

End of Intern Presentation by Qi,
2009 @ com.sap.cis.tt

Topic Tracker

SYSTEMATIC THOUGHT LEADERSHIP FOR INNOVATIVE BUSINESS



Topic Tracker Team

Qi Li,

Supervisor: Mia Ming Mao

Project Team: Topic Tracker @ Continuous Sense Making

Agenda



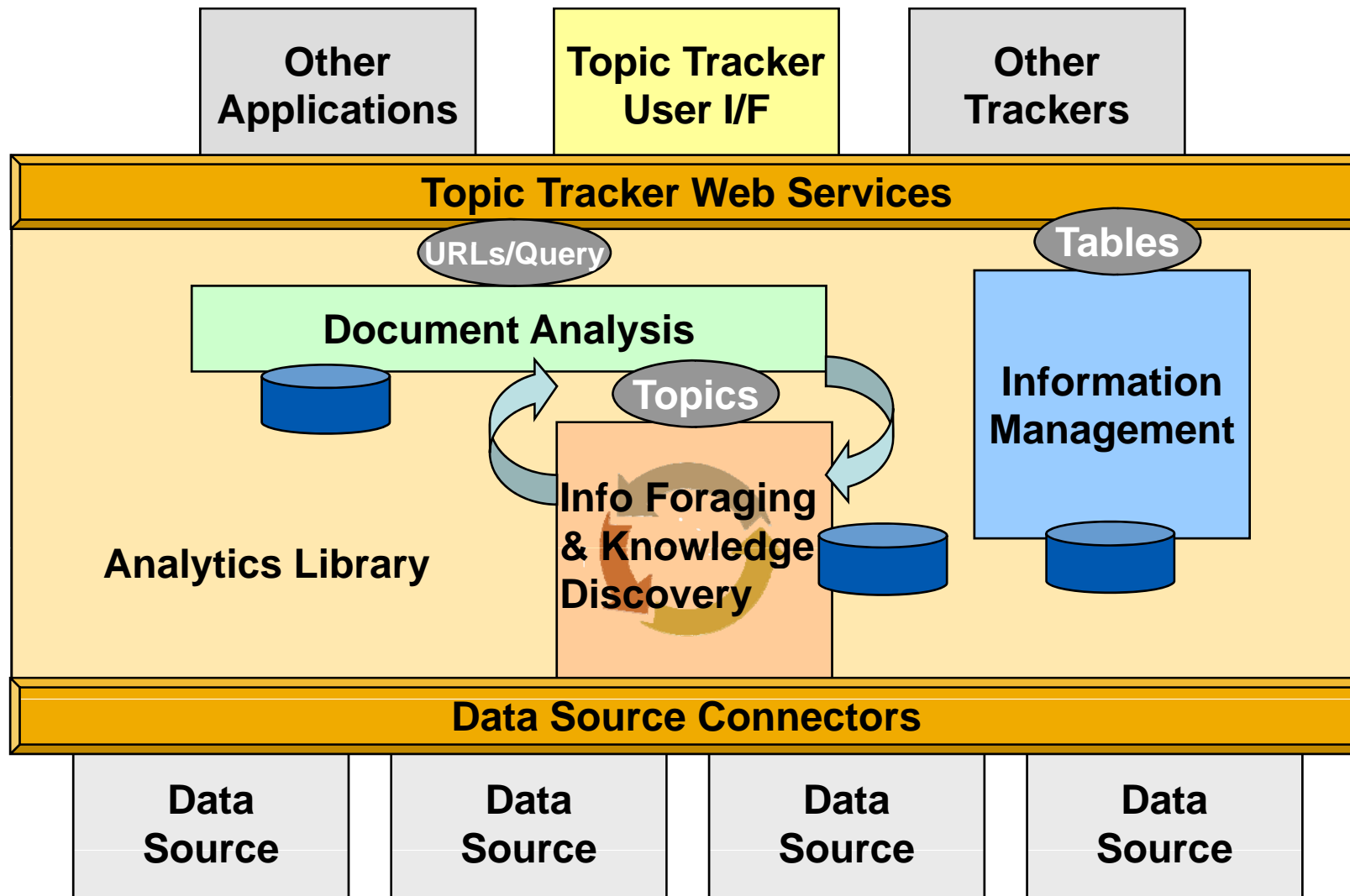
- **Overview of TT**
- **Topic Detection**
- **Relation Extraction from Knowledge Base**
- **RAPBE**
- **Conclusion**
- **Demo**

What is TT



- **Topic Tracker is a knowledge discovery and information summarization tool to provide Information Workers with automatic in-context analytical knowledge (e.g. Statistical, Relational and Classification).**
 - Identify the focus (i.e. major concepts called topics) of a text-based document
 - Continuously find and gather information from large and varied sources
 - Analyze available information from a statistical view
 - Annotate semantic relationships between key mentions
 - Mostly work on unstructured data but can integrate structured data such as SAP ERP data (i.e. DB1) as well

Topic Tracker Block Diagram



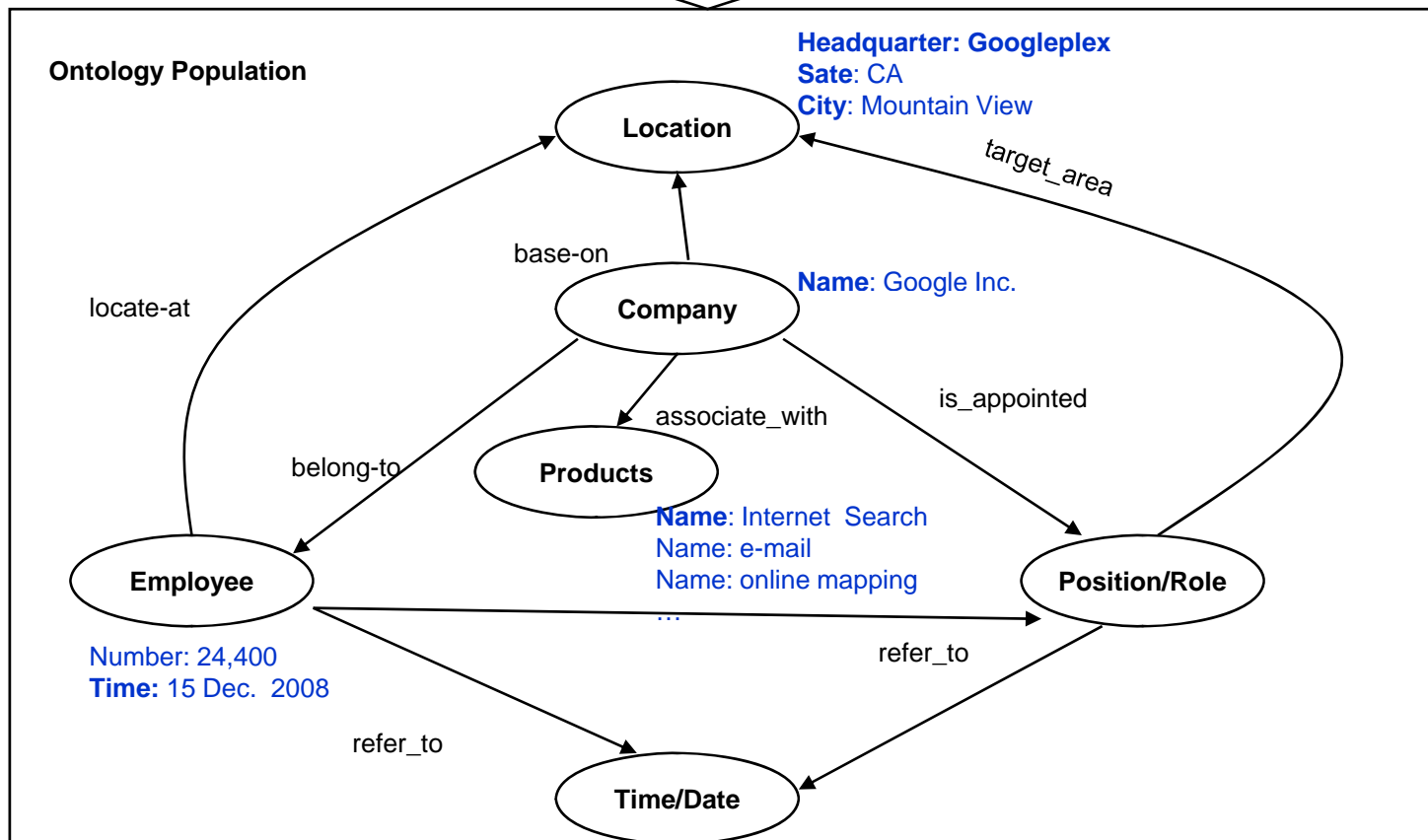
What Topic Tracker Can Do



- **Topic detection and community clustering** on one or multiple given documents
- Multiple data sources access
 - Internet search & documents retrieval
 - Specialized semi-structured data sources
 - Specialized vocabulary (aliases, code words, ...)
- Search results analysis
 - Entity, keywords and key phrase extraction
 - Statistics of entity occurrence and correlations
 - Relationship between entities and keywords/phrases
- Multiple parallel classifications
- Ongoing background search and analysis of large document collections

Google, Inc. is an American public corporation, earning revenue from advertising related to its Internet search, e-mail, online mapping, office productivity, social networking, and video sharing services as well as selling advertising-free versions of the same technologies. The Google headquarters, the Googleplex, is located in Mountain View, California. As of 15 December 2008, the company has 24,400 full-time employees.

-----Wikipedia



Extracting Relations using Structured Data



- Knowledge Base – Freebase
- What is the relationship of “Apple Inc.”, “iTune”, “iPod”, and “Steve Jobs”?

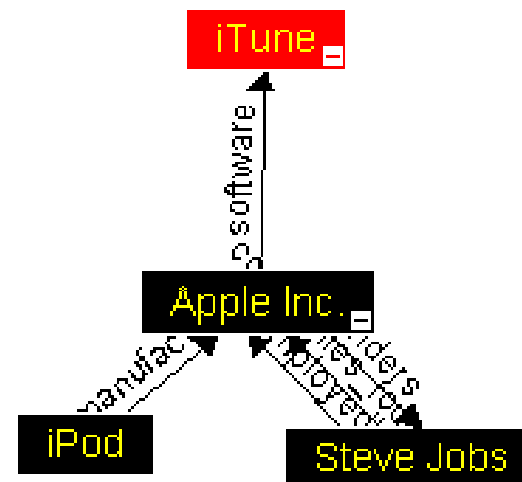
Apple Inc., software, iTune

Apple Inc., founders, Steve Jobs

iPod, manufacturer, Apple Inc.

Steve Jobs, companies_founded, Apple Inc.

Steve Jobs, employedby, Apple Inc.

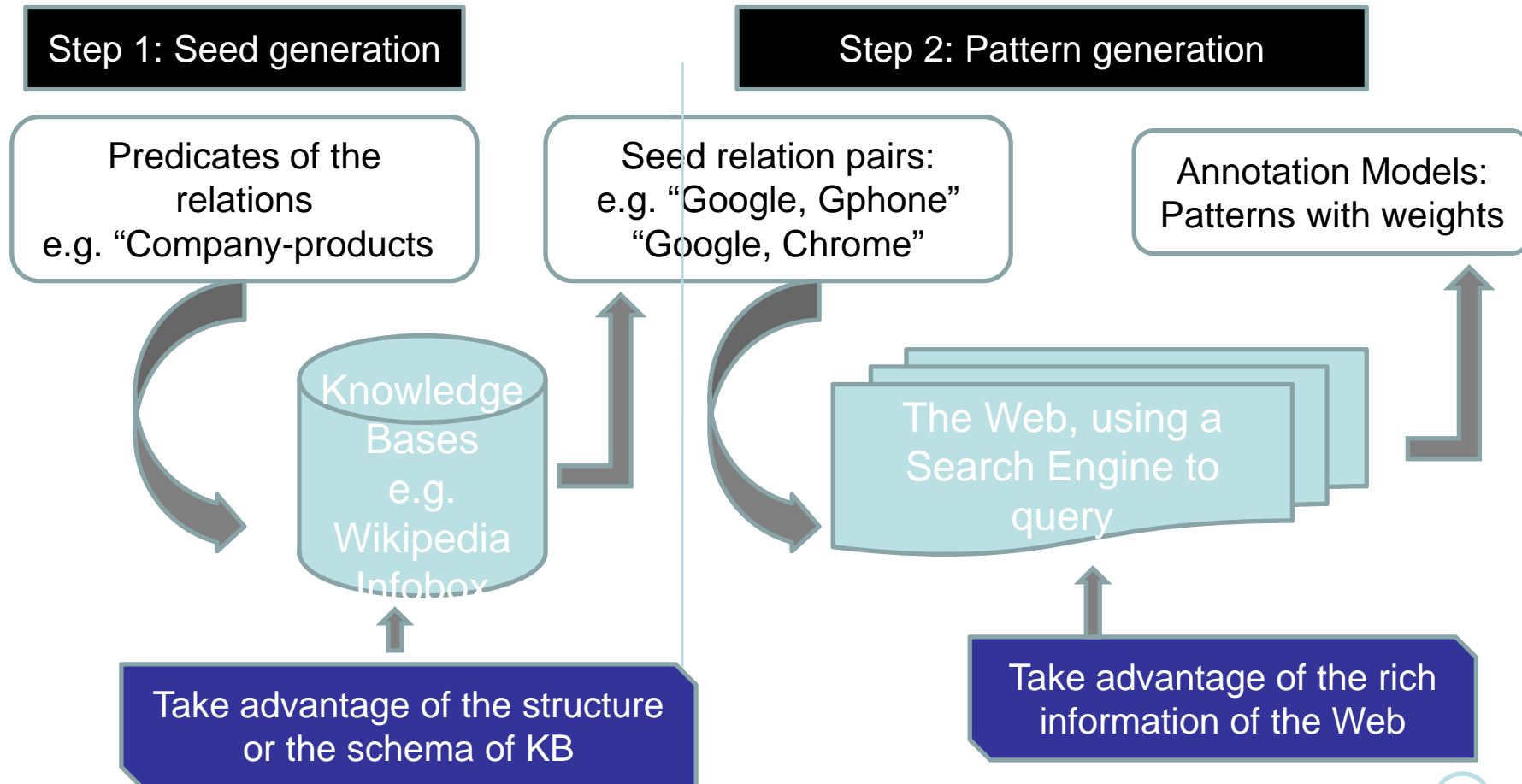




HWY
50

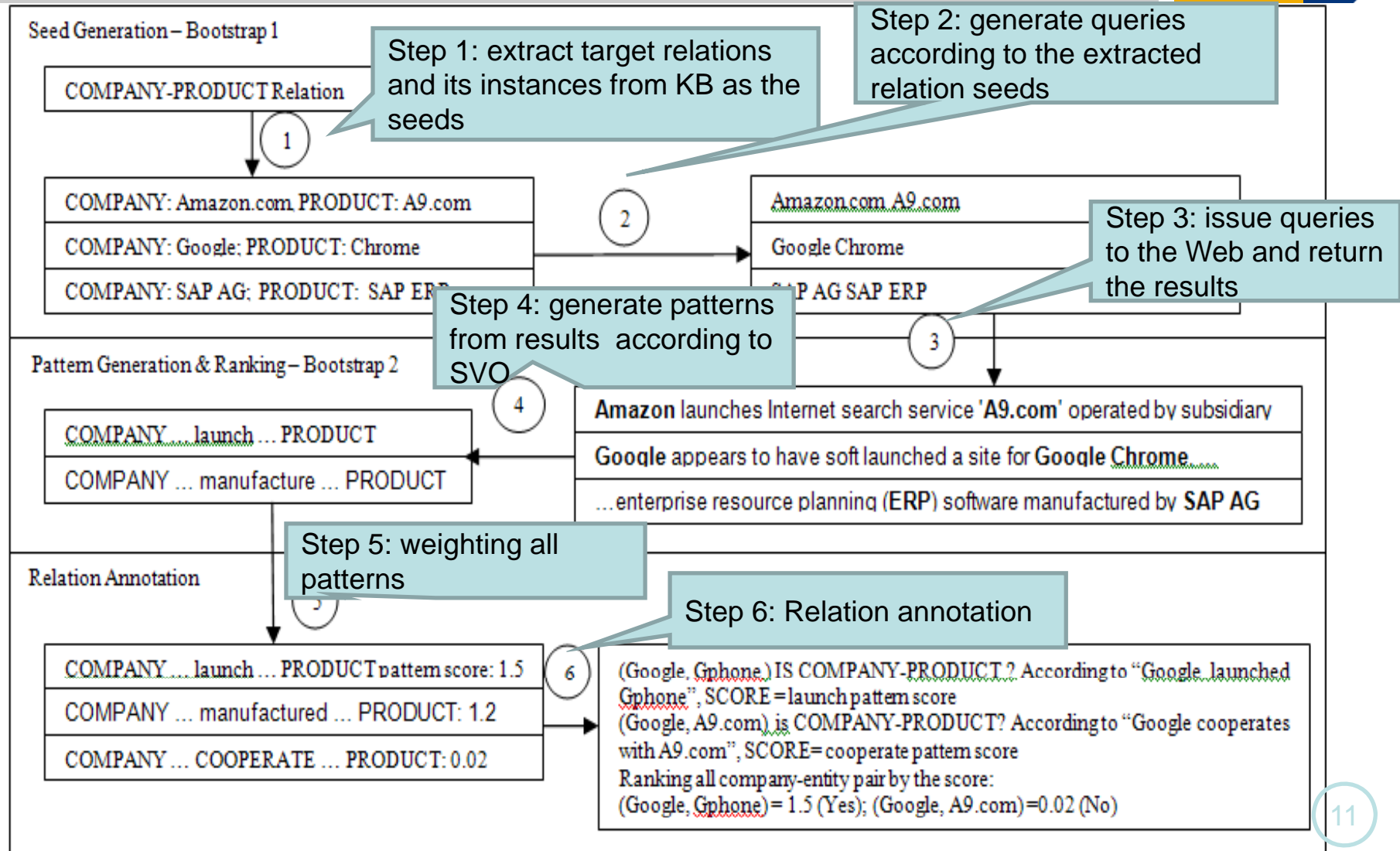
*The Loneliest Road
in America*

Combining Structured Data and Un-structured Data



10

RAPBE: Relation Annotation Platform in Business Environment



qili@sis.pitt.

edu

Five Weights

- Frequency Weight (FW)

$$FW(p) = \frac{|x, p, y|}{\sum_p |x, p, y|}$$

- Distance Weight (DW)

$$DW(p) = \frac{1}{\# \text{ of word between } (x, y)}$$

- Verb Distance Weight (VDW)

$$VDW(p) = \frac{1}{\# \text{ of word between } (p, y)}$$

- Frequency Distance Weight (FDW)

$$FDW(p) = DW(p) \times FW(p)$$

- Pointwise Mutual Information (PMI)

$$PMI \text{ Weight } (p) = \text{avg}_t \frac{pmt(t, p)}{\text{Max } pmt}$$

$$pmt(t, p) = \log \frac{|x_i, p, y_i|}{|x_i, y_i| |p|}$$

Experiment -- Set Up



- Sample Relations
 - Company-Location (C-L) : relations with identifiable entities
 - Company-Products (C-P): relations with a non-identifiable entity
- Named entity: Inxight LinguistX Platform from Business Object
<http://www.businessobjects.com/product/catalog/linguistx/>
- Testing Data Set:
 - 25 Wikipedia articles + 20 news from CNET
- Training Data Set:
 - C-L: 100 companies with 256 C-L pairs from Infobox;
 - C-P: 31 companies with 265 C-P pairs from Infobox.
- Search Engine: Yahoo!BOSS

Experiment Conclusion



- Relation Annotation Platform in Business Environments (RAPBE) for relation annotation using web mining techniques.
- Two-Step learning, seed generation and pattern generation.
- Five weights
- FW/FDW better for relations with identifiable entities
- DW/VDW better for relations with a non-identifiable entity

Conclusion



- Second Half Year
 - TT AIS Version
 - TT BI Version
 - Analysis Large File
 - Relation Annotation
 -
- What's more?

EEE09 @ Las Vegas



Two Papers



- Ming Mao, Thomas Heinzl, Keith Klemba, Qi Li, A Sensemaking-based Information Foraging and Summarization System in Business Environments, The 2009 International Conference on e-Learning, e-Business, Enterprise Information Systems, and e-Government
- Qi Li, Daqing He, Ming Mao, A Study of Relation Annotation in Business Environments Using Web Mining , Third IEEE International Conference on Semantic Computing, 2009



Acknowledge



- Mia Ming Mao
- CIS: Keith, Thomas, Cirrus, Ming
- AIS: Horse, Andreas, Max
- BI: Ronny
- Intern family
- SAP Labs

Live Demo

The SAP logo, consisting of the letters 'SAP' in white on a blue background, is positioned in the bottom right corner of a yellow rectangular area.

Topic Tracker @ SAP

V1.0

TT Service Interface and Result Summary



- Topic Tracker Document Analysis Diagnostic Interface
 - <http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/DocumentAnalysis.html>
- Topic Tracker Document Analysis Service
 - **Single document:**
 - <http://cis3.pal.sap.corp:8080/TopicTrackerBI/DocumentAnalysisServlet?Url=http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/ballmer.txt>
 - **Multiple documents:**
 - <http://cis3.pal.sap.corp:8080/TopicTrackerBI/DocumentAnalysisServlet?Url=http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/ballmer.txt;http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/berkshire.txt;http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/cashflow.txt;http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/NetIncome.txt>

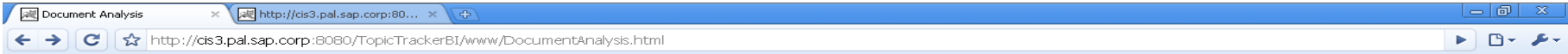
• Output

SelectionID	Iteration	Doc URL	Tool	Tool Attribute	Tool Version	Run Date	Run Time	Term	Relation	Term/Class	Freq	Classification Confidence	Term Significance in Doc	
1241542871718	0	http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/ballmer.txt	ThingFinder	Key Entity	4.2	5/12/2009	11:37:32	Steven A. Ballme	is_a	PERSON	1		10	100
1241542871718	0	http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/ballmer.txt	ThingFinder	Key Entity	4.2	5/12/2009	11:37:32	Microsoft	is_a	COMPANY	5		10	92
1241542871718	0	http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/ballmer.txt	ThingFinder	Key Entity	4.2	5/12/2009	11:37:32	Bill Gates	is_a	PERSON	2		10	56
1241542871718	0	http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/ballmer.txt	MCL	Community	1	5/12/2009	11:37:32	Steven A. Ballme	belongs_to	Community_0	1	0.949531581	3.236929	
1241542871718	0	http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/ballmer.txt	MCL	Community	1	5/12/2009	11:37:32	Bill Gates	belongs_to	Community_0	1	0.949531581	2.745539	
1241542871718	0	http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/ballmer.txt	MCL	Community	1	5/12/2009	11:37:32	Chief Executive C	belongs_to	Community_0	1	0.949531581	2.714843	
1241542871718	0	http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/ballmer.txt	MCL	Community	1	5/12/2009	11:37:32	fellow sophomore	belongs_to	Community_0	1	0.949531581	1.342964	
1241542871718	0	http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/ballmer.txt	MCL	Community	1	5/12/2009	11:37:32	assistant product	belongs_to	Community_0	1	0.949531581	1.342964	
1241542871718	0	http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/ballmer.txt	MCL	Community	1	5/12/2009	11:37:32	Microsoft	belongs_to	Community_0	1	0.949531581	0.987946	
1241542871718	0	http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/ballmer.txt	MCL	Community	1	5/12/2009	11:37:32	Gates	belongs_to	Community_0	1	0.949531581	0.922257	
1241542871718	0	http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/ballmer.txt	MCL	Community	1	5/12/2009	11:37:32	Harvard University	belongs_to	Community_1	1	0.335626251	0.716003	
1241542871718	0	http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/ballmer.txt	MCL	Community	1	5/12/2009	11:37:32	Harvard Crimson	belongs_to	Community_1	1	0.335626251	0.716003	
1241542871718	0	http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/ballmer.txt	MCL	Community	1	5/12/2009	11:37:32	football team	belongs_to	Community_1	1	0.335626251	0.626502	
1242153389079	0	http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/ballmer.txt	MCL_FreqToken	Topics	0.1	5/12/2009	11:37:32	Microsoft Gates	is_topic_of	Community_0	1	0.952945786		2
1242153389079	0	http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/ballmer.txt	MCL_MaxSig	Topics	0.1	5/12/2009	11:37:31	Steve Ballmer	is_topic_of	Community_0	1	0.952945786		3.236929
1242153389079	0	http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/ballmer.txt	MCL_FreqToken	Topics	0.1	5/12/2009	11:37:31	Harvard Football	is_topic_of	Community_1	1	0.335626251		1
1242153389079	0	http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/ballmer.txt	MCL_MaxSig	Topics	0.1	5/12/2009	11:37:31	Harvard University	is_topic_of	Community_1	1	0.335626251		0.716003
1241542871718	0	http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/ballmer.txt	Freebase	Relation	0.1	5/12/2009	11:37:32	Microsoft	founders	Bill Gates	1		1	148
1241542871718	0	http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/ballmer.txt	Freebase	Relation	0.1	5/12/2009	11:37:32	Microsoft	employee	Steve Ballmer	1		1	132

Questions and Comments



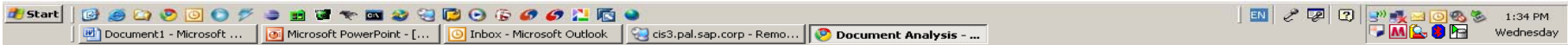
Thank you!



Document Analysis

Please input url for the plain text:

[Clean Up All Data in the server](#)





Document Analysis x http://cis3.pal.sap.corp:80... x

← → C ☆ http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/Translation.txt

Translation (Q13, Do you have any comments concerning SAP's software solutions?)
SAP solutions are very reliable & meets our needs & very robust in performance
They are reasonably robust, but very complex to use
we just started on production about one year ago & therefore we rate them low - we have the basic model
no
I understand that there should be greater flexibility in costs, according to the companies and the way they use SAP, so that it is not so costly.
We've had business in Armenia and there's no translation into Armenian yet. We are doing the upgrade from R/3 to ECC 6.0 with unicode, but we need to make Z developments for critical functions that must execute in that language, because that's what the business units require. For example we had to postpone the installation of the Banker solution in 2008 for that reason.
In the last year there wasn't a clear strategy for solutions.
N
We had had experience with implementing the project "Electronic Invoicing" we did with a partner recommended by SAP.
High quality standard solutions.
I hope the new version addresses a lot of solutions / limitations that our version has
There isn't a specific solution for our type of business, medical product distributor. There are processes that require windows that we don't have, we operate 7x24 with a very high volume of transactions. There is no handling of subdailies that would reduce the volume of transactions in accounting.
Public administration has specific characteristics which make it more difficult to adapt to manage the functions of the solution.
They should include public administration.
When recommending a SAP solution it is important to understand if the potential client can meet the "SAP costs" in a sustainable way, and whether they can get access to and retain sufficient numbers of trained staff.
- User-friendliness in need of improvement - in the Retail branch solution, some relevant functions are missing or only half-heartedly implemented (and thus not usable)
I can't find very much that is good about the SAP-BW from the technical viewpoint. In my view, SAP ERP 47-200 is a stable, fully developed product.
In recent times, newer products (Solman, ERP) have had lots of errors, and support packs are often full of mistakes. Solutions are often too complex, not very practicable (e.g. Solman CharM) and the "cutting together" to create what is useful in the company is very time-consuming. Customizing Docu. for particular scenarios can hardly be found any more, you have to attend a special SAP course and there are still things you need to know.
No
sap utilities does not really map the needs for district heating. We needed to develop it a lot ourselves.
The classic ERP areas are characterised by stability, functional maturity and integration. In the case of new products (e.g. SRM, HCM environment), this is no longer the case, and so we are thinking more about best of breed solutions and will probably change our software strategy in this direction.
The integration between Business Objects and SAP BI still needs a great deal of improvement. See our ongoing escalation
When it comes to E-Recruiting, generally poor support and extremely laborious implementation - some points raise the questions of whether handling was ever tested intensively; licensing policy (example: HCM Talent management) -> products which used to be contained in our licence contract (example: HCM Performance management) are no longer developed further - it is expensive to licence the successor to SAP/Nakisa and it costs more than twice the best-of-breed supplier which is at least as good, and they have already been in the market longer in this area -> how are we expected to explain and defend this type of behaviour from SAP within the company?
ECC6 is very hardware demanding
Most problems we had in the last years were concerning CRM-system (Performance,...). New netweaver systems (BI,Portal, PI) using Java Stack are very complicated and not easy to administrate. It would be nice to have a SAP-like administration cockpit for java and doublestack systems (monitoring, transport, systemadmin, patch-implementation).
None
Quality of the products and quality of further development is getting worse from month to month! --> Banana software--> the product ripens with the customer --> some standard functions were never called --> short dump after calling a standard transaction!
SAP PLM is certainly a future market. The basis is very good. However, further development in terms of user friendliness and more partner solutions would be a good idea.
Are of HR: billing of UZ/WR would be improved, more could be automated in BMVK, charging of EU amount autom.
ESS via portal compared with ESS via ITS is a step backwards in terms of user-friendliness!
For our company, it would be important to convert innovations into stable, reliable applications, which has not yet succeeded with BI 7.0 and CRM MSA 5.0.
IS-H: no innovative development steps; no further development in the product itself, but only via expensive additional modules (e.g. ACM). BI: insufficient AT-specific content in the area of IS-H, constant need for tuning in the area of performance. Reporting: no further development in core (only via BI)
Because of the variety of solutions, it is difficult to find the right combination. There are only a few qualified integration consultants.
more user-friendliness
Reliable, relatively old front-end (SAPGUI)
Sorting in planning folder must work as standard
The quality of development decreases with every new version. There have never been as many mistakes as there are in ERP 2005.
Use of new solutions in the industry components/standard made more difficult by additional programming due to missing functions in the past
As a mature site (10 years) Western Australia Police has very few issues with our software solution.
Large breath of solution.
My focus is on interfaces enabled via XI/PI which controls message delivery between ECC and non-SAP applications. SAP should provide a statement on the purpose of having a distributed PI environment and enable it to be truly loosely coupled (enable user authentication against a local data source).
need to access more 'grass roots' level information about functionality, not easy to find. Showing people the product and how it can be used, SAP standard for example, to

Start | Document1 - Microsoft ... | Microsoft PowerPoint - [... | Inbox - Microsoft Outlook | cis3.pal.sap.corp - Remo... | http://cis3.pal.sap.co... | 1:34 PM | Wednesday



TopicTracker Demo

Use Query: <http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/Translation.txt> . Use Search Engine: Document Analysis . Number of results per search engines: 0

[Docs](#) [query](#) [entity_stat](#) [relations](#) [relation_detail](#) [entity_detail](#) [community](#) [output](#)

COMPANY PROP_MISC NOUN_GROUP PERSON LOCATION OTHER

Translation (Q13, Do you have any comments concerning SAP's software solutions?) SAP solutions are very reliable & meets our needs & very robust in performance They are reasonably robust, but very complex to use we just started on production about one year ago & therefore we rate them low - we have the basic model no I understand that there should be greater flexibility in costs, according to the companies and the way they use SAP, so that it is not so costly. We've had business in Armenia and there's no translation into Armenian yet. We are doing the upgrade from R/3 to ECC 6.0 with unicode, but we need to make Z developments for critical functions that must execute in that language, because that's what the business units require. For example we had to postpone the installation of the Banker solution in 2008 for that reason. In the last year there wasn't a clear strategy for solutions. ? N We had bad experience with implementing the project "Electronic Invoicing" we did with a partner recommended by SAP. ? High quality standard solutions. I hope the new version addresses a lot of solutions / limitations that our version has There isn't a specific solution for our type of business, medical product distributor. There are processes that require windows that we don't have, we operate 7x24 with a very high volume of transactions. There is no handling of subdailies that would reduce the volume of transactions in accounting. Public administration has specific characteristics which make it more difficult to adapt to manage the functions of the solution. They should include public administration. When recommending a SAP solution it is important to understand if the potential client can meet the "SAP costs" in a sustainable way, and whether they can get access to and retain sufficient numbers of trained staff - User-friendliness in need of improvement - in the Retail branch solution, some relevant functions are missing or only half-heartedly implemented (and

Output file:

[Display all the output results](#)

[Display this part results](#)

[Clean Up All Data in the server](#)

Relation Freebase RAPBE

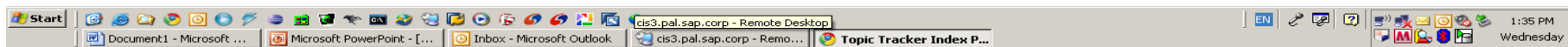
Community

Relation

Topics

Topic Tracker Team: Mia Ming Mao, Qi Li

SCROLL LOCK: ON





TopicTracker Demo

Use Query: <http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/Translation.txt> . Use Search Engine: Document Analysis . Number of results per search engines: 0

[Docs](#) [query](#) [entity_stat](#) [relations](#) [relation_detail](#) [entity_detail](#) [community](#) [output](#)

postpone the installation of the Banker solution in 2008 for that reason. In the [last year](#) there wasn't a [clear strategy](#) for solutions. ? N
We had [bad experience](#) with implementing the project "Electronic Invoicing" we did with a partner recommended by [SAP](#). ? [High quality standard solutions](#). I hope the [new version](#) addresses [a lot of solutions / limitations](#) that our version has There isn't a [specific solution](#) for our type of business, [medical product distributor](#). There are processes that require windows that we don't have, we operate 7x24 with a [very high volume](#) of transactions. There is no handling of subdailies that would reduce the volume of transactions in accounting. [Public administration](#) has [specific characteristics](#) which make it more difficult to adapt to manage the functions of the solution. They should include [public administration](#). When recommending a [SAP](#) solution it is important to understand if the [potential client](#) can meet the "[SAP](#) costs" in a [sustainable way](#), and whether they can get access to and retain [sufficient numbers](#) of [trained staff](#).
- [User-friendliness](#) in need of improvement - in the Retail [branch solution](#), some [relevant functions](#) are missing or only half-heartedly implemented (and

Output file:

[Display all the output results](#)

[Display this part results](#)

[Clean Up All Data in the server](#)

Relation Treebase RAPDE

[Community](#)

Topics TokenFreq MaxSig

[More](#)

URL: <http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/Translation.txt>

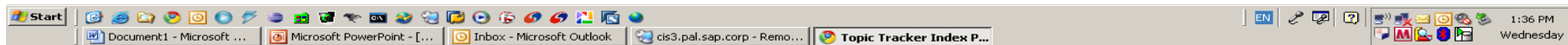
Armenia--adjectival_form-->Armenian
Armenia--currency_used-->Armenian
Armenia--official_language-->Armenian
Armenia--agencies-->Armenian
Armenia--works-->Armenian
Armenian--alias-->Armenia
Armenian--image-->Armenia
Armenian--name-->Armenia
Armenian--restaurant-->Armenia
Armenian--dishes-->Armenia

[StarTree](#)

Community

Topics

Topic Tracker Team: Mia Ming Mao, Qi Li





TopicTracker Demo

Use Query: <http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/Translation.txt> . Use Search Engine: Document Analysis . Number of results per search engines: 0

[Docs](#) [query](#) [entity_stat](#) [relations](#) [relation_detail](#) [entity_detail](#) [community](#) [output](#)

postpone the installation of the Banker solution in 2008 for that reason. In the [last year](#) there wasn't a [clear strategy](#) for solutions. [7 N](#) We had [bad experience](#) with implementing the project "Electronic Invoicing" we did with a partner recommended by [SAP](#). [? High quality standard solutions](#). I hope the [new version](#) addresses [a lot of solutions / limitations](#) that our version has There isn't a [specific solution](#) for our type of business, [medical product distributor](#). There are processes that require windows that we don't have, we operate 7x24 with a [very high volume](#) of transactions. There is no handling of subdailies that would reduce the volume of transactions in accounting. [Public administration](#) has [specific characteristics](#) which make it more difficult to adapt to manage the functions of the solution. They should include [public administration](#). When recommending a [SAP](#) solution it is important to understand if the [potential client](#) can meet the "[SAP](#) costs" in a [sustainable way](#), and whether they can get access to and retain [sufficient numbers](#) of [trained staff](#). - [User-friendliness](#) in need of improvement - in the Retail [branch solution](#), some [relevant functions](#) are missing or only half-heartedly implemented (and

Output file:

[Display all the output results](#)

[Display this part results](#)

[Clean Up All Data in the server](#)

Relation Trebase RAPDE

[Community](#)

Topics TokenFreq MaxSig

[More](#)

URL: <http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/Translation.txt>

Armenia--adjectival_form-->Armenian
Armenia--currency_used-->Armenian
Armenia--official_language-->Armenian
Armenia--agencies-->Armenian
Armenia--works-->Armenian
Armenian--alias-->Armenia
Armenian--image-->Armenia
Armenian--name-->Armenia
Armenian--restaurant-->Armenia
Armenian--dishes-->Armenia

[StarTree](#)

Armenia-->Community_0
Armenian-->Community_0
software solutions-->Community_1
High quality standard solutions-->Community_1

Topics

Topic Tracker Team: Mia Ming Mao, Qi Li





TopicTracker Demo

Use Query: <http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/Translation.txt> . Use Search Engine: Document Analysis . Number of results per search engines: 0

[Docs](#) [query](#) [entity_stat](#) [relations](#) [relation_detail](#) [entity_detail](#) [community](#) [output](#)

postpone the installation of the Banker solution in 2008 for that reason. In the [last year](#) there wasn't a [clear strategy](#) for solutions. ⁷ ^N We had [bad experience](#) with implementing the project "Electronic Invoicing" we did with a partner recommended by [SAP](#). [?] [High quality standard solutions](#). I hope the [new version](#) addresses [a lot of solutions / limitations](#) that our version has There isn't a [specific solution](#) for our type of business, [medical product distributor](#). There are processes that require windows that we don't have, we operate 7x24 with a [very high volume](#) of transactions. There is no handling of subdailies that would reduce the volume of transactions in accounting. [Public administration](#) has [specific characteristics](#) which make it more difficult to adapt to manage the functions of the solution. They should include [public administration](#). When recommending a [SAP](#) solution it is important to understand if the [potential client](#) can meet the "[SAP](#) costs" in a [sustainable way](#), and whether they can get access to and retain [sufficient numbers](#) of [trained staff](#). - [User-friendliness](#) in need of improvement - in the Retail [branch solution](#), some [relevant functions](#) are missing or only half-heartedly implemented (and

Output file:

[Display all the output results](#)

[Display this part results](#)

[Clean Up All Data in the server](#)

Relation Trebase RAPDE

[Community](#)

Topics TokenFreq MaxSig

[More](#)

URL: <http://cis3.pal.sap.corp:8080/TopicTrackerBI/www/Translation.txt>

Armenia--adjectival_form-->Armenian
Armenia--currency_used-->Armenian
Armenia--official_language-->Armenian
Armenia--agencies-->Armenian
Armenia--works-->Armenian
Armenian--alias-->Armenia
Armenian--image-->Armenia
Armenian--name-->Armenia
Armenian--restaurant-->Armenia
Armenian--dishes-->Armenia

[StarTree](#)

Armenia-->Community_0
Armenian-->Community_0
software solutions-->Community_1
High quality standard solutions-->Community_1

software solutions-->Community_1
Armenia-->Community_0
solut-->Community_1
armenian-->Community_0

Topic Tracker Team: Mia Ming Mao, Qi Li

