenstände d für die $\varphi[d]$ wahr ist
- ▶ Anfrage $q[x]$ für ein Gegenbeispiel von $L \rightarrow R$:

$$q[x] := \bigwedge_{l \in L} \varphi_l[x] \wedge \bigvee_{r \in R} \neg \varphi_r[x]$$

- ▶ alternativ: $Q = \{q_r[x] \mid r \in R\}$ mit

$$q_r[x] := \bigwedge_{l \in L} \varphi_l[x] \wedge \neg \varphi_r[x]$$

dann

$$Ans(q[x]) = \bigcup_{q_r \in Q} Ans(q_r[x])$$

Social Question Answering/Crowdsourcing

The screenshot shows the Yahoo! Answers homepage. At the top, there are links for 'New User? Register' and 'Sign In'. On the right, there are links for 'Make Y! My Homepage', 'Mail', 'My Y!', and 'Yahoo!' with a bell icon. Below the header, there's a search bar with a magnifying glass icon and a 'Search Web' button. The main navigation menu includes 'HOME', 'BROWSE CATEGORIES', and 'ABOUT'. Below the menu, there are three large buttons: 'Ask' (with a question mark icon), 'Answer' (with a smiley face icon), and 'Discover' (with an exclamation mark icon). A search bar with the placeholder 'What are you looking for?' is positioned below these buttons. To the right of the search bar are 'Search Y! Answers' and 'Advanced Search' links.

Home > All Categories > Education & Reference > Homework Help > Resolved Question

A screenshot of a resolved question on Yahoo! Answers. The question is titled 'Resolved Question' and asks 'What are the member countries of NATO and the Warsaw Pact?'. It is posted by a user named 'Simplici...' with a small profile picture. The question has received several responses. One response, which appears to be the accepted answer, is from a user named 'I have to do a map project for history class over winter break. Part of the project is coloring in which countries are a part of NATO and which ones are a part of the Warsaw Pact. After googling it, I found out that some countries left the Warsaw Pact for NATO and that other countries formed in the former USSR territory. So do I label the countries that were part of the USSR as part of the Warsaw Pact even though they were just part of the country then? Also where do I place the countries that left the'.

Idee: Anfrage an andere Experten weiterleiten

- ▶ Social Question Answering (z.B. StackExchange, Yahoo! Answers)

Social Question Answering/Crowdsourcing

The screenshot shows the Amazon Mechanical Turk interface. At the top, there's a banner for 'Artificial Artificial Intelligence'. Navigation tabs include 'Your Account', 'HITS', 'Qualifications', and a highlighted '281,213 HITS available now'. A sign-in link is at the top right. Below the banner, a search bar allows filtering by 'Find HITs containing country' and includes checkboxes for filters like 'for which you are' and 'require Master Qu...'. A main heading says 'All HITs | HITs Available To You | HITs Assigned To You'. The search results for 'HITs containing 'country'' show two results:

- Requester: Stephen Morison** | **HIT Expiration Date:** May 22, 2013 (17 hours 47 minutes) | **Reward:** \$0.01
Time Allotted: 60 minutes | **HITs Available:** 2618
- Identify the Asian country: India, Pakistan, Iran, Tajikistan and Afghanistan** | **View a HIT in this group**
Requester: Aditya Kurve | **HIT Expiration Date:** May 30, 2013 (1 week 1 day) | **Reward:** \$0.25
Time Allotted: 60 minutes | **HITs Available:** 1

Idee: Anfrage an andere Experten weiterleiten

- ▶ Crowdsourcing (z.B. Amazon Mechanical Turk)

Social Question Answering/Crowdsourcing



Which country won the Eurovision?

Antworten Retweeten Favorisieren Mehr

9:40 PM - 18 Mai 13

Verpasse keine Updates von mary

Trete Twitter noch heute bei und folge Deinen Interessen!

Vor- und Zuname

E-Mail

Passwort

Registrieren

Idee: Anfrage an andere Experten weiterleiten

- ▶ andere Ansätze (z.B. E-Mail, (Micro-)Blog)

Linked Open Data Cloud

- ▶ Teil des *Semantic Web*
- ▶ große Wissensbasen wie Wikidata, YAGO oder DBpedia
- ▶ typischerweise Möglichkeit für *SPARQL*-Anfragen
- ▶ *Einschränkung*: noch vglw. begrenztes Wissen

SPARQL Explorer for <http://dbpedia.org/sparql>

```
SELECT DISTINCT ?country WHERE {
  ?country dcs:subject dbc:European_countries . OPTIONAL {
    ?y dcs:subject dbc:Member_states_of_NATO . FILTER (?country = ?y) . } FILTER
  (!BOUND(?y)) }
  UNION
```

Results: [Browse](#) | [Go!](#) | [Reset](#)

SPARQL results:

country
:Cyprus
:Georgia_(country)
:Turkey

Web-Suchmaschinen

Annahmen:

1. Viele Webseiten beschreiben einzelne Gegenstände.
2. Für jedes Merkmal gibt es einen Suchbegriff, dessen Vorkommen in einer Webseite ein guter Indikator dafür ist, dass der beschriebene Gegenstand das Merkmal hat.
3. Ebenso ist die Abwesenheit eines Suchbegriffes ein guter Indikator dafür, dass der Gegenstand das Merkmal nicht hat.

Web-Suchmaschinen

Für eine Implikation $L \rightarrow R$ stellen wir für jedes $r \in R$ die Anfrage

$$q_r[x] := +l_1 \cup l_2 \cup \dots \cup l_{|L|} \cup -r$$

und zeigen den Experten die Ergebnisliste

zusätzlich Einschränkungen möglich auf:

- ▶ Gegenstandsdomäne d : $q_r[x] := +d \cup l_1 \cup l_2 \cup \dots \cup l_{|L|} \cup -r$
- ▶ Website s : $q_r[x] := +\text{site}:s \cup l_1 \cup l_2 \cup \dots \cup l_{|L|} \cup -r$

Implementierung

- ▶ Java-basierter Prototyp (Web-Anwendung)
- ▶ nutzt die FCAlib-Implementierung von NEXT CLOSURE
- ▶ Anfragen an Microsofts Bing-API
- ▶ [http://github.com/fcatools/
web-attribute-exploration](http://github.com/fcatools/web-attribute-exploration)

Beispiel

	NATO	EU	Euro	Schengen
Czech Republik	×	×		×
Norway	×			×
Germany	×	×	×	×

Erste Implikation ist $\emptyset \rightarrow \{\text{NATO, Schengen}\}$

- ▶ Anfragen:
 - NATO
 - Schengen
- ▶ aber: Suchmaschinen unterstützen reine Negation nicht
- ▶ daher: Hinzufügen der Domäne “Countries in Europe”:
 - + ‘Countries in Europe’ -NATO
 - + ‘Countries in Europe’ -Schengen

Beispiel

1. [Countries of Europe - Geography Home Page - Geography at About.com](http://geography.about.com/library/maps/breurope.htm)
<http://geography.about.com/library/maps/breurope.htm>
The countries of Europe.: city geography europe maps serbia and montenegro bosnia and herzegovina countries of europe
2. [European Countries](http://www.aneki.com/europe.html)
<http://www.aneki.com/europe.html>
List of Countries in Europe with maps, statistics, and country comparisons of all the European Nations
3. [Countries in Europe - YouTube](http://www.youtube.com/watch?v=k2AMN0L-rfk)
<http://www.youtube.com/watch?v=k2AMN0L-rfk>
This video includes all the countries in Europe except Vaticana,Monaco, San Marino, Andora, Liechtenstein, Malta . I hope it will be helpful. The song is aria ...
4. [ESL - English Exercises: Countries in Europe](http://www.englishexercises.org/exercise.asp?id=8524)
<http://www.englishexercises.org/exercise.asp?id=8524>
Fullscreen: Countries in Europe by robirimi. Date: 30 - Sep - 2012 Level: elementary Age: 8-11. Description: Three exercises about Italy, Germany, France, Spain ...
5. [List of countries in EUROPE, list of countries of EUROPE, European ...](http://www.countries-of-the-world.com/countries-of-europe.html)
<http://www.countries-of-the-world.com/countries-of-europe.html>
Europe is unique continent which is not surrounded by water from all directions, and has overland border with the neighbouring continent Asia. Definition of correct ...
6. [Pages Europe, Europe Yellow Pages, Europe Business Directory ...](http://pageseurope.com/)
<http://pageseurope.com/>
... Europe Hotels, All Inclusive Europe, Europe Real Estate, Travel to Europe, European Vacations, Jobs in Europe, Map of Europe, European Football, Countries in Europe
7. [Countries in EUROPE - Cost of Living City to City](http://www.earthcosts.com/countries-europe/)
<http://www.earthcosts.com/countries-europe/>
New posts: Hot thread with new posts: No new posts: Hot thread with no new posts: Thread is closed
8. [The Largest Countries in Europe | Infoplease.com](http://www.infoplease.com/askeds/largest-countries-europe.html)
<http://www.infoplease.com/askeds/largest-countries-europe.html>
The Question: According to your info Sweden is the fourth largest country in Europe. Which are the three bigger ones?
9. [How Many Countries are there in Europe? - Buzzle](http://www.buzzle.com/articles/how-many-countries-in-europe.html)
<http://www.buzzle.com/articles/how-many-countries-in-europe.html>
Europe is one of the most beautiful continents in the world, with a variety of countries and cultures in its fold. Wondering how many countries are there ...
10. [Richest Countries in Europe](http://www.aneki.com/europe_richest.html)
http://www.aneki.com/europe_richest.html
List of the richest countries in Europe ... Plutocrats: The Rise of the New Global Super-Rich and the Fall of Everyone Else

→ Hinzufügen der Einschränkung auf en.wikipedia.org:

- + 'Countries in Europe' +site:en.wikipedia.org -NATO
- + 'Countries in Europe' +site:en.wikipedia.org
- Schengen

Beispiel

Web-Based Attribute Exploration

Formal Context

Countries in Europe	NATO	EU	Euro	Schengen
Czech Republic	x	x		x
Norway	x			x
Germany	x	x	x	x

change context

Attribute Exploration

The current implication is: [] \Rightarrow [Schengen, NATO].

You can either accept it or provide a counterexample:

	NATO	EU	Euro	Schengen
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Can you find a counterexample within the following web search results?

1. +"Countries in Europe" -"Schengen" site:en.wikipedia.org
 2. +"Countries in Europe" -"NATO" site:en.wikipedia.org

+ "Countries in Europe" - "Schengen" site:en.wikipedia.org

custom search

- 1. [Former countries in Europe after 1815 - Wikipedia, the free ...](http://en.wikipedia.org/wiki/Former_countries_in_Europe_after_1815)
This article gives a detailed listing of all the countries, (including puppet states), that have existed in Europe since the Congress of Vienna in 1815 to the present ...
 - 2. [Category:Former countries in Europe - Wikipedia, the free encyclopedia](http://en.wikipedia.org/wiki/Category:Former_countries_in_Europe)
Former countries in Europe after 1815; List of early East Slavic states; List of East Slavic duchies; List of historic states of Germany; List of historic states of Italy
 - 3. [Category:Countries in Europe - Wikipedia, the free encyclopedia](http://en.wikipedia.org/wiki/Category:Countries_in_Europe)
Subcategories. This category has the following 58 subcategories, out of 58 total.
 - 4. [List of national capitals of countries in Europe by area ...](http://en.wikipedia.org/wiki/List_of_national_capitals_of_countries_in_Europe_by_area)
This list includes the Capitals of European countries by area. The chart is below. Rank City Country Area (km²) 1. Ankara Turkey 70032516000000000000 2,516 ...
 - 5. [List of sovereign states and dependent territories by population ...](http://en.wikipedia.org/wiki/Largest_countries_in_Europe)

Beispiel

Web-Based Attribute Exploration

Formal Context

Countries in Europe	NATO	EU	Euro	Schengen
Czech Republic	x	x		x
Norway	x			x
Germany	x	x	x	x

[change context](#)

Attribute Exploration

The current implication is: [] \Rightarrow [Schengen, NATO].

You can either [accept](#) it or [provide a counterexample](#) :

	NATO	EU	Euro	Schengen
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Can you find a find a counterexample within the following web search results?

1. +"**Countries in Europe**" -"Schengen" site:en.wikipedia.org
2. [+"Countries in Europe" -"NATO" site:en.wikipedia.org](#)

[+"Countries in Europe" -"Schengen" site:en.wikipedia.org](#)

[custom search](#)

Beispiel

Can you find a counterexample within the following web search results?

1. **+ "Countries in Europe" - "Schengen" site:en.wikipedia.org**
2. [+"Countries in Europe" - "NATO" site:en.wikipedia.org](#)

+"Countries in Europe" - "Schengen" site:en.wikipedia.org

custom search

1. [Former countries in Europe after 1815 - Wikipedia, the free ...](#)

http://en.wikipedia.org/wiki/Former_countries_in_Europe_after_1815

This article gives a detailed listing of all the countries, (including puppet states), that have existed in Europe since the Congress of Vienna in 1815 to the present ...

2. [Category:Former countries in Europe - Wikipedia, the free encyclopedia](#)

http://en.wikipedia.org/wiki/Category:Former_countries_in_Europe

Former countries in Europe after 1815; List of early East Slavic states; List of East Slavic duchies; List of historic states of Germany; List of historic states of Italy

3. [Category:Countries in Europe - Wikipedia, the free encyclopedia](#)

http://en.wikipedia.org/wiki/Category:Countries_in_Europe

Subcategories. This category has the following 58 subcategories, out of 58 total.

4. [List of national capitals of countries in Europe by area ...](#)

http://en.wikipedia.org/wiki/List_of_national_capitals_of_countries_in_Europe_by_area

This list includes the capitals of European countries by area. The chart is below. Rank City Country Area (km²) 1. Ankara Turkey 70032516000000000000 2,516 ...

5. [List of sovereign states and dependent territories by population ...](#)

http://en.wikipedia.org/wiki/Largest_countries_in_Europe

Beispiel

Warum sind keine Länder unter den ersten Ergebnissen?

- ▶ Abgleich nur mit dem *Text* der Webseiten
→ Einschränkung auf Domäne wirkungslos
- ▶ Seiten mit Suchbegriffen im Titel werden höher bewertet
- ▶ *Bewertung durch PageRank* bevorzugt Seiten mit vielen eingehenden Links

Warum fehlen Länder, die Gegenbeispiele wären?

Warum werden Länder zurückgegeben, die keine Gegenbeispiele sind??

→ beschränkte Gültigkeit der Annahmen 2 und 3:

- ▶ Webseiten *enthalten nicht* immer die Wörter entsprechend den Merkmalen der Gegenstände, die sie beschreiben
- ▶ Webseiten *enthalten manchmal* Wörter entsprechend Merkmalen die die Gegenstände, die sie beschreiben, *nicht haben*

Schlussfolgerung

- ▶ Gegenbeispiele zu *finden ist schwierig*, oft auch für menschliche Experten
- ▶ vorgeschlagener Ansatz
 - ▶ ist *eingeschränkt anwendbar* für Web-Suche,
 - ▶ könnte nützlich sein zur *Exploration von Linked Open Data*,
 - ▶ oder zur Fehlersuche
- ▶ Generelles Problem der *Open World Assumption*

Schlussfolgerung

Einige der Probleme könnten gelöst werden durch

- ▶ mehr Informationen zu Gegenständen + Merkmalen
- ▶ Kombination der Quellen (1. Linked Open Data, 2. Web-Suche, 3. Crowdsourcing/Social Question Answering)
- ▶ weitergehende Analyse der gefundenen Seiten
- ▶ Warten auf bessere Wissensbasen ;-)

Agenda

Triadische FBA mit TRIAS

Merkmalsexploration im Web

ConExp-NG

Motivation

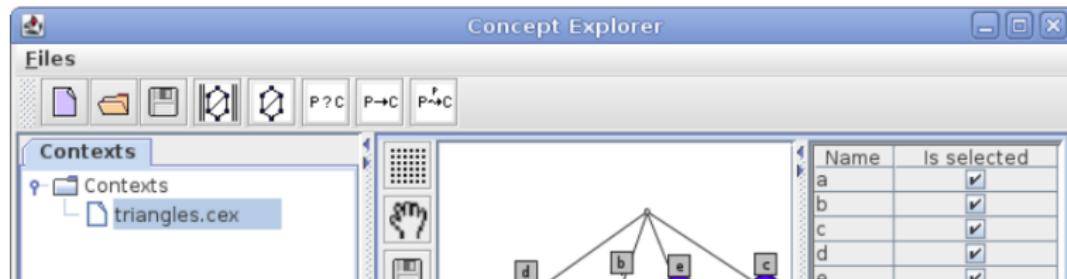
Vektorgraphik für ConExp

Mittels [Formaler Begriffsanalyse](#) kann man Begriffe und Begriffshierarchien aus Daten gewinnen. Ein dazu oft verwendetes Werkzeug ist der [Concept Explorer](#) (ConExp) - ein Java-Programm zum Eingeben von Kontexten sowie zum Analysieren und Visualisieren von Begriffsverbänden.

Ziel dieser Arbeit ist es, ConExp um einen Vektorgraphik-Export zu erweitern, so dass die damit gezeichneten Begriffsverbände weiterverwendet werden können. Dabei kommen insbesondere die Formate PostScript, PDF und LaTeX in Frage. Des weiteren soll ein XML-basiertes Export-Format entwickelt und implementiert sowie ggf. weitere notwendige Anpassungen vorgenommen werden.

Vorwissen über [Formale Begriffsanalyse](#) ist empfehlenswert aber nicht notwendig. Gute Java-Kenntnisse, insbesondere in der GUI-Programmierung sind von Vorteil.

Kontakt: [Robert Jäschke](#)

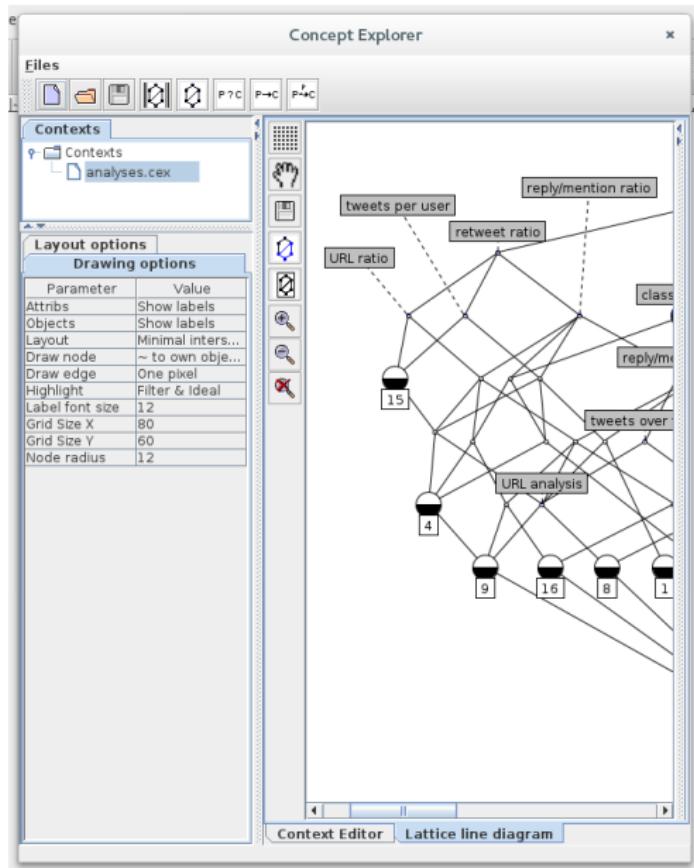


http://www.kbs.uni-hannover.de/~jaeschke/2013/02/19/Vektorgraphik_fuer_ConExp.html

Motivation

ConExp sehr beliebt, aber

- ▶ fehlender Vektorgrafikexport
- ▶ nicht modular
- ▶ schwierig zu erweitern



Motivation

vorhanden: FCAlib von Barış Sertkaya

- ▶ Java-Implementierung einer Bibliothek für FBA
- ▶ Klassenstruktur für Kontexte, Gegenstände, Begriffe, Implikationen, Hüllenoperatoren, Merkmalsexploration, Experten, etc.
- ▶ Implementierung von Next Closure für Merkmalsexploration
- ▶ modular, erweiterbar, gut wartbar
- ▶ <http://github.com/fcatools/fcalib>

hinzukamen:

- ▶ Daniel Borchmann: conexp-clj benötigt Visualisierung
- ▶ drei sehr motivierte Studierende

Entwicklungsphasen

04/2013–08/2013 Studentenprojekt

- ▶ modularer Aufbau
- ▶ Re-Implementierung der vorhandenen Features
- ▶ Reverse-Engineering/Neuimplementierung
Visualisierung

10/2013–02/2014 Studentenprojekt

- ▶ deutliche Verbesserungen und Bereinigungen

03/2014–03/2015 studentische Hilfskraft

- ▶ weitere Verbesserungen

Architektur

Wiederverwendung vorhandener Bibliotheken:

FCAlib: Datenstrukturen, Next Closure

Batik: Vektorgraphik (SVG, EPS, PDF)

WebLaF: GUI

moderne Softwareentwicklung:

- ▶ Maven
- ▶ GitHub

(<https://github.com/fcatools/conexp-ng>)

Features

ConExp-NG - "/home/rja/untitled.cex"

Context Editor

	female	juvenile	adult	male
girl	X	X		
woman	X		X	
boy		X		X
man			X	X

Confirm or reject implication

Is it true, that when an object has attribute(s) juvenile, adult, that it also has attribute(s) female, male?

Yes No Stop Attribute Exploration

The screenshot shows the ConExp-NG application window titled "ConExp-NG - '/home/rja/untitled.cex'". The main area is labeled "Context Editor" and contains a table with four columns: "female", "juvenile", "adult", and "male". The rows represent objects: "girl", "woman", "boy", and "man". The "girl" and "woman" rows have "X" marks in the "female" and "juvenile" columns. The "boy" row has an "X" mark in the "juvenile" column. The "man" row has "X" marks in the "adult" and "male" columns. A vertical toolbar on the left side contains various icons for file operations and editing. A modal dialog box is displayed in the center, asking "Is it true, that when an object has attribute(s) juvenile, adult, that it also has attribute(s) female, male?". It includes three buttons: "Yes", "No", and "Stop Attribute Exploration".

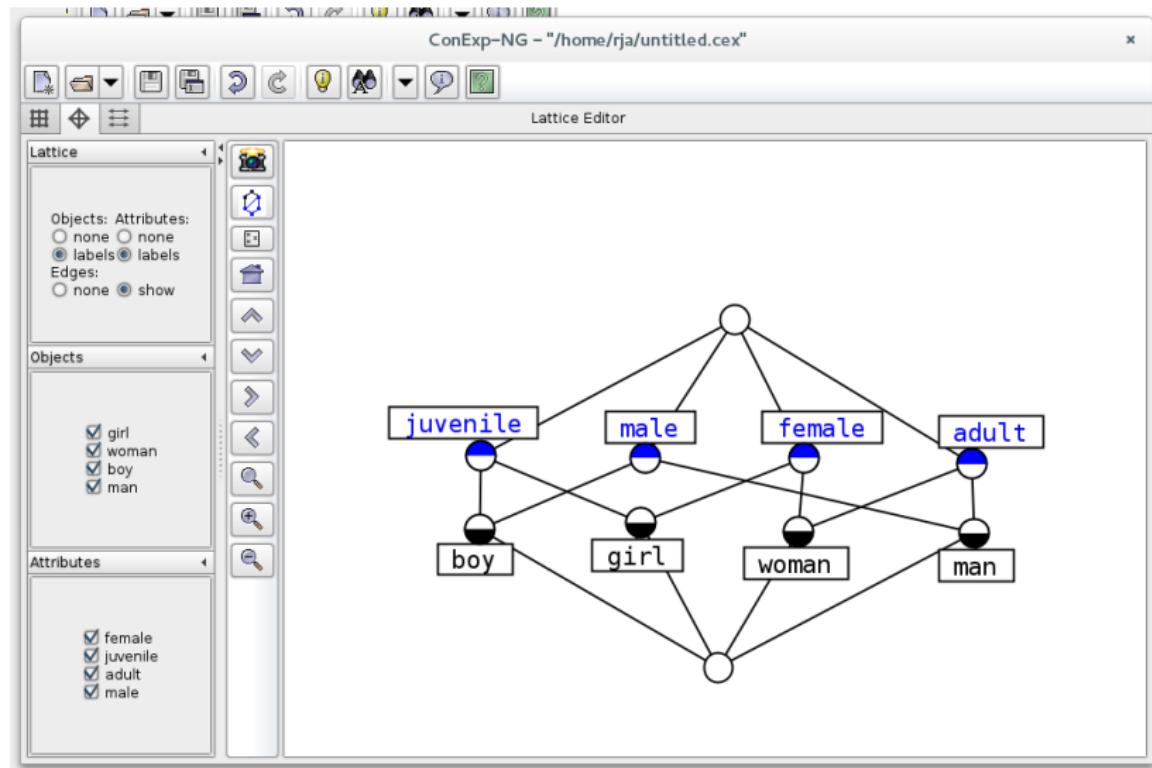
Features

ConExp-NG - "/home/rja/untitled.cex"

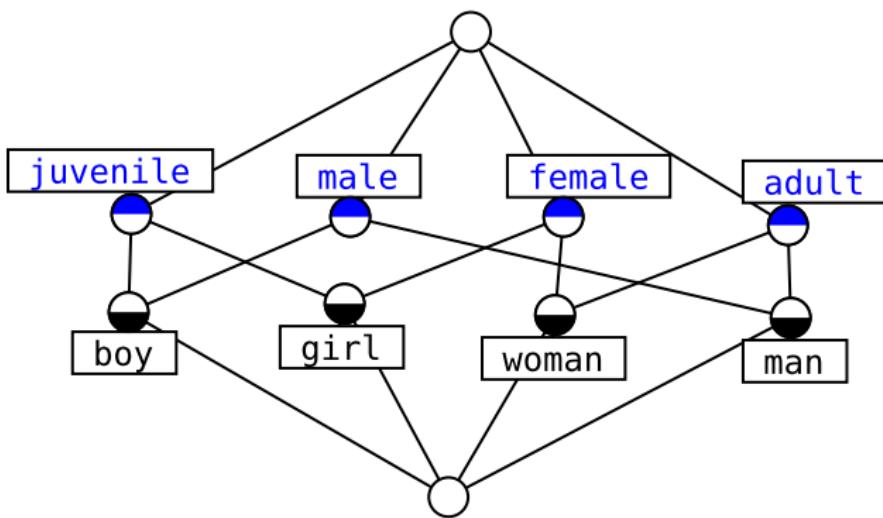
The screenshot shows the ConExp-NG application window titled "ConExp-NG - "/home/rja/untitled.cex"". The interface includes a toolbar with various icons, a main menu bar, and several panes. On the left, there's a panel for "Association Settings" with sliders for "Support" (set to 0.3) and "Confidence" (set to 0.5), and a large green circular icon below it. Below the settings are two lines of text: "#Association rules = 4" and "#With support = 4". Underneath these, there are sections for "Together With Implications" and "Sorted By:" with radio button options for "Alphabetical Order" and "Support" (which is selected). The right side of the window contains two code editor panes. The top pane is titled "Implications (Duquenne-Guigues Base/Stem Base)" and contains the following rule:
0< 0 > {juvenile, adult} ==> {female, male};
1< 0 > {female, male} ==> {adult, juvenile};

The bottom pane is titled "Associations (Luxenburger Base)" and contains the following rule:
1< 4 > [] =[0.5]>< 2 > [adult];
2< 4 > [] =[0.5]>< 2 > [female];
3< 4 > [] =[0.5]>< 2 > [juvenile];
4< 4 > [] =[0.5]>< 2 > [male];

Features



Features



Status und Ausblick

- ▶ grundlegende Funktionalität vorhanden
- ▶ gute Ausgangsbasis für Weiterentwicklung
- ▶ notwendige Verbesserungen
 - ▶ Optionen für Verbandsvisualisierung
 - ▶ Layoutalgorithmen
 - ▶ Dateiformate
 - ▶ Separation in Bibliotheken
- ▶ eigene Ideen hinzufügen:
<http://github.com/fcatools/conexp-ng/issues>

Stand 2016

[https://github.com/fcatools:](https://github.com/fcatools)

- ▶ FCAlib
- ▶ ConExp-FX
- ▶ conexp-clj
- ▶ ConExp-NG
- ▶ Trias



<http://www.upriss.org.uk/fca/fcasoftware.html>

Dank an



- ▶ Gerd Stumme, Andreas Hotho, Bernhard Ganter,
Sebastian Rudolph & Christoph Schmitz
- ▶ das Team von ConExp-NG: Torsten Casselt, Eugen Kiss,
Jan Kassel & David Bormann
- ▶ Daniel Borchmann & Johannes Wollbold