

Evaluating Temporal Information Access & Temporal Counterpart Search

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<http://ntcirtemporalia.github.io>

Schedule of this Talk

1. NTCIR Temporalia Tasks
2. Temporal Counterpart Search

NTCIR Temporalia Tasks



- **Hideo Joho** (*Univ. of Tsukuba*)
- **Roi Blanco** (*Univ. of A Coruna*)
- **Haitao Yu** (*Univ. of Tsukuba*)
- **Shuhei Yamamoto** (*Univ. of Tsukuba*)



Importance of Time in Search: Examples

- When search results **do not match** temporal intent behind query...:
 - “[tokyo weather](#)” → page with ~~yesterday’s~~ weather
 - “[economy forecast japan](#)” → page with ~~past~~ forecasts
 - “[1964 tokyo olympics](#)” → page about ~~preparations~~ for the next Olympics

Background: Temporal IR

- 1.5% of queries are **explicit temporal queries** [Nunes 2008]
 - “Germany 1920s”, “Olympics 1956”
- Many queries are **implicitly temporal**, e.g.:
 - “einstein childhood”, “fashion trend”, “kyoto weather”, “olympics”, “population increase expectation”
- Queries with temporal component require special treatment [Arikan 2009; Berberich 2010; Kanhabua 2010]
 - By **matching query temporality** with **document temporality**

Recent surveys on Temporal IR contain over 100 different references [Campos 2014, Kanhabua 2014]

Objective

- Offer standardized test bench for evaluating different aspects of **Temporal Information Retrieval**
 - Foster research to **understand temporal aspects of search needs** and to accommodate them in the best way

Search aspects where time dimension matters:

- Query
- Search intent
- Context
- Document processing/understanding
- Result ranking
- Result diversification
- Result presentation
- User feedback
-

What is NTCIR?

- Series of evaluation workshops for Information Access Technologies since 1999
- Similar to TREC or CLEF
- Run by NII, Japan in Tokyo

NTCIR Temporalia-1 and -2

- **Temporalia 1 (2013-2014)**
 - **Temporal Query Intent Classification (TQIC) {Eng}**
 - Classify query to temporal classes
 - **Temporal Information Retrieval (TIR) {Eng}**
 - Rank documents for temporal queries
- **Temporalia 2 (2015-2016)**
 - **Temporal Intent Disambiguation (TID) {Eng/Ch}**
 - Estimate temporal intent distribution behind query
 - **Temporally Diversified Retrieval (TDR) {Eng/Ch}**
 - Provide temporally diversified ranking of documents

Collection	Language	Description	Size
Temporalia-1 TQIC	EN	Queries with temporal classes	300
Temporalia-1 TIR	EN	Topics with temporal subtopics	50
Temporalia-2 TID	EN	Queries with distribution over temporal classes	300
Temporalia-2 TID	CH	Queries with distribution over temporal classes	300
Temporalia-2 TDR	EN	Topics with temporal subtopics	50
Temporalia-2 TDR	CH	Topics with temporal subtopics	50

Participating Teams

- Temporalia-2: Total number of participating teams **14**
 - **TID:** English **12** (30 runs) and Chinese **3** (7 runs)
 - **TDR:** English **4** (10 runs) and Chinese **0**
- Temporalia-1: Total number of participating teams **8**
 - **TQIC:** **6** (17 runs)
 - **TIR:** **5** (18 runs)

40% increase in number of teams compared to Temporalia-2

Team ID	Team Name	Country	TID	TDR
DUTEN	Dalian University of Technology	P.R.C.	En	
DUTCH	Dalian University of Technology	P.R.C.	Ch	
GIR	University of Glasgow	UK	En	
HITSZ	Harbin Institute of Technology, Shenzhen Graduate School	P.R.C.	En, Ch	En
Ho-tm	Japan Advanced Institute of Science and Technology	Japan	En	
IRISM	Indian School of Mines, Dhanbad	India	En	
KDETM	Toyohashi University of Technology	Japan	En	
KGO	University of Tokushima	Japan	En	
kyoto	Kyoto University	Japan	En	
L3S	Leibniz University Hannover	Germany	En	En
MPII	Max Planck Institute for Informatics	Germany	En	En
TUTA1	University of Tokushima	Japan	Ch	
WHUIR	Wuhan University	P.R.C.	En	
WIS	TU Delft	The Netherlands	En	
ORG	Temporalia Organiser	Japan, Spain		En

Temporalia-2

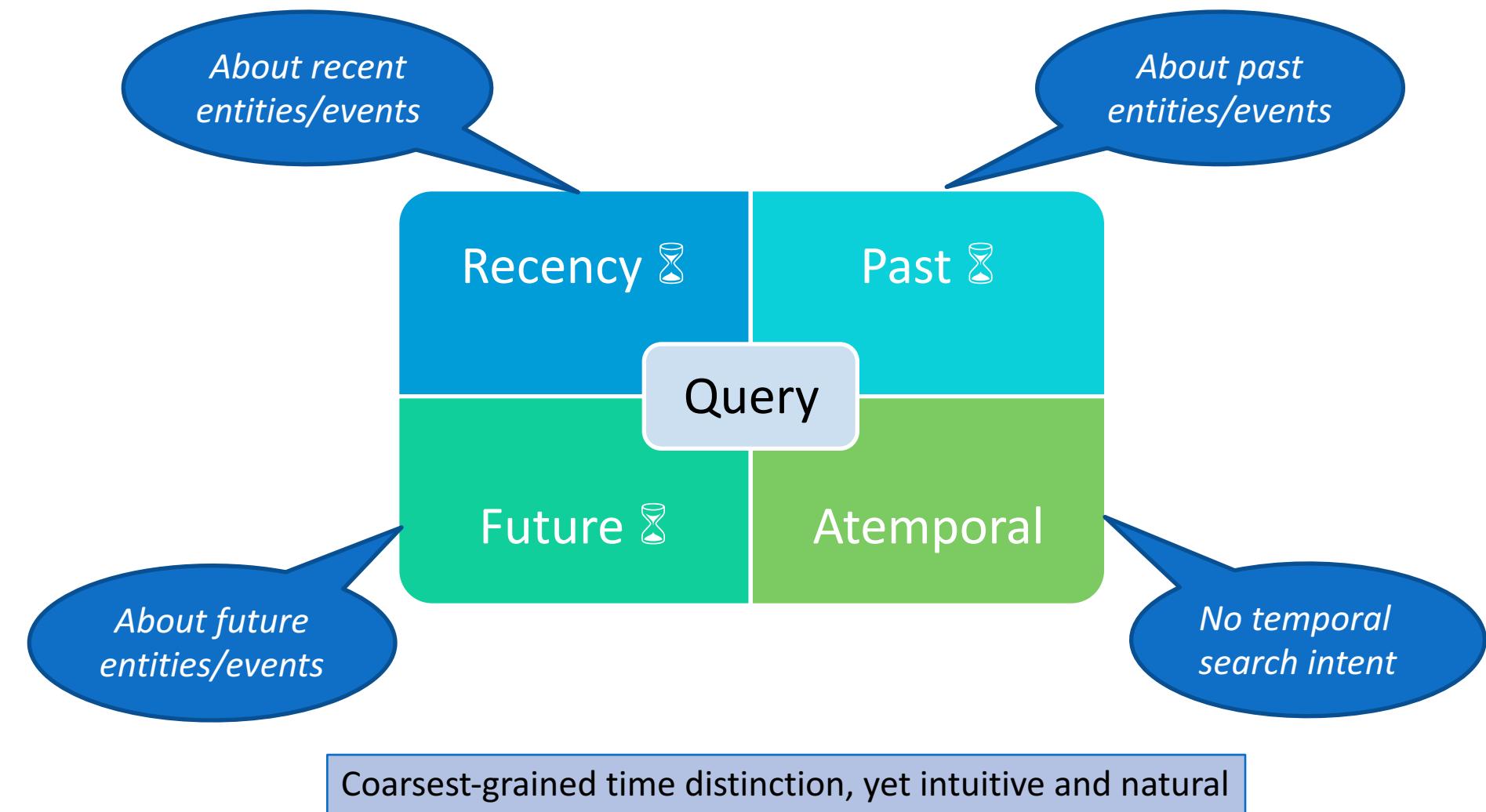
TEMPORALIA

Team ID	Institution	Country	TQIC	TIR
HITSZ	Harbin Institute of Technology at Shenzhen	P.R.C.	☒	☒
HULTECH	University of Caen	France	☒	
TUTA1	University of Tokushima	Japan	☒	☒
Andd7	Dhirubhai Ambani Institute of Information and Communication Technology	India	☒	☒
MPII	Max Planck Institute for Informatics	Germany	☒	
UniMAN	University of Manchester	UK	☒	
BRKLY	U.C. Berkeley	USA		☒
OSKAT	Osaka Kyoiku University	Japan		☒
ORG	Temporalia Organizers	Japan, Spain		☒

Temporalia-1

Temporal Intent Disambiguation (TQIC → TID)

Query Temporal Categories



Background: Search for Present, Past and Future Related Information on the Web

- Survey of 110 users about **target time of search intent** in their recent search queries [Joho 2013]

Answers	Frequency	Percentage
Information older than 1 year	9	8.2%
One year ago	0	0.0%
Several months ago	5	4.5%
Several weeks ago	2	1.8%
Last week	2	1.8%
Several days ago	9	8.2%
Yesterday	9	8.2%
Today	53	48.2%
Tomorrow	1	0.9%
Several days later	5	4.5%
Next week	0	0.0%
Several weeks later	1	0.9%
Several months later	1	0.9%
One year later	0	0.0%
More than one year later	1	0.9%
Others (Please specify)	12	10.9%
Total	110	100.0%

Past: 24.5%

Present: 57.3%

Future: 7.2%

Target time of sought information

TQIC (Temporalia1) and TID (Temporalia2): Query Examples

Temporalia-1

Class	Query
Past	Who Was Martin Luther
Past	when did the titanic sink
Past	Yuri Gagarin Cause of Death
Past	History of Coca-Cola
Past	price hike in bangladesh 2008
Recency	apple stock price
Recency	Number of Millionaires in USA
Recency	time in london
Recency	Trendy Plus Size Clothing
Recency	Did the Pirates Win Today
Future	2013 MLB Playoff Schedule
Future	College Baseball Regional Projections
Future	disney prices 2014
Future	long term weather forecast
Future	release date for ios7
Atemporal	blood pressure monitor
Atemporal	distance from earth to sun
Atemporal	how to start a conversation
Atemporal	New York Times
Atemporal	lose weight quickly

Temporalia-2

Query	Past	Recency	Future	Atem.
Australian Open	0.091	0.0	0.455	0.455
NBA Finals	0.1	0.0	0.4	0.5
NBA playoff schedule	0.0	0.2	0.6	0.2
price of oil	0.0	0.9	0.0	0.1
how to lose weight	0.0	0.1	0.0	0.9
time in India	0.0	1.0	0.0	0.0
history of volleyball	1.0	0.0	0.0	0.0

Query issuing time provided along with query text (May 1, 2013)

TID English Dataset Creation

Collecting 300 seed temporal expressions
from dictionaries & query logs

Submitting to three major web search
engines

Collecting top 10 query suggestions for
each input query and duplicate removal

Annotating queries by crowdsourcing with
test questions borrowed from Temporalia-1

300 formal run queries picked
up after manual analysis for
balancing the distributions

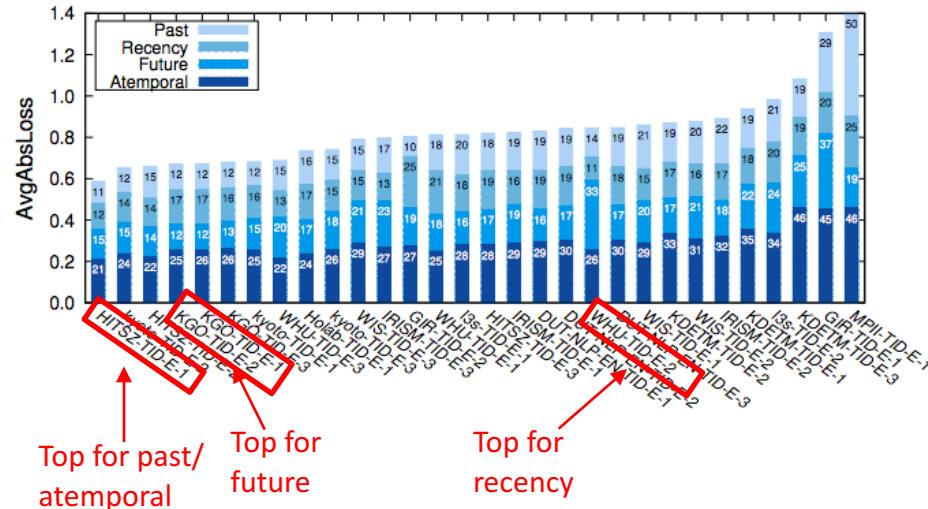
TID Approaches 1/2

Team	Special Features	External data sources	External tools	Classifiers
<u>DUTEN</u>	POS, Trigger words, word temporal probability, Temporal distance, Implicit & rule-based time distance	Google Trends, Temporalia-1 TQIC queries	coreNLP, POS tagger, SUTime	Logistic Regression
<u>DUTCH</u>	Temporal distance, word temporal probability, temporal triggers, other text features, time gap from Google trends	Google Trends, SogouQ queries, Translated Temporalia-1 TQIC queries	HeidelTime, Word2Vec	Linear SVC, Logistic Regression, Random Forrest
<u>GIR</u>	TFIDF, Verb tense, temporal expressions	Google Search API	CoreNLP	C4.5, Random Forest, Naive Bayes, kNN, SVM
<u>HITSZ</u>	Verb tense, Temporal expressions, Temporal distance, Word temporal probability	-	CoreNLP, Jieba	Rule based
<u>Ho-tm</u>	Query string, Query processing time, Verb Tense, Query length	-	Stanford NLP	NB
<u>IRISM</u>	Terms, Dates in queries, Query issue time, Temporal words	-	Mallet	MaxEnt, NB, C4.5
<u>KDETM</u>	Temporal distance, Temporal reference, POS-tags	Temporalia-1 TQIC queries	CoreNLP, SUTime	Rule-based, NB, SVM

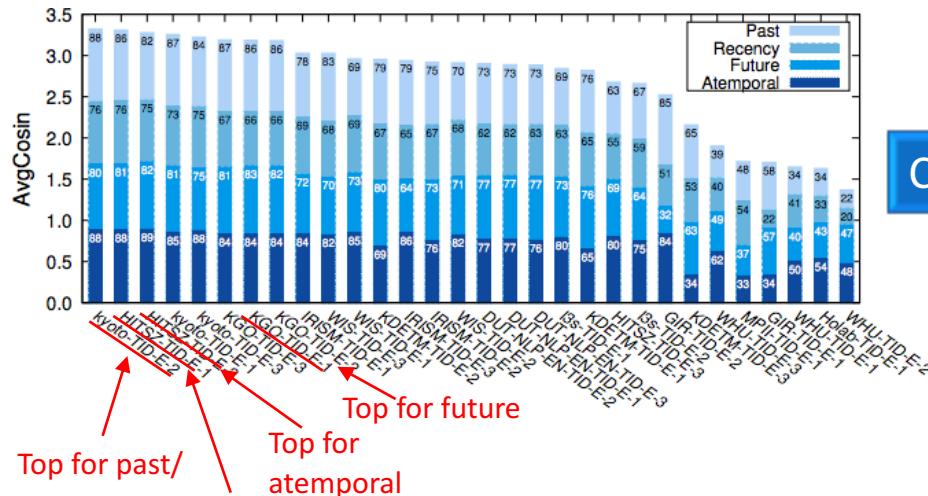
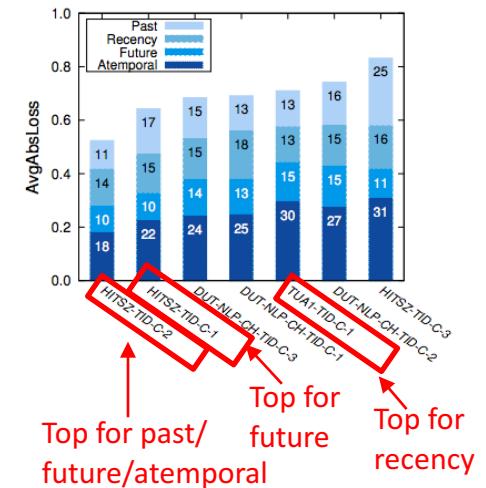
TID Approaches 2/2

Team	Special Features	External data sources	External tools	Classifiers
<u>KGO</u>	Temporal distance, Verb tense, Temporal Named Entity, Holidays, People, Time, Lemma	Wikipedia, Holidays database	CoreNLP, TextRazor	Deep Neural Net
<u>Kyoto</u>	Unigram+POS, Bigram, verb tense, Temporal expressions, Holidays, Word vectors	Temporalia-1 TQIC queries	POS tagger, SUTime	SVM, SVR, NN, CNN
<u>L3S</u>	Temporal distance, Linguistic features, Ngram features	-	POS tagger, SUTime	Rule-based voting
<u>MPII</u>	-	-	-	Temporal language model
<u>TUTA1</u>	-	-	-	Word2vec
<u>WHUIR</u>	Name entities, Query length, Dates, Verb tense, Dominant keyword, Temporal distance, Temporal words	-	CoreNLP, TempoWordnet	SVR
<u>WIS</u>	Lemmas, Named entities, Verb tenses, Temporal words, Wikipedia pageview features	Temporalia-1 TQIC queries , Wikipedia pageview statistics	CoreNLP, SUTime, DBPedia Spotlight, PCA	SVM, Ridge

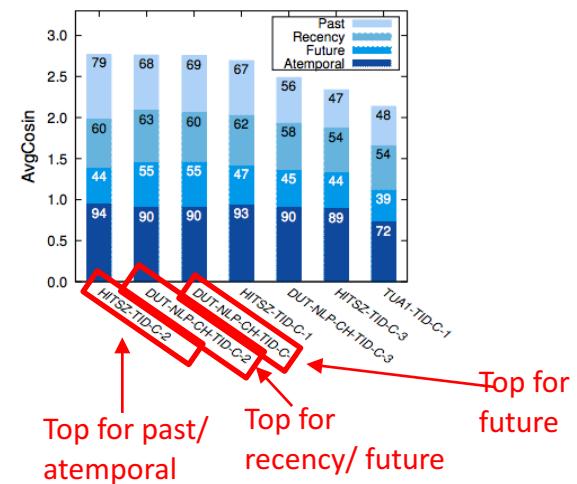
TID Results



Absolute loss



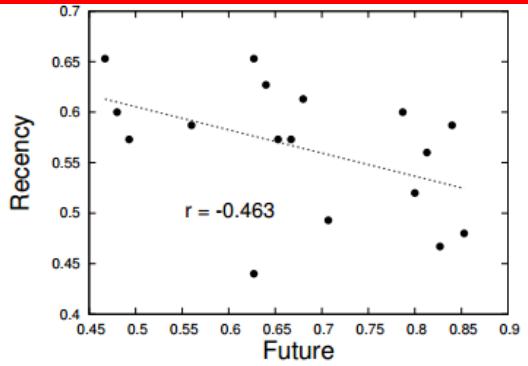
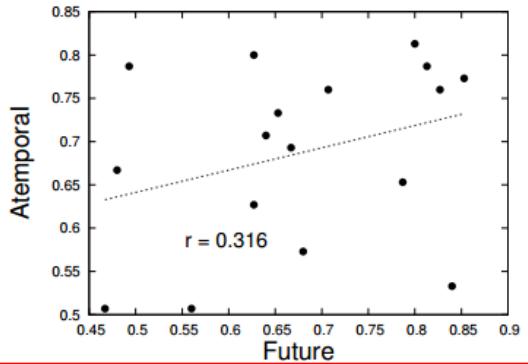
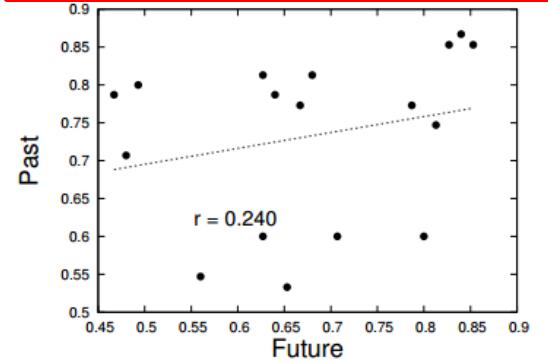
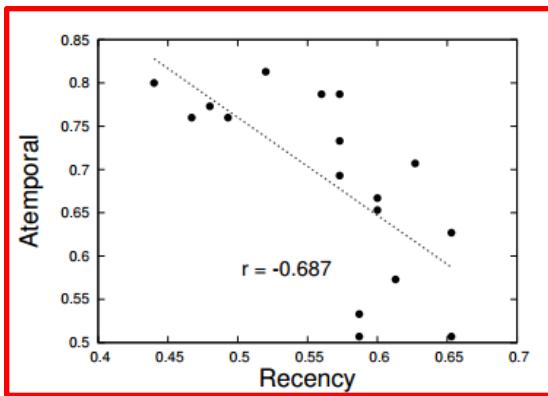
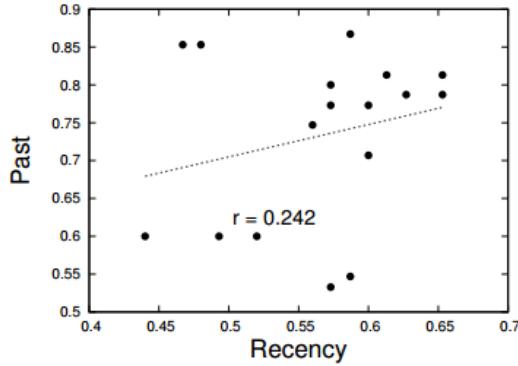
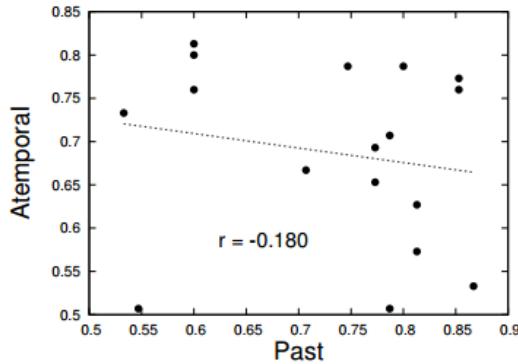
Cosine similarity



English

Chinese

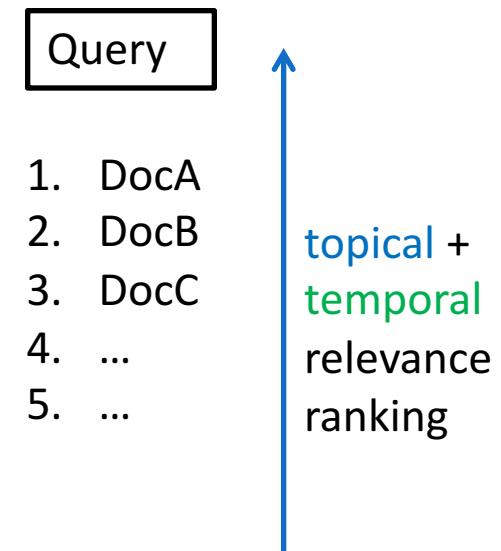
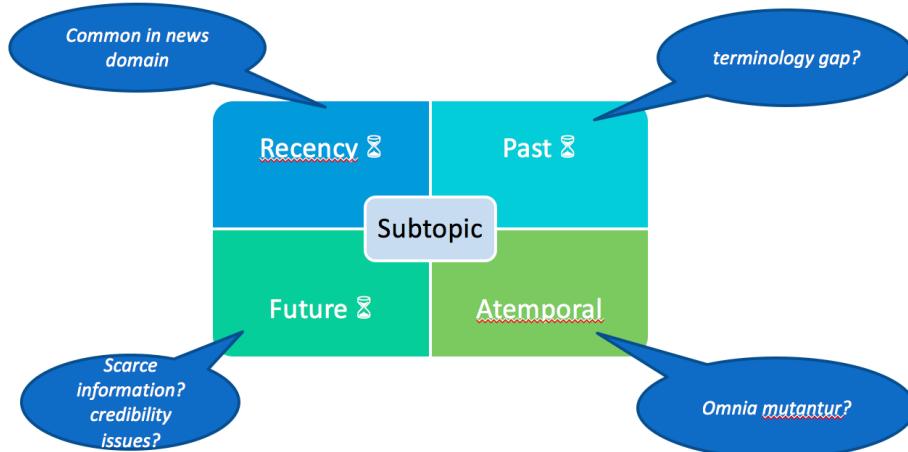
Pearson's Correlation of Temporal Classes (Temporalia-1 TQIC)



Temporally Diversified
Retrieval (TIR → TDR)

Temporally Diversified Retrieval

1. Returning ranked documents for each temporal class:
 - past, recency, future and atemporal
2. Returning temporally diversified documents



English Document Collection

- **LivingKnowledge Corpus** [<http://livingknowledge.europarchive.org/>]
 - **Crawl time:** April 2011 and March 2013
 - **Source:** annotated **news** and **blog** feeds
 - **Size:** 20GB uncompressed (>5GB zipped)
 - 3.8M documents from 1500 different blogs and news sources
 - Text only
- Provided annotations: **Time Annotations**, **Named Entities** and **Sentence Splitting**
 - Participants can choose to use annotations or not
 - Participants can use external collections such as Wikipedia

More details of annotations at: <https://sites.google.com/site/ntcirtemporalia>
M. Matthews et al. *Searching Through Time in the New York Times*, HCIR, 2010

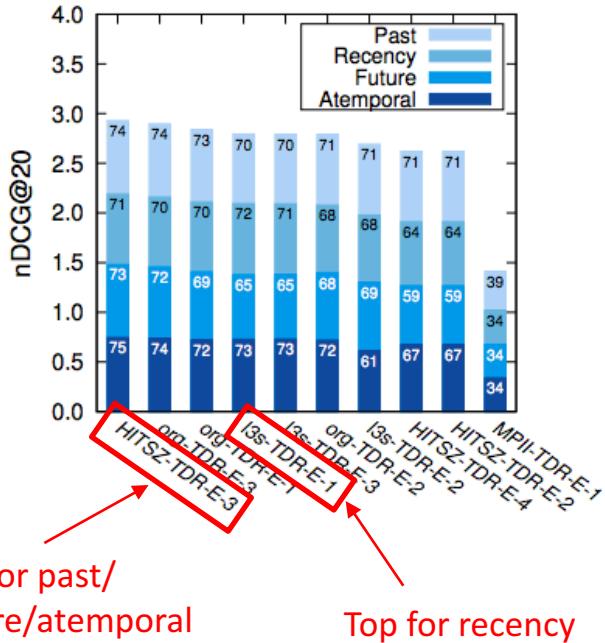
Temporalia-2 English TDR: Topic Example

Junk food health effect	
Description	I am concerned about the health effects of junk food in general. I need to know more about their ingredients, impact on health, history, current scientific discoveries and any prognoses.
Past question	When did junk foods become popular?
Recency question	What are the latest studies on the effect of junk foods on our health?
Future question	Will junk food continue to be popular in the future?
Atemporal question	How junk foods are defined?
Search date	29 May 2013 GMT+0:00

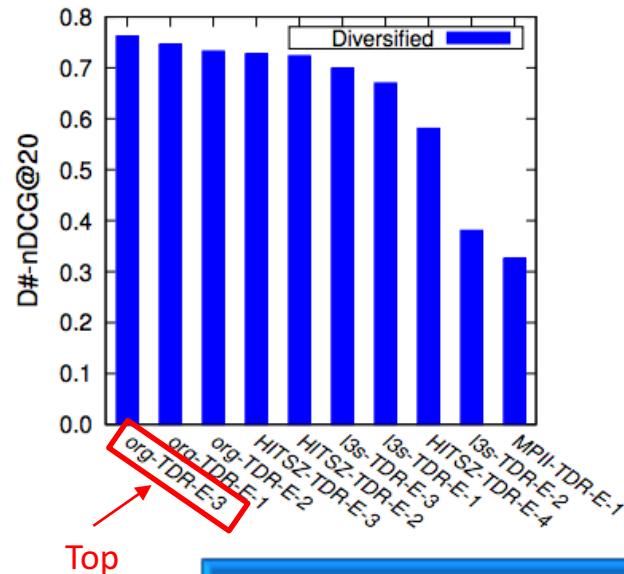
TDR/TIR: Relevance Assessment

1. Creating results pool (TIR: 30k, TDR: 11k documents,)
 - Depth of 20
2. Evaluating each document against each of four temporal classes using crowdsourcing (CrowdFlower) with common settings [Kazai 2013]

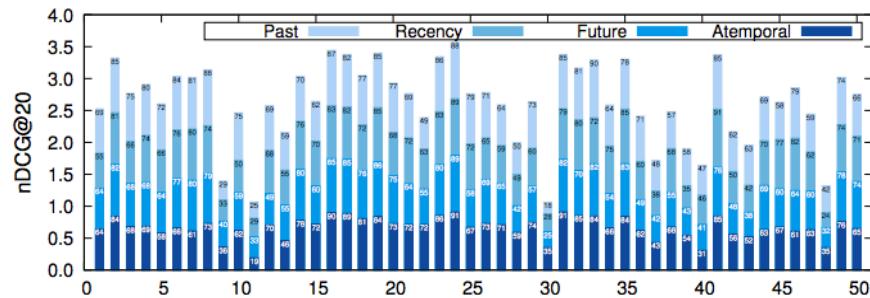
English TDR Results



TDR Results
(nDCG@20)



TDR Results for diversified
retrieval (D#-nDCG@20)



TDR topics (nDCG@20)

TIR/TDR Approaches

Team	Used fields	External data sources	Approach
<u>HITSZ</u>		-	Learning to rank, BM25, own TQIC method
<u>TUTA1</u>		-	Learning to rank
<u>Andd7</u>		-	
<u>BRKLY</u>		-	Logistic regression model, blind relevance feedback
<u>OKSAT</u>		Wikipedia, Web search results	Plural set of terms
<u>ORG</u>	title, search question, description	-	BM25 (Solr)

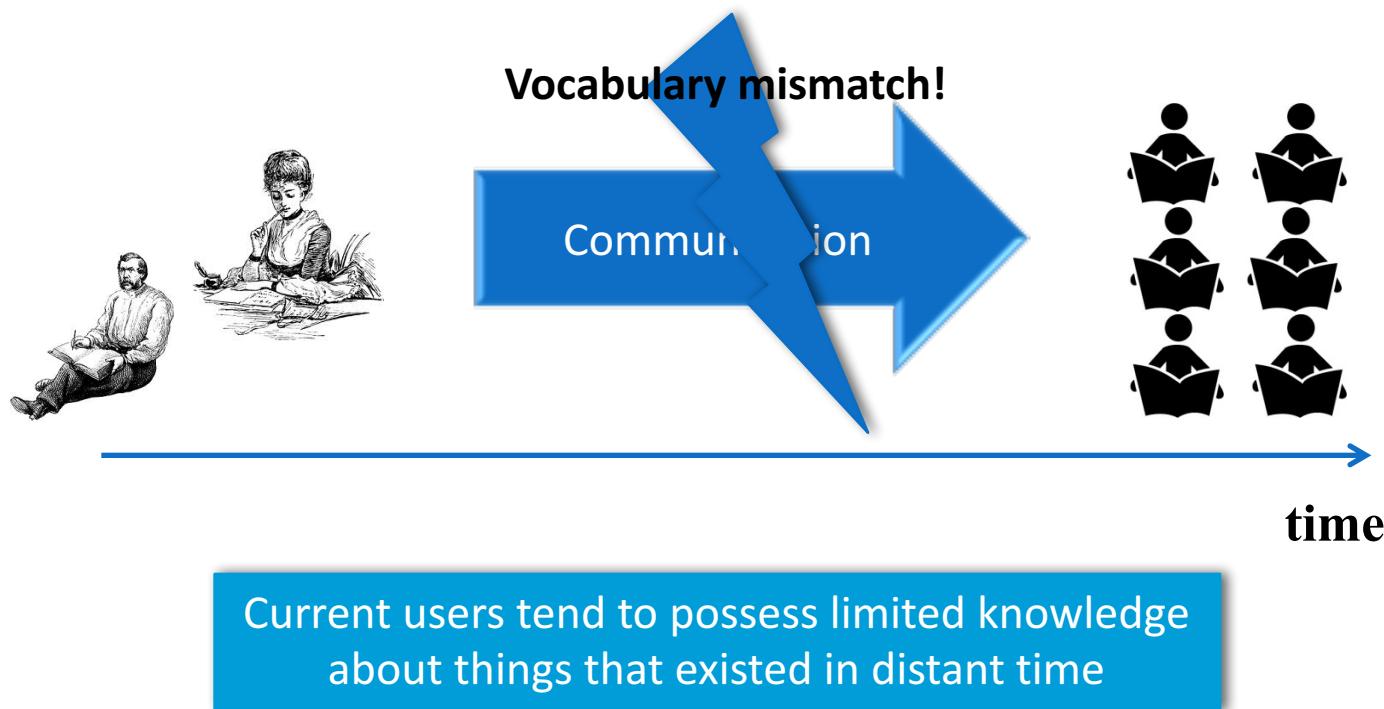
Team	Used tags	Other Tools/Features	Approach
<u>HITSZ</u>	Time expressions	Solr, Lucene, HITSZ_BW system	Temporalia-1 TIR own approach + Diversification techniques
<u>L3S</u>	Time expressions	Verb Tense, Topical features, Temporal features (relevance, density)	Multiclass SVM for extracting features, Learning-to-Rank
<u>MPII</u>	Time expressions	-	Temporal language Model (TimeSearch), BM25
<u>ORG</u>	-	Solr	BM25, Round Robin approach for diversification

Temporal Counterpart Finding

- Yating Zhang (*Kyoto Univ.*)
- Katsumi Tanaka (*Kyoto Univ.*)

Background

- World is subject to **constant evolution**
 - Users have **problems** with **understanding and retrieving historical documents**



Research Problem: Temporal Counterparts Finding

Past

?



Present



?



USB stick

?



facebook

facebook

Past

?



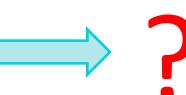
Present



Smartphone



Beatles



?



Samaranch



?

Research Problem: Temporal Counterparts Finding

Past



walkman

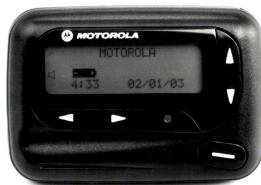
Present



iPod



Past



pager

Present



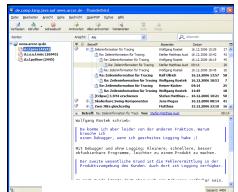
smartphone



Floppy disk
(diskette)



USB stick



Usenet

facebook



THE BEATLES



BONO LARRY ADAM EDGE



Samaranch



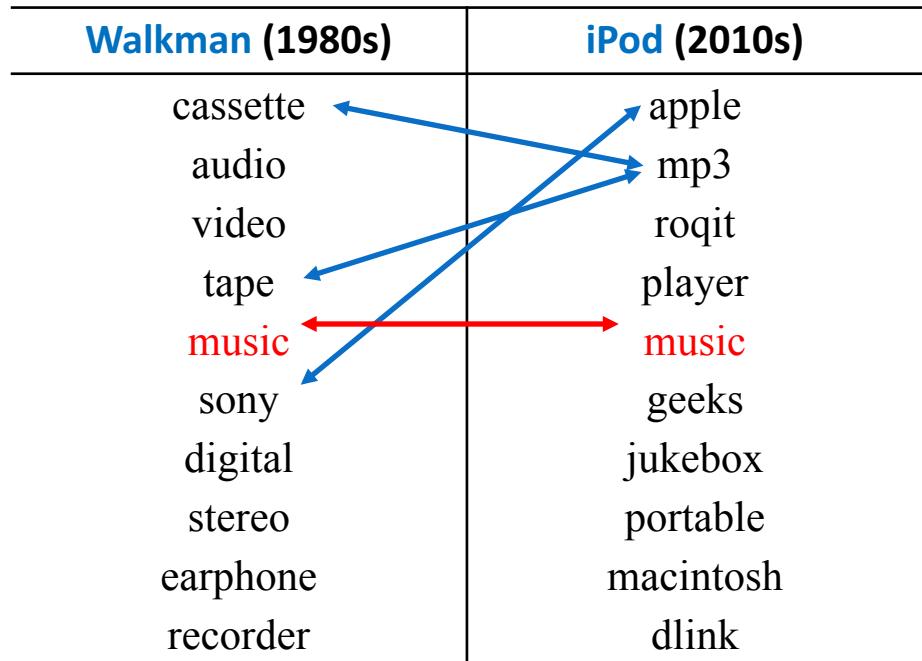
Rogge

Research Motivation

- Task: *Finding Corresponding Entities Across Time*
- Applications:
 1. Supporting search in archives by query suggestion [Berberich 2009]
 2. Automatic generation of *temporal counterpart timelines*
 3. Providing foundations for automatic “across-time translation”

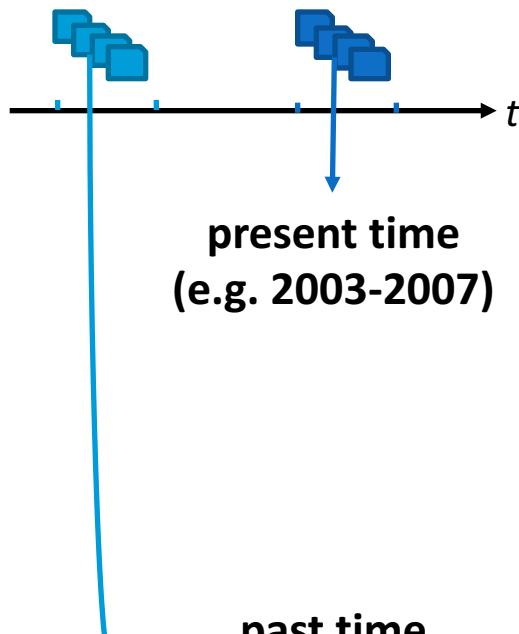
“Panta Rei” (万物流転) [Eng: “Everything Changes”]

- **Everything changes:** contexts surrounding *temporal counterparts* are different [Berberich 2009, Tahmasebi 2012]



* Contexts in the New York Times corpus

Across-time Transformation: from Present Time to Past Time



Distributed Vector Representations
(NN) [Mikolov]

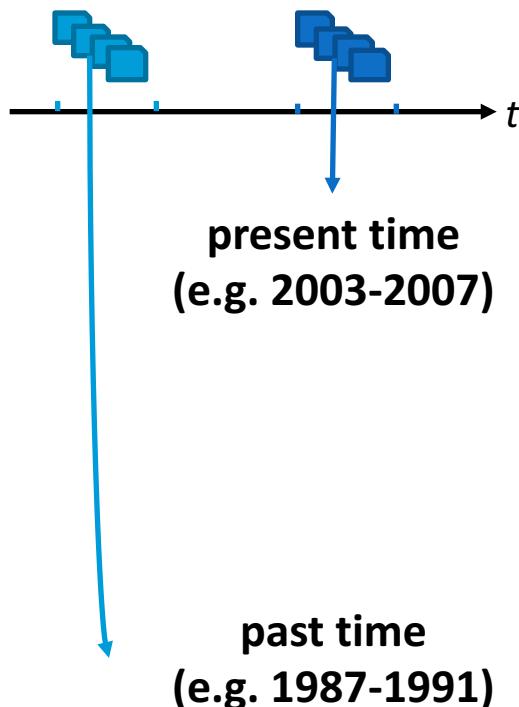
$$\begin{matrix} & D_1 & D_2 & \cdots & D_m \\ w_1 & \cdots & \cdots & \cdots & \cdots \\ w_2 & \cdots & \cdots & \cdots & \cdots \\ \vdots & \cdots & \cdots & \cdots & \cdots \\ w_P & \cdots & \cdots & \cdots & \cdots \end{matrix}$$

past time
(e.g. 1987-1991)

$$\begin{matrix} & \Phi_1 & \Phi_2 & \cdots & \Phi_n \\ \omega_1 & \cdots & \cdots & \cdots & \cdots \\ \omega_2 & \cdots & \cdots & \cdots & \cdots \\ \vdots & \cdots & \cdots & \cdots & \cdots \\ \omega_Q & \cdots & \cdots & \cdots & \cdots \end{matrix}$$

D_i and Φ_k are the dimensions of each vector space

Across-time Transformation: from Present Time to Past Time



Distributed Vector Representations
(NN) [Mikolov]

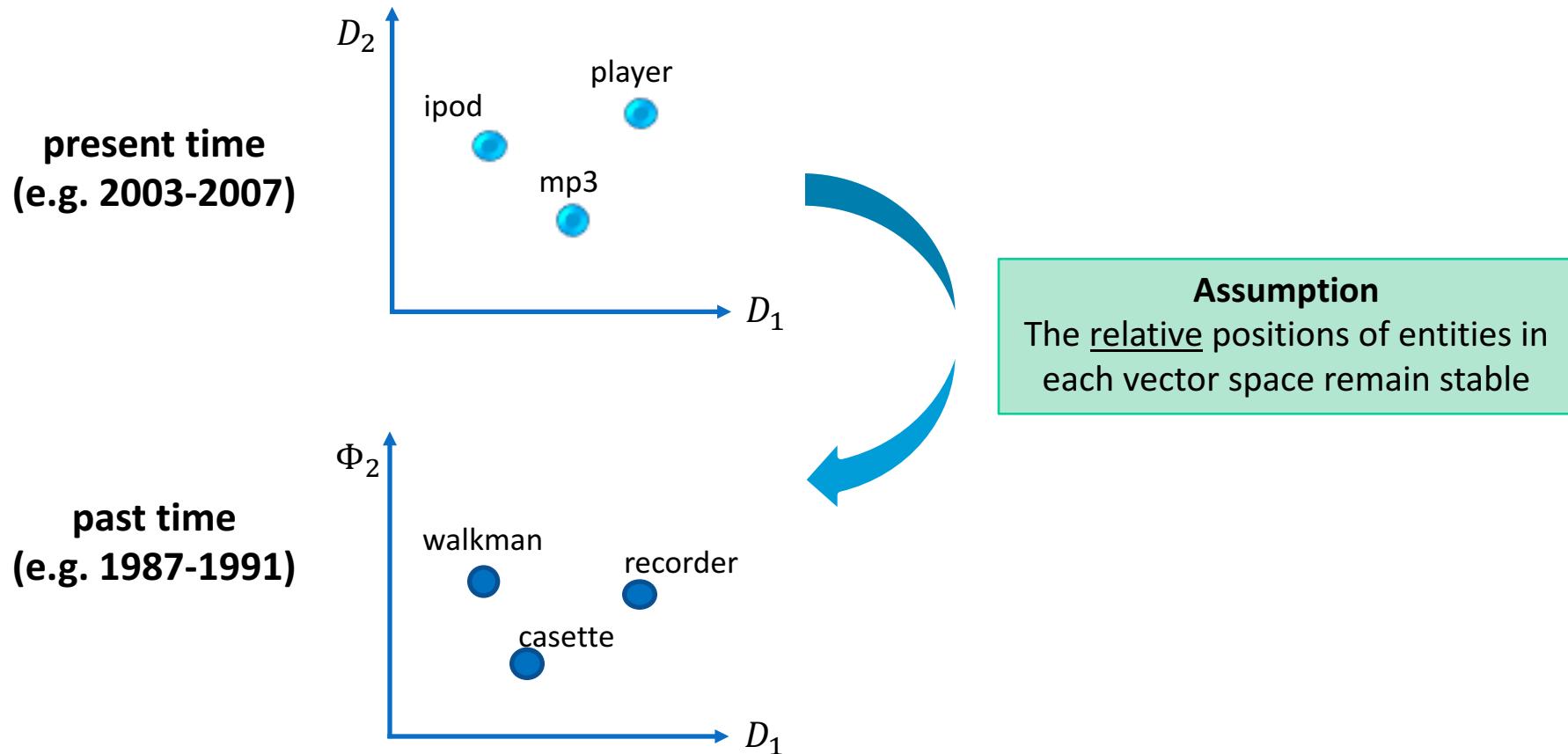
$$\begin{matrix} & D_1 & D_2 & \cdots & D_m \\ w_1 & \cdots & \cdots & \cdots & \cdots \\ w_2 & \cdots & \cdots & \cdots & \cdots \\ \vdots & \cdots & \cdots & \cdots & \cdots \\ w_P & \cdots & \cdots & \cdots & \cdots \end{matrix}$$

$$\begin{matrix} & \Phi_1 & \Phi_2 & \cdots & \Phi_n \\ \omega_1 & \cdots & \cdots & \cdots & \cdots \\ \omega_2 & \cdots & \cdots & \cdots & \cdots \\ \vdots & \cdots & \cdots & \cdots & \cdots \\ \omega_Q & \cdots & \cdots & \cdots & \cdots \end{matrix}$$

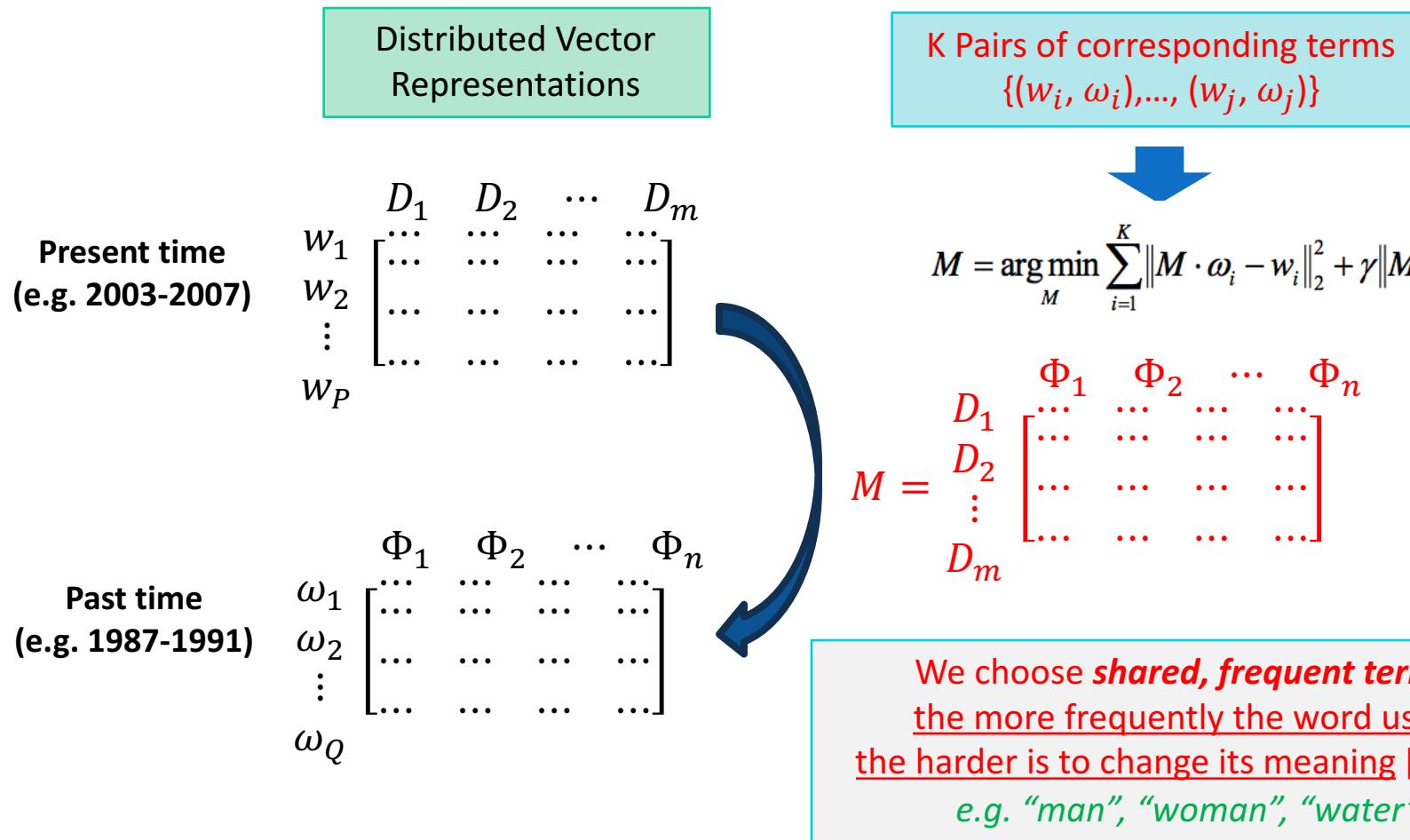


D_i and Φ_k are the dimensions of each vector space

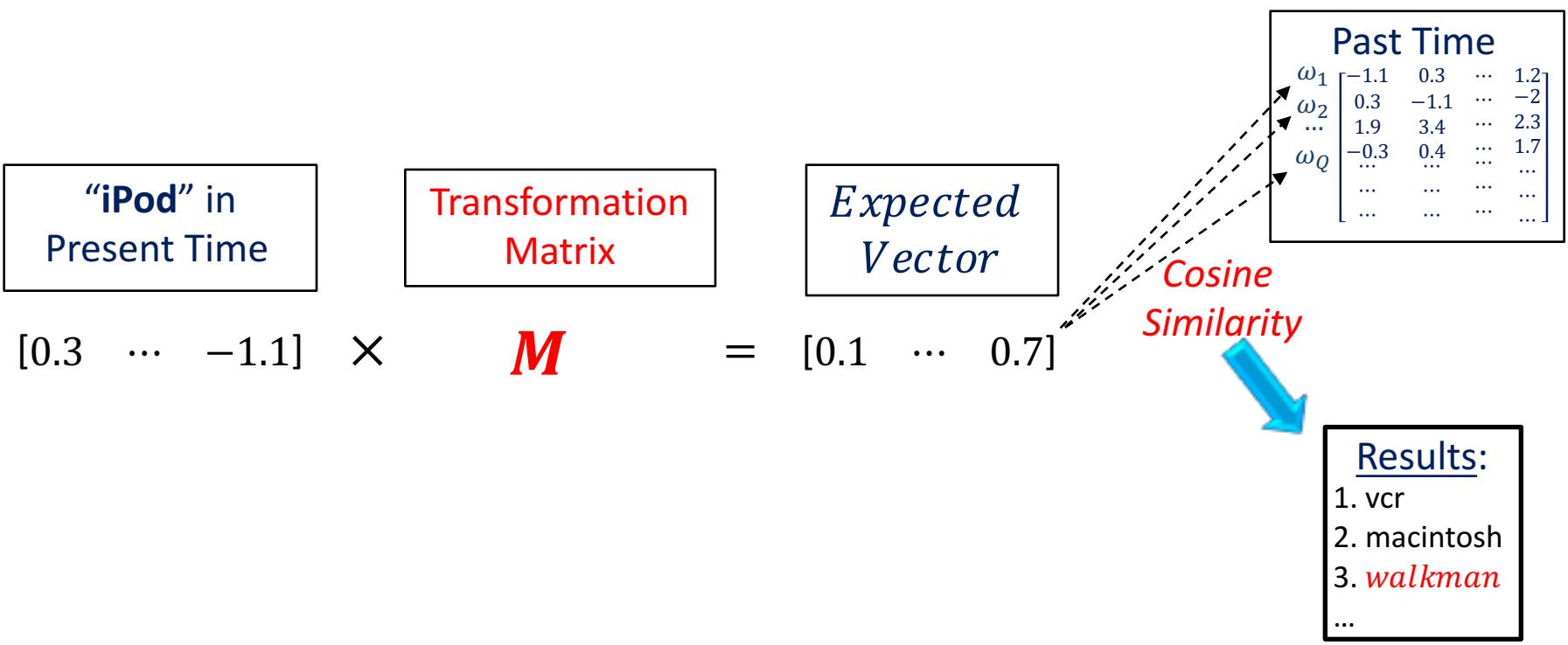
Assumption behind Proposed Approach



Constructing Transformation Matrix



Across-Time Term Transformation



Result: ranked list of temporal counterparts

Improving Across-Time Term Transformation

Not the best answers..

VCR was found a counterpart of iPod due to allowing to record/playback
Macintosh was found a counterpart of iPod as being produced by Apple

Transformation Matrix



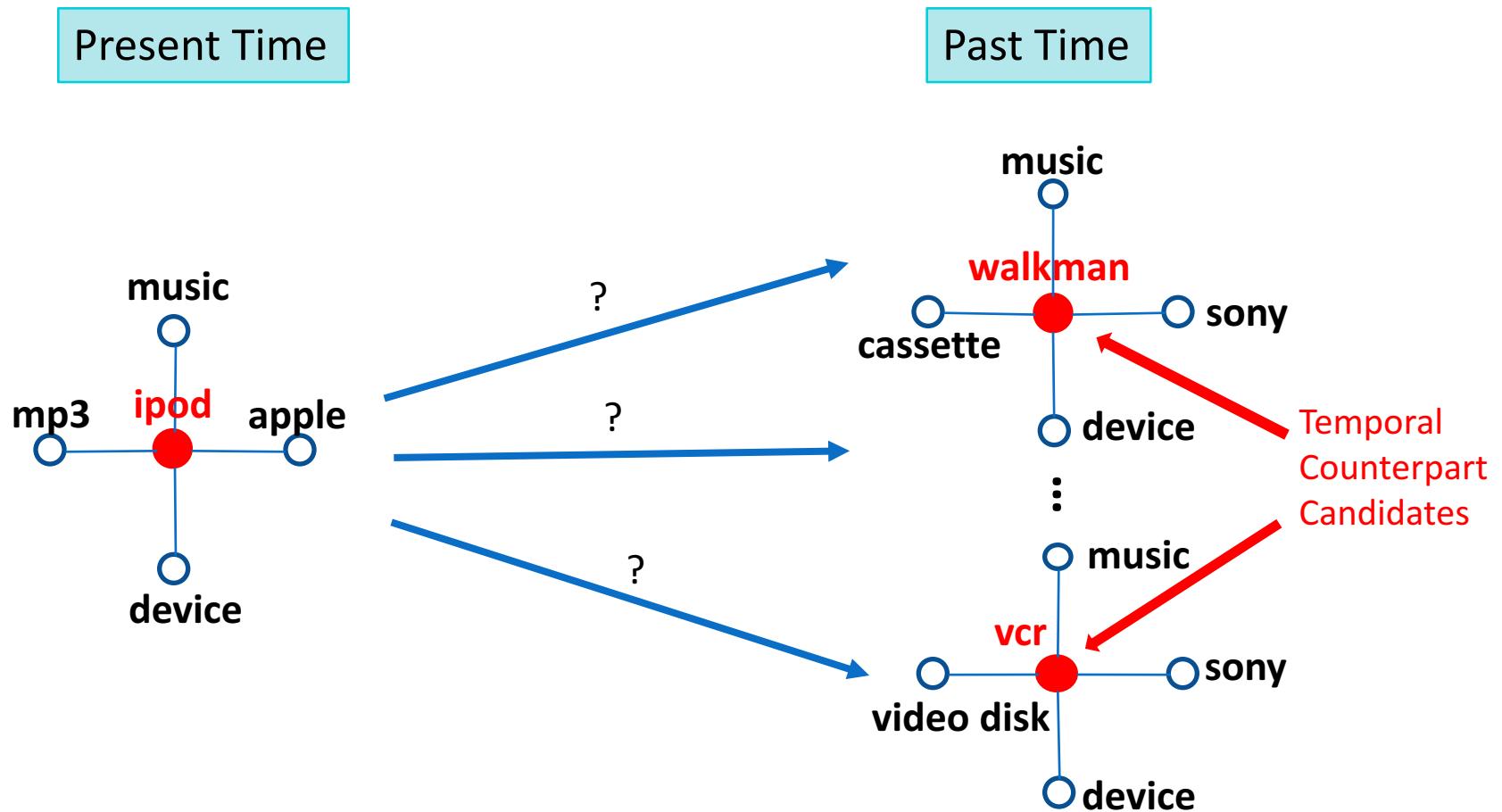
Global Correspondence

Relations between the query and its local context are neglected



Local Correspondence

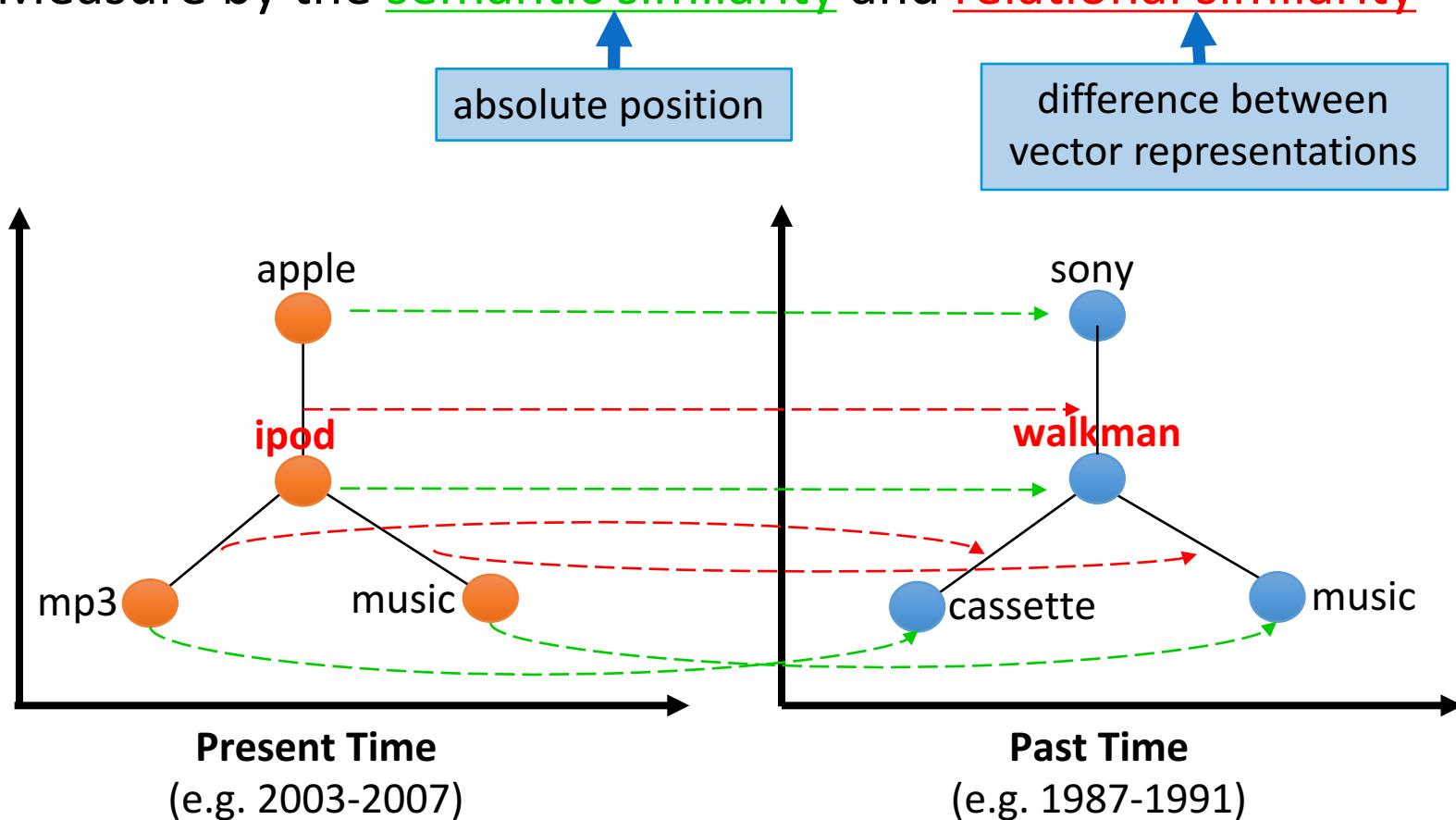
Transformation Using Local Graph by Using Reference Points



Local Graph Similarity Measurement

Our approach:

Measure by the semantic similarity and relational similarity



Expected Characteristics of Reference Points

- Reference Points - terms in query's context which help to build the across-time connection. They should:
 - a) have **high relation** with the query
 - b) be sufficiently **general**
 - c) **independent** from each other

Reference Point Detection

- Three methods for finding reference points using:
 1. Term co-occurrence (**LT-Cooc**)
 - Uses terms with high frequency and high relatedness as captured by Chi-square test
 - e.g. *iPod: music, Apple, computer, digital, iTunes*
 2. Lexico-Syntactic Patterns (**LT-Lex**)
 - Uses term hyponyms [Ohshima, 2010]
 - e.g. *iPod: music, music device, music player*
 3. Semantic Clustering (**LT-Cluster**)
 - Bisecting k-means is first used to obtain clusters of words with similar meanings
 - Chooses typical term from each semantic cluster
 - e.g. *iPod: music, digital, iTunes, company, store*

Example Results: Finding Past Counterparts for Present Queries

	queries [2002,2007]	correct answers [1987,1991]	baselines		methods	
			BOW (baseline)	LSI (baseline)	GT (proposed)	LT-Lex (proposed)
1	Putin	Yeltsin	1000+	51	24	2
2	Chirac	Mitterrand	1000+	6	7	2
3	iPod	Walkman	1000+	6	3	1
4	Facebook	Usenet	1000+	1000+	1	1
5	Linux	Unix	1000+	5	20	1
6	spam	junk mail	1000+	1000+	5	1
7	spreadsheet	database	1000+	395	3	1
9	email	messages	1000+	1	2	7
10	email	letters	1000+	1000+	1	1
11	email	mail	1000+	119	7	6
12	email	fax	1000+	1000+	3	4
14	superman	batman	1000+	46	5	2
15	Pixar	Tristar	1000+	110	1	1
16	Pixar	Disney	1000+	1	3	2
17	Euro	Mark	1000+	1000+	2	1
19	Euro	Franc	1000+	1000+	7	3
20	Myanmar	Burma	1000+	3	64	46
21	Koizumi	Kaifu	1000+	66	2	1
22	NATO	NATO	1000+	1	304	141
24	fridge	freezer	1000+	7	1	1
25	fridge	refrigerator	1000+	4	2	2
27	Serbia	Yugoslavia	1000+	12	1	1
28	Kosovo	Yugoslavia	1000+	27	14	10
30	mp3	compact disk	1000+	44	58	19
...

Rank of correct answers

Evaluation:[2002,2007] and [1987,1991] on NYT News Corpus

1. Searching **from present to past** (95 query-answer pairs)

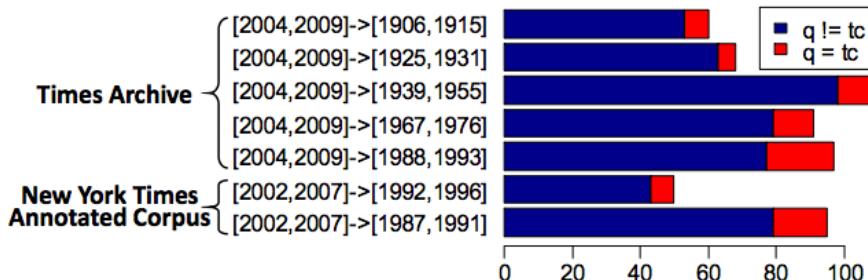
	Method	MRR	P@1	P@5	P@10	P@20
baselines	BOW	4.1e-5	0	0	0	0
	LSI-Com	0.206	15.8	27.3	29.5	38.6
	LSI-Tran	0.112	7.9	13.6	21.6	22.7
methods	GT	0.298	16.8	44.2	56.8	<u>73.7</u>
	LT-Lex	<u>0.369</u>	<u>24.2</u>	<u>49.5</u>	<u>63.2</u>	71.6
	LT-Cooc	0.283	18.8	35.3	50.6	62.4
	LT-Cluster	0.285	14.7	42.1	55.1	65.2

2. Searching **from past to present** (95 query-answer pairs)

	Method	MRR	P@1	P@5	P@10	P@20
baselines	BOW	3.4e-5	0	0	0	0
	LSI-Com	0.181	13.2	19.7	28.9	35.5
	LSI-Tran	0.109	5.3	17.1	21.1	23.7
methods	GT	0.226	15.2	27.3	33.3	45.5
	LT-Lex	<u>0.235</u>	<u>16.7</u>	28.8	31.8	<u>48.5</u>
	LT-Cooc	0.231	<u>14.7</u>	<u>30.7</u>	<u>36</u>	46.7
	LT-Cluster	0.228	13.6	28.8	31.8	47

Test Collections for Temporal Counterpart Search

- Entities (persons, locations, objects), non-entities
 - Extracted from Wikipedia and other sources
 - **NYT**: 95 term pairs (query and its counterpart)
 - [2002, 2007] → [1992, 1996],[1987, 1991]
 - **Times**: >400 term pairs
 - [2004,2009] → [1988,1993],[1977,1987],[1939,1955],[1925,1931],[1906,1915]



Time Periods	US president	Name of location
[2004,2009]	Bush	Thailand
[1988,1993]	Bush, Reagan	Thailand
[1967,1976]	Johnson, Nixon, Ford	Thailand
[1939,1955]	Roosevelt, Truman, Eisenhower	Siam, Thailand
[1925,1931]	Coolidge, Hoover	Siam
[1906,1915]	Roosevelt, Taft, Wilson	Siam

Test Collections for Temporal Counterpart Search

[1988,1993]

```
bush reagan,bush,clinton
merkel kohl
schroder kohl
chirac mitterrand
kwasniewski walesa,jaruzelski,rakowski
kaczynski walesa,jaruzelski,rakowski
brown thatcher,major
blair thatcher,major
putin yeltsin,yanayev,gorbachev
medvedev yeltsin,yanayev,gorbachev
berlusconi amato,ciampi,Andreotti,mita
prodi amato,ciampi,Andreotti,mita
benedict paul
paul paul
zapatero gonzalez
aznar gonzalez
koizumi hosokawa,miyazawa,kaifu,uno,takeshita
abe hosokawa,miyazawa,kaifu,uno,takeshita
fukuda hosokawa,miyazawa,kaifu,uno,takeshita
aso hosokawa,miyazawa,kaifu,uno,takeshita
hatoyama hosokawa,miyazawa,kaifu,uno,takeshita
fischer klestil,waldheim
london london
petersburg leningrad,petersburg,saint,st
mumbai bombay
kolkata calcutta
chennai madras
oslo oslo
wroclaw wroclaw
ankara ankara
chemnitz karl,marx,stadt
guangzhou guangzhou
minh minh,saigon
istanbul istanbul
russia ussr,russia
lanka lanka
sri sri
thailand thailand
myanmar myanmar,burma
iran iran
berlin bonn,berlin
slovakia czechoslovakia,slovak,slovakia
czech czechoslovakia,czech
slovenia jugoslavia,slovenia
serbia yugoslavia,serbia
bosnia yugoslavia,bosnia
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[1967,1976]

```
bush johnson,nixon,ford
merkel kiesinger,brandt,scheel
merkel schmidt
schroder kiesinger,brandt,scheel,schmidt
chirac destaing,estaing,poher,pompidou
chirac gaulle
kwasniewski gomulka,gierek
kaczynski gomulka,gierek
brown wilson,callaghan,heath
blair wilson,callaghan,heath
putin brezhnev
medvedev brezhnev
berlusconi andreotti,moro,rumor,colombo,leone
prodi andreotti,moro,rumor,colombo,leone
benedict paul
paul paul
zapatero suarez,navarro,miranda,blanco,franco
aznar suarez,navarro,miranda,blanco,franco
zapatero suarez,navarro,miranda,blanco,franco
aznar suarez,navarro,miranda,blanco,franco
koizumi miki,fukuda,tanaka,sato
abe miki,fukuda,tanaka,sato
fukuda miki,fukuda,tanaka,sato
aso miki,fukuda,tanaka,sato
hatoyama miki,fukuda,tanaka,sato
london london
petersburg leningrad
mumbai bombay
kolkata calcutta
chennai madras
oslo oslo
wroclaw wroclaw
ankara ankara
chemnitz karl,marx,stadt
guangzhou guangzhou,canton
minh minh,saigon
istanbul istanbul
russia ussr,soviet
lanka lanka,sri,ceylon
sri lanka,sri,ceylon
thailand thailand
myanmar burma
iran iran
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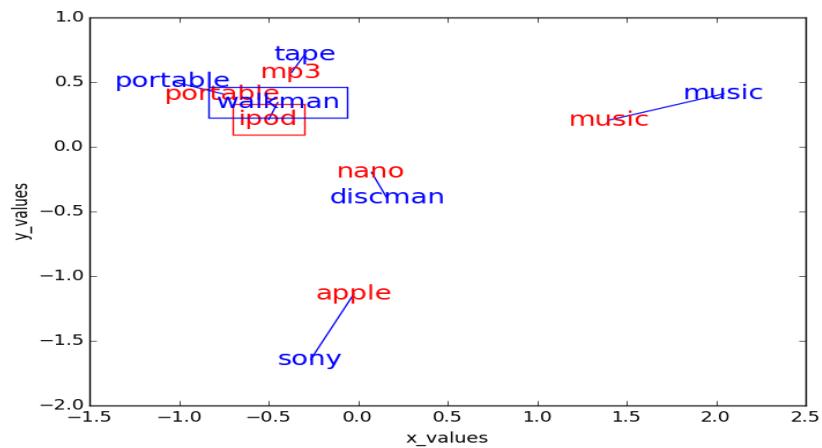
[1925,1931]

```
bush coolidge,hoover
merkel bruning,muller,marx,luther
schroder bruning,muller,marx,luther
chirac doumergue
kwasniewski moscicki,wojciechowski,rataj
kaczynski moscicki,wojciechowski,rataj
brown macdonald,baldwin
blair macdonald,baldwin
putin lenin,stalin
medvedev lenin,stalin
berlusconi mussolini
prodi mussolini
benedict pius
paul pius
zapatero alcala,zamora,azana
aznar alcala,zamora,azana
koizumi tsuyoshi,reijiro,hamaguchi,giichi,takaaki
abe tsuyoshi,reijiro,hamaguchi,giichi,takaaki
fukuda tsuyoshi,reijiro,hamaguchi,giichi,takaaki
aso tsuyoshi,reijiro,hamaguchi,giichi,takaaki
hatoyama tsuyoshi,reijiro,hamaguchi,giichi,takaaki
klestil miklas,hainisch
khol miklas,hainisch
prammer miklas,hainisch
prinzhorn miklas,hainisch
fischer miklas,hainisch
london london
petersburg leningrad
mumbai bombay
kolkata calcutta
chennai madras
oslo oslo,kristiania
wroclaw breslau
ankara istanbul,angora,constantinopole
chemnitz chemnitz
guangzhou canton,guangzhou
minh saigon
istanbul istanbul,constantinople
russia ussr,soviet
lanka ceylon
sri ceylon
thailand siam
myanmar burma
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Conclusions

- **Temporalia-1/2:** the only evaluation tasks entirely devoted to temporal information retrieval
 - Subtasks:
 - Temporal Query Intent Categorization (**TQIC**) and Temporal Intent Disambiguation (**TID**)
 - Temporal Information Retrieval (**TIR**) and Temporally Diversified Information Retrieval (**TDR**)
 - 22 teams participating, English and Chinese languages
 - Lots of space for future extensions
- **Temporal Counterpart Search:** 2 methods and test sets

Thank you!



Latest work: result visualization (with PCI)

Thank you!