

Recuperación de Información

Actualidad y Retos

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Contenidos

1 Recuperación de Información

2 Componentes básicos de un sistema de RI

- Rastreo
- Indexación
- Búsqueda (Ranking)

3 Retos



Contenidos

1 Recuperación de Información

2 Componentes básicos de un sistema de RI

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3 Retos



Recuperación de Información (RI)

RI: Definición

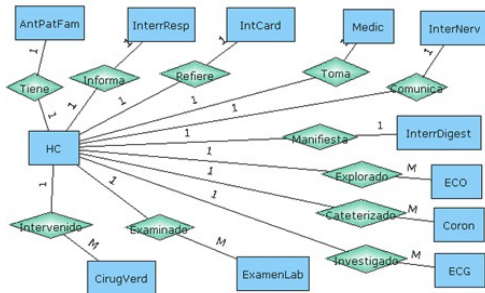
RI es encontrar **material** (usualmente docs) de naturaleza **no estructurada** (usualmente texto) que satisfaga una **necesidad de información** en grandes colecciones almacenadas en computadoras



RI vs RD

Recuperación de Datos (RD)

- Estructurada (BD)
- Indexación **por campos**



RI vs RD

Recuperación de Datos (RD)

- Lenguaje Consulta Cerrado
- No ranking

	ID	FULLNAME	CCID	AGE	GENDER	BIRTHDAY	REGISTRATIONDATETIME	ISDELETED
1	1	AAMIR HASAN	101	23	MALE	1990-01-01 00:00:00	2010-06-27 00:20:43.020	0
2	2	AMIR ALI	102	23	MALE	1993-02-01 00:00:00	2010-06-27 00:20:43.020	0
3	3	AHMED ALI	103	23	FEMALE	1994-08-01 00:00:00	2010-06-27 00:20:43.020	0
4	4	SONIA KHAN	104	23	FEMALE	1991-07-01 00:00:00	2010-06-27 00:20:43.020	0
5	5	AWAIS AHMED	105	23	MALE	1992-01-01 00:00:00	2010-06-27 00:20:43.023	0
6	6	AAMIR KHAN	106	23	MALE	1997-01-05 00:00:00	2010-06-27 00:20:43.023	0
7	7	SOBIA HINA	107	23	FEMALE	1988-01-01 00:00:00	2010-06-27 00:20:43.023	0
8	8	ADNAN KHAN	106	23	MALE	1987-01-01 00:00:00	2010-06-27 00:20:43.023	0
9	9	AAMIR HASAN	108	23	MALE	1997-04-01 00:00:00	2010-06-27 00:20:43.027	0
10	10	AAMIR HASAN	101	23	MALE	1990-01-01 00:00:00	2010-06-27 00:20:43.027	0
11	11	AAMIR KHAN	107	23	MALE	1990-01-01 00:00:00	2010-06-27 00:20:43.027	0

RI vs RD

Recuperación de Información (RI)

- No estructurada (p.e. texto)
- o Semi-estructurada (p.e. XML)
- Indexado Full-text



```
<?xml version="1.0" encoding="ISO-8859-1"?>
<report>
  <author>Ducyk, Philippe</author>
  <text>
    Specimen.
    The report body is inserted here.
    Specimen.
  </text>
  <patient>
    <id>123456789</id>
    <name>Patient, Fake A.</name>
    <birthdate>19501225</birthdate>
    <gender>M</gender>
    <zip>32610</zip>
    <city>Gainesville, FL</city>
    <country>USA</country>
  </patient>
  <request>
    <date>20070710</date>
    <info>Post operation check</info>
    <physician>Strangelove, Doctor</physician>
    <department>Orthopedics</department>
    <ward>PACU</ward>
    <state>H</state>
  </request>
  <exam>
    <code>1531</code>
    <description>Knee, left</description>
    <room>MOB9</room>
    <technician>DWI</technician>
    <radiologist>Duyck, Philippe</radiologist>
  </exam>
  <exam>
    <code>1521</code>
    <description>Femur, left</description>
    <room>MOB9</room>
    <technician>DWI</technician>
    <radiologist>Duyck, Philippe</radiologist>
  </exam>
</report>
```

RI vs RD

Recuperación de Información (RI)

- Consultas **libres**
- **Ranking** por relevancia

cancer treatment

Aproximadamente 209.000.000 resultados (0,14 segundos)

Sugerencia: [Buscar solo resultados en español](#). Puedes especificar el idioma de búsqueda en [Preferencias](#).

[Cancer Treatment - National Cancer Institute](#)

www.cancer.gov/cancertopics/treatment - Traducir esta página

Information on standard, complementary, and alternative methods of **cancer treatment**, on specific anticancer drugs, and on drug development and approval.

↳ [Types of Treatment - PDQ Cancer Information ...](#) - [Questions to Ask Your Doctor ...](#)

[Types of Treatment - National Cancer Institute](#)

www.cancer.gov/cancertopics/treatment/types-of-... - Traducir esta página [+1]

Information on chemotherapy, radiation therapy, surgery, and other **cancer treatment** methods.

[Cancer treatments - Cancer Information - Macmillan Cancer Support](#)

www.macmillan.org.uk/cancer-information - Traducir esta página

Information about **cancer treatment** including chemotherapy, radiotherapy and surgery, as well as information about individual drugs, how they are given and ...

[Management of cancer - Wikipedia, the free encyclopedia](#)

en.wikipedia.org/wiki/Management_of_cancer - Traducir esta página

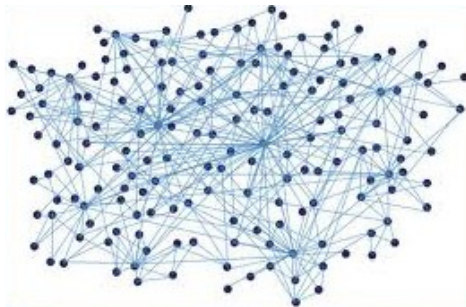
In a [Types of treatments](#): The **treatment of cancer** has undergone evolutionary changes as understanding of the underlying biological processes has ...

[Budwig Diet Center - Natural Alternative Cancer Treatment](#)

www.budwigcenter.com/ - Reino Unido - Traducir esta página

DOWNLOAD OUR FREE GUIDES and learn about our natural, unique and complementary alternative **cancer treatment** methods that endure the natural ...

Ejemplo paradigmático: La Web



- Motores búsqueda tipo Google
- Crawling, Indexación, Recuperación

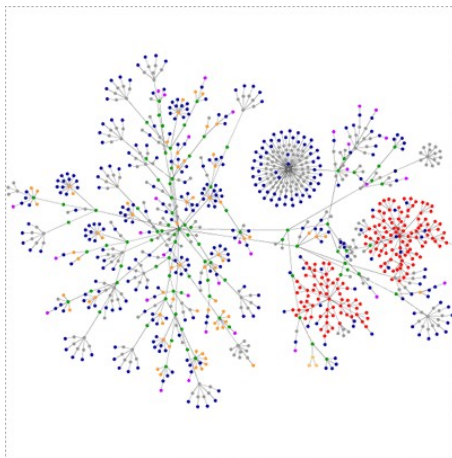
Ejemplo paradigmático: La Web



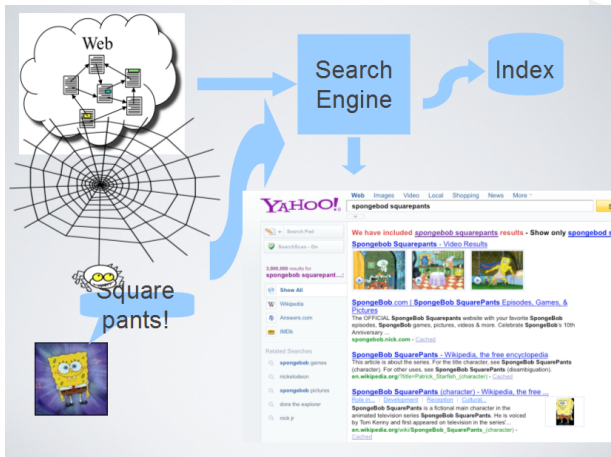
- Dinamismo
- Duplicidad
- Autoridad/Credibilidad

Ejemplo paradigmático: La Web

- Análisis de enlaces
- Texto de los enlaces (*Anchor text*)



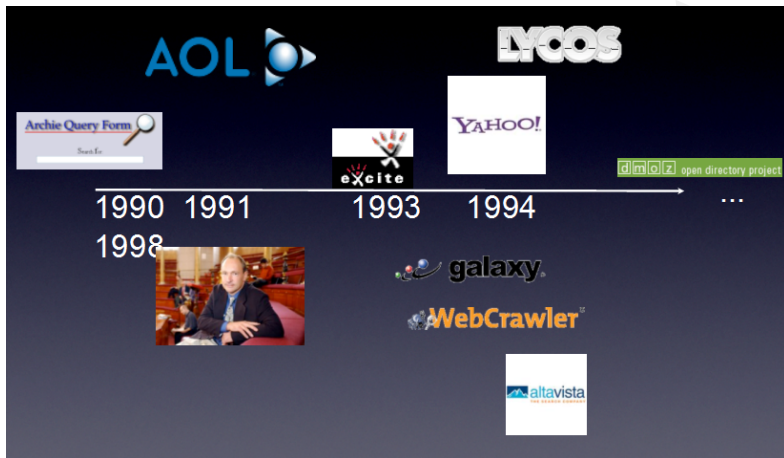
Web Search Engines



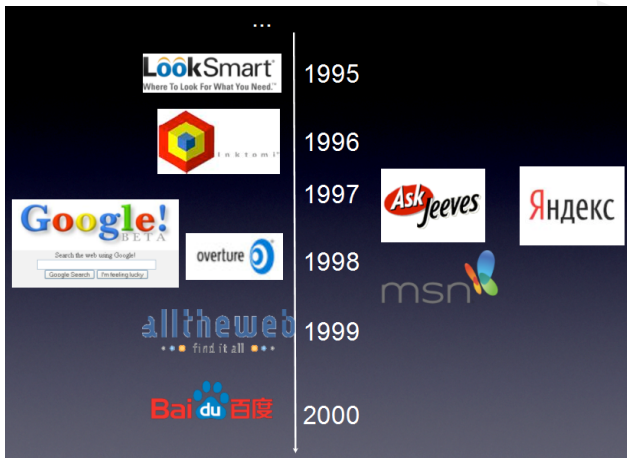
Web Search Engines (SE)

The screenshot shows a Yahoo! search results page for the query "andres iniesta". The page layout includes a top navigation bar with links for Web, Images, Video, Local, Shopping, News, and More. Below the navigation bar is a search bar containing the text "andres iniesta" and a yellow "Search" button. To the left of the search bar is a "Search Pad" section with links to "Search Pad" and "SearchScan - On". Below the search bar, the results are displayed in a two-column format. The left column lists "291,000 results for andres iniesta" and "Related People" with a list of football players: Gianluca Zambro... (with a small image), Fernando Torres (with a small image), Xavi (with a small image), Ronaldinho (with a small image), Cesc Fabregas (with a small image), Thierry Henry (with a small image), Lionel Messi (with a small image), and David Villa (with a small image). The right column displays the search results for "andres iniesta". It starts with "Also try: andres iniesta girlfriend, andres iniesta spain, more..." followed by a link to "Andres Iniesta - Official Site" with the URL "www.andresiniesta.es". Below this is a "News & Photos" section with a "Twitter" link. The "News & Photos" section contains a grid of four images: a portrait of Andres Iniesta, a photo of him in a red and blue jersey, a photo of him in a red and blue jersey, and a photo of him in a red and blue jersey. Below the images is a link to "more Andres Iniesta photos...". The "Latest News" section contains several news items: "Iniesta has seen W.Cup goal 'a thousand times'" (AFP via Yahoo! News - Sep 07 06:38am), "Spain: Messi scores as Barcelona blanks Racing" (Sports Illustrated - Aug 29 01:41pm), "Barcelona cruises to 3-0 win against Santander" (Boston Herald - Aug 30 02:46am), and a link to "more Andres Iniesta news...". Below the news section is a link to "Andrés Iniesta - Wikipedia, the free encyclopedia" with a small image of him. The Wikipedia link is followed by a summary of his career: "Club career | International career | Career statistics | Honours". The summary states: "Andrés Iniesta Luján is a World cup-winning Spanish football midfielder who currently plays for Spanish La Liga club FC Barcelona. His willingness to play anywhere on the pitch, coupled..." followed by a link to "en.wikipedia.org/wiki/Iniesta - Cached". Below the Wikipedia link is a link to "Andres Iniesta | andres-iniesta.com" with a small image of him. The link is followed by a summary of the website: "Andres Iniesta Fan Zone, a place for all fans of this amazing midfield player of FC Barcelona" followed by a link to "www.andres-iniesta.com - Cached". Below the fan zone link is a link to "Andrés Iniesta" with a small image of him. The link is followed by a summary of the website: "Barcelona.com : info on Andrés Iniesta, biography of Andrés Iniesta from FC Barcelona" followed by a link to "fc.barcelona.com/andres_iniesta - Cached". Below the biography link is a link to "Andres Iniesta Insists Barcelona Never Doubted ..." with a small image of him. The link is followed by a summary of the article: "Barcelona midfielder Andrés Iniesta has declared that his side never doubted themselves as they returned to winning ways with a resounding 5-1 dismantling of ..." followed by a link to "soccernews.bigsoccer.com/article/08d06JsdJ9Jb - Cached".

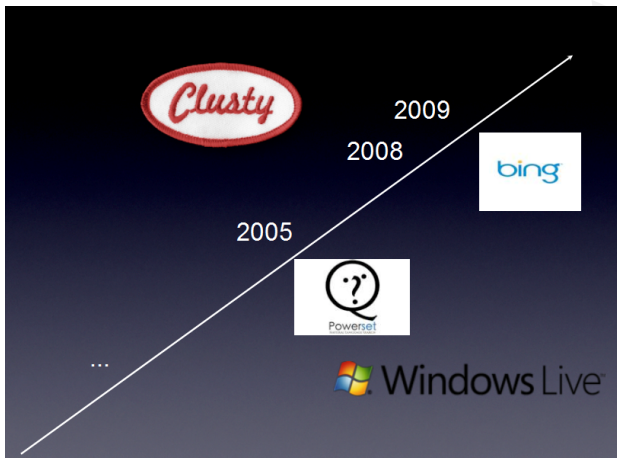
Historia de los SEs



Historia de los SEs



Historia de los SEs



Anuncios

Web Images Video Local Shopping More

debt settlement back end company Search Options

Showing results containing: Branch

Explore related concepts: Back End Processing commission Branch state coverage Debt Negotiation processing company business opportunity attorney

Search Pad SearchScan - On

10,700,000 results for debt settlement back...

Debt Aid Processing
Debt Settlement Back End Processing 100% commission
www.debtsettlementprocessors.com

Debt Settlement Software
Help Clients Settle Their Debt. Use Our Turnkey Software Solution.
thinkdebtthinksp.com

Back End Debt Settlement Net Branch Affiliate Opportunity
Debt settlement processing, Debt Settlement affiliate, Debt settlement net branch, back end debt settlement, debt settlement back end, debt settlement business opportunity
backenddebtsettlement.com - Cached

Debt Settlement Business in a Box
Debt Settlement - DebtSettlementNetBranch.com currently offers Debt Settlement Net Branch opportunities for the mortgage brokers and loan officers nationwide
www.debtsettlementnetbranch.com - Cached

Debt Settlement Back End Company
NLDS' debt settlement back end processing is a turnkey opportunity offering full back end support.
www.newlifelending.us/backend.html - Cached

Alliance8 - A Debt Settlement Processing Company
Alliance8 - A Debt Settlement Processing Company. Alliance8 offers an incredible business opportunity to provide a financial freedom to your clients.
www.alliance8.com - Cached

Start A Debt Settlement Business
Highest Payouts, Turn-Key System To Start Your Own Debt Settlement Co.
www.debtbranchusa.com

Debt Settlement Back End
Best resource for debt settlement back end. Get debt free now.
www.debtsettlementsite101.com

See your message here.

Ranking de imágenes/video

YAHOO! Web Images Video Local Shopping News More

percebes Search Options

SafeSearch: OFF Show only: ☐ Wallpaper ☐ Black & White [More Filters](#)

Also try: [what are percebes](#), [percebes galicia](#) [More...](#)

 File Percebes.JPG ... 2048 x 1536 664KB commons.wikimedia.org	 File Percebes.JPG ... 800 x 600 143KB commons.wikimedia.org	 PERCEBES 534 x 516 149KB goma2.com	 Eating Percebes, Mánora ... 718 x 539 101KB snapshots.travelvice.com
 ... Our harvest PERCEBES AGUINO 800 x 600 119KB agimar.es	 Percebes or Barnacles 480 x 640 31KB twftr.com	 Percebes 1024 x 768 153KB atavi.ch.cam.ac.uk	 Percebes 600 x 400 239KB daniquet.com
 Percebes Gallegos (Goose ... 593 x 520 119KB gastrogonia.com	 Percebes.jpg 1175 x 740 675KB pescadoscortes.com	 Los percebes son mariscos ... 600 x 400 33KB bbc.co.uk	 Percebes (Goose Barnacles ... 500 x 388 264KB godutchgirl.com

Respuesta Automática a Preguntas (QA)



The screenshot shows the WikiAnswers.com website. At the top, the navigation bar includes links for "Answers.com", "WikiAnswers.com", "Search", and "Help". Below this is a green header with the "Ask" button and a text input field containing "Difference between open source and conventi". To the right of the input field is a "Go" button. Below the header, there are links for "Browse: Unanswered questions | Most recent questions | Reference library". A blue sidebar on the left contains a "Sign in" section with fields for "Username" and "Password", a "Remember me" checkbox, and "Sign in" and "Join now" buttons. Below the sidebar is an "ADVERTISEMENT" for "Hotels.com". The main content area displays a question: "Q: Difference between open source and conventional source?". Below the question is the answer: "A: The difference between open source software and conventional 'closed source' software is primarily the availability of the source code to the general public. In conventional source software, the source is kept private within the company or person(s) that the author the code. Generally, all updates and improvements to the software are made and distributed by the original authors. Where as, with open source software the code is made available to persons and organizations outside of the organization that authored the original code. Since the code is generally readily available to the public, many people have the ability to view, troubleshoot, update, improve, and modify the code. There are many different types of open source software. For more information of these types one should search for more".

Aplicaciones de la tecnología de RI

- Búsqueda de Texto/Web
- Búsqueda de anuncios
- Búsqueda de expertos
- Búsqueda multimedia
- Búsqueda de emails
- Sistemas QA
- Sistemas de Recomendación
- Búsqueda escritorio
- Búsqueda corporativa



Contenidos

1 Recuperación de Información

2 Componentes básicos de un sistema de RI

- Rastreo
- Indexación
- Búsqueda (Ranking)

3 Retos



Sistemas de RI

Colección de documentos

- web, artículos científicos, tests clínicos, ensayos, etc.
- Rastreo?



Rastreo



Crawler/Araña/Robot/WebBot

- Cola de URLs a visitar
- Método para recuperar y procesar recursos web
- Parser de páginas para extraer enlaces salientes
- Conexión con el indexador del SE



Rastreo

Modo de operación

1. Inicializar conj. de **páginas semillas**
2. Repetir
 - 2.1 Tomar URL de la cola
 - 2.2 Recuperar y parsear la pág web
 - 2.3 Extraer URLs de la pág
 - 2.4 Añadir URLs a la cola

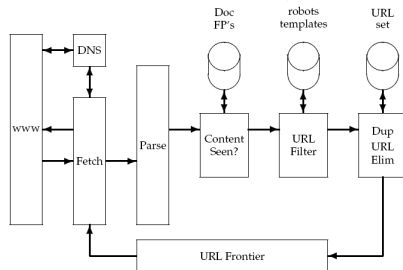


Figure 20.1 Basic crawler architecture.

Rastreo

Retos

- Escalabilidad
- Páginas spam
- Duplicidad
- *Spider traps*
- Distribuir carga (muchas arañas en paralelo)



Rastreo

Retos

- Ratio de revisita variable
- Ancho de banda
- Profundidad de rastreo
- Respetar sitios web (*politeness*)
(`robots.txt`)



Indexado

Fundamental para hacer la información accesible

- 1879: Index Medicus para catalogación de trabajos médicos
- 1960s- : MEDLINE (puede considerarse la versión electrónica de Index Medicus)



Indexado Manual

- Un humano asigna **términos de indexación** y **atributos**
- Usualmente siguiendo una terminología **estandarizada** (tesauro, vocabulario controlado, ...) y un **protocolo** específico
- **Poca escalabilidad**

Ej.- BD bibliográficas



Indexado Automático

- Realizado por **computadoras**
- Usualmente **full-text**, limitándose a cuestiones básicas de preprocesado



Indexación Automática

- A partir de los 90 con el crecimiento de la Web
- **Ficheros invertidos**
- **Ponderación** de términos (tf/idf,...)
- **Análisis de enlaces** (PageRank, HITS, etc.)
- **Recopilar** la colección (crawling) vs **colección explícita** (p.e. MEDLINE)



Indexación

- Índice o fichero invertido
- vocabulario controlado o no
- metadatos
-

E

Eating aids, 127–28

Emergencies, 119, 128–29, 146–47, 248–64—

fire, 98, 147

power outages, 98

Emergency first aid, 248–65—

first aid kits, 265

F

Fainting—

dealing with, 259–60

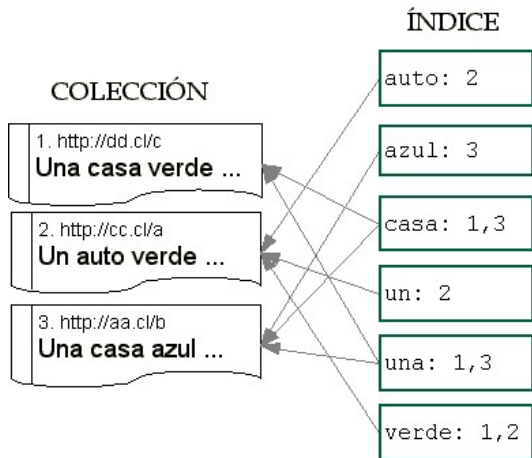
prevention, 259

Falling and related injuries—

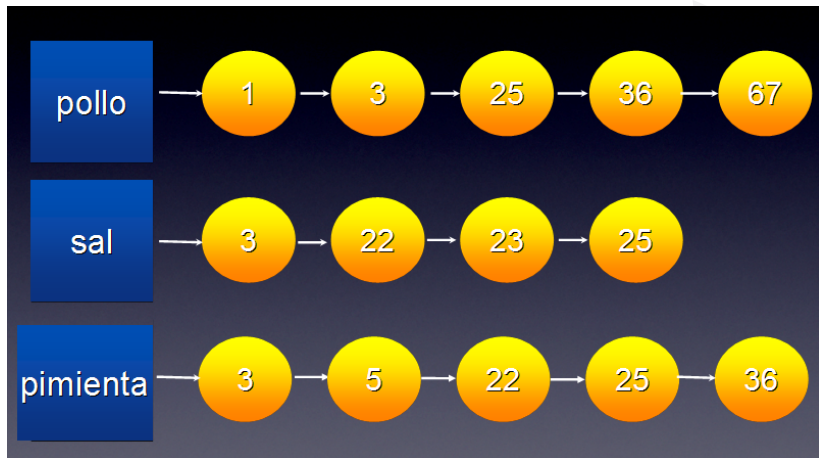
broken bones, 258–59

prevention, 257

Indexación



Índice invertido



Preprocesamiento

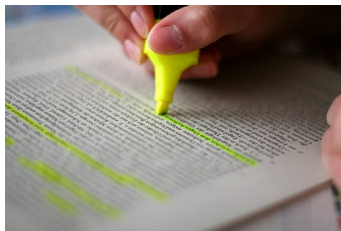
- Stemming/Lematización

computer, computing, ... => comput

- Stopwords

- Procesamiento de Lenguaje Natural

Part-of-Speech (POS), Reconocimiento de Entidades, etc.

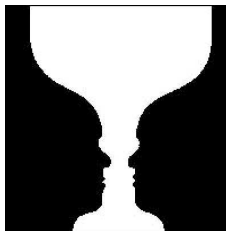


Desambiguación (polisemia)

AIDS vs hearing aids

EKG leads vs lead poisoning

- **Contexto**, recursos **terminológicos** externos (p.e. Wordnet y sus synsets)



Acrónimos y nombres compuestos

Acrónimos

EPOC, RTH, VIH, ...

Nombres compuestos

Anquilomatosi s cutánea,
Abombamiento apical,
Reticulohistiocitosis
multicéntrica, ...

Medical Abbreviations

IAA - interrupted aortic arch

IABP - intra-aortic balloon pump

IAC - internal auditory canal

IASD - interatrial septal defect

IBD - irritable bowel disease

IBI - intermittent bladder irrigation

IBW - Ideal body weight

IC - intracutaneous

ICA - internal carotid artery

ICBG - iliac crest bone graft

ICCE - intracapsular cataract extra...

ICCU - intensive coronary care unit

ICD - International Classification of ...

ICF - intracellular fluid

ICF - intermediate care facility

ICH - intracranial hemorrhage

ICM - idiopathic cardiomyopathy

Look Up :iab|.....

Extracción de Información

Extraer hechos o conocimiento a partir de texto libre

- Una forma de **minería de textos**
- Procesamiento de Lenguaje Natural (NLP)



Procesamiento de Lenguaje Natural

- Procesar la **narrativa**
P.e. en informes de pacientes
extraer síntomas, resultados de tests, condiciones físicas, etc.
- Necesaria **alta precisión**

[illegible]

Sistemas de RI

Recuperación

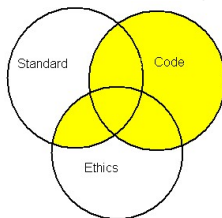


Tipo de búsqueda

Emparejamiento exacto o Búsqueda booleana (AND/OR/NOT)

propanolol AND hypertension

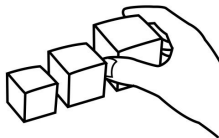
- Dificultad de **comprensión** de las conectivas booleanas
- Difícil **controlar** el tamaño del conjunto de salida
- Estimación **binaria** de la relevancia



Emparejamiento parcial

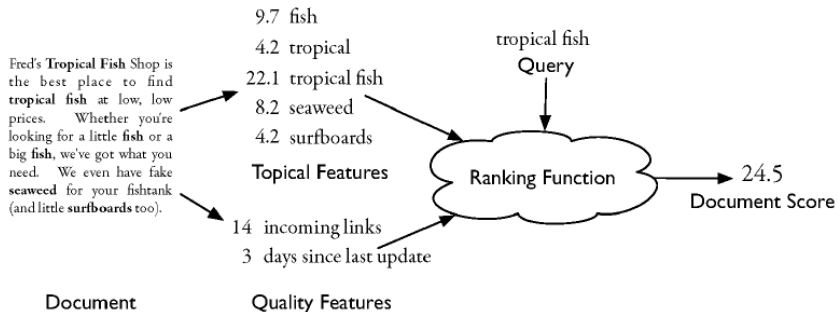
Ranking

- Consulta en **lenguaje natural libre**
- **Ponderación** de términos (tf/idf y sus muchas evoluciones)
- **Funciones** de ranking
Modelos probabilísticos (BM25, Language Models, etc)



Ranking

Factores dependientes de la consulta + factores independientes



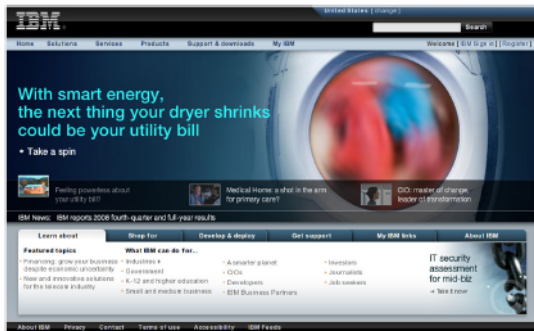
Texto de los enlaces (*Anchor Text*)



IBM

IBM manufactures and sells computer services, hardware, and software. Also provides financing services in support of its computer business.

www.ibm.com



Análisis de Enlaces

PageRank (Google)

- Sistema *democrático* de votación
1 enlace entrante $\rightarrow$ 1 voto
- Simple cuenta de enlaces no es suficiente
- El *PageRank* de una página
Medida objetiva de importancia



Análisis de Enlaces

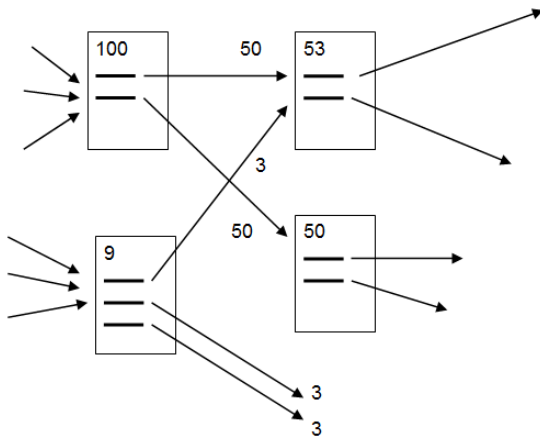
PageRank (Google)

- Si $T_1, T_2, \dots, T_n$ apuntan a una pág. A
$$PR(A) = (1 - d) + d \cdot \left(\frac{PR(T_1)}{C(T_1)} + \dots + \frac{PR(T_n)}{C(T_n)} \right)$$

 $C(P)$, número de enlaces que tiene la página P
 $d \in [0, 1]$, factor de escalado
- PR crece con el núm. de *inlinks*
- PR crece con la calidad de las págs que apuntan a A
(ej.- pág. que figura en el directorio de Yahoo)

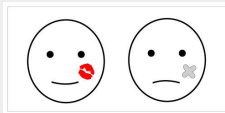


PageRank (Google)



Mejorar la búsqueda

Realimentación de relevancia



Selección de términos y Expansión de consultas

Automática o asistida



Más servicios de búsqueda

Operadores de proximidad

colon ADJ5 cancer

Recuperación de pasajes

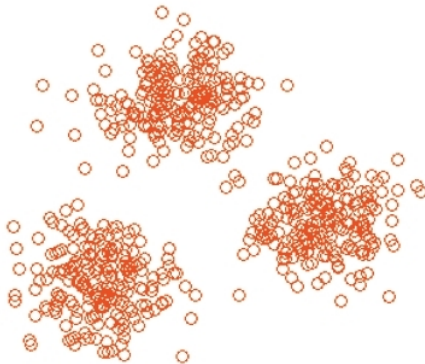
- **discurso** (párrafos, oraciones, etc.)
- **semánticos** (automatizar el troceado conceptual de los textos)
- de ventana



Agrupamiento

Clustering

- grupos **no** predefinidos
- **descubrir** las clases de los ejemplos



Filtrado

- **Flujo** de docs (p.e. stream de noticias)
- Esencialmente técnicas estándar de RI
- **Perfil de interés** $\leftrightarrow$ Consulta
- **Adaptativo** o por **lotes** (batch)



Generación Automática de Resúmenes

- Extracts vs Abstracts
- Grado de reducción, Informativos y bien formados
- Orientados a consulta (p.e. web snippets) o no

[Varicela: MedlinePlus enciclopedia médica](http://www.nlm.nih.gov/medlineplus/spanish/ency/article/001592.htm)

www.nlm.nih.gov/medlineplus/spanish/ency/article/001592.htm

8 Feb 2011 – La **varicela** se puede contagiar muy fácilmente a otras personas. Usted puede contraerla tocando los líquidos de una ampolla de **varicela** o si ...

↳ [Vista de cerca](#) - [Lesión en la pierna](#) - [Lesiones en el tórax por varicela](#) - [Varicela](#)



Recuperación con Lenguas Cruzadas

CrossLingual Information Retrieval (CLIR)

- p.e para recuperar datos de ensayos clínicos no escritos en nuestra lengua de origen
- p.e. para propósitos educativos: aprender la terminología médica en Inglés



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Frontiers, Challenges, and Opportunities for Information Retrieval (SWIRL 2012)



Temas comunes

Not just a ranked list

Move beyond the classic *single adhoc query and ranked list* approach, considering richer modes of querying, models of interaction, and approaches to answering

cancer treatment

Aproximadamente 209.000.000 resultados (0,14 segundos)

Sugerencia: [Buscar solo resultados en español](#). Puedes especificar el idioma de búsqueda en [Preferencias](#).

Cancer Treatment - National Cancer Institute

www.cancer.gov/cancertopics/treatment - Traducir esta página

Information on standard, complementary, and alternative methods of **cancer treatment**, on specific anticancer drugs, and on drug development and approval.

¹⁴ Types of Treatment - PDQ Cancer Information ... - Questions to Ask Your Doctor ...

Types of Treatment - National Cancer Institute

www.cancer.gov/cancertopics/treatment/types-of-... - Traducir esta página

Information on chemotherapy, radiation therapy, surgery, and other **cancer treatment** methods.

Cancer treatments - Cancer Information - Macmillan Cancer Support

www.macmillan.org.uk - Cancer information - Traducir esta página

Information about **cancer treatment** including chemotherapy, radiotherapy and surgery, as well as information about individual drugs, how they are given and ...

Management of cancer - Wikipedia, the free encyclopedia

en.wikipedia.org/wiki/Management_of_cancer - Traducir esta página

Ir a **Types of treatments**: The **treatment of cancer** has undergone evolutionary changes as understanding of the underlying biological processes has ...

Rudwig Diet Center - Natural Alternative Cancer Treatment

www.budwigcenter.com - Reino Unido - Traducir esta página

DOWNLOAD OUR FREE GUIDES and learn about our natural, unique and complementary alternative **cancer treatment** methods that enduce the natural ...

Temas comunes

Help for users

Ways that IR technology can be extended to support users more broadly, including ways to bring IR to inexperienced, illiterate, and disabled users



Temas comunes

Capturing context

Ways to incorporate what is happening with and around a user to affect querying and result presentation. In particular, this theme treats people using search systems, their context, and their information needs as critical aspects needing exploration



Temas comunes

Information, not documents

Push Information Retrieval research beyond document retrieval and into more complex types of data and more complicated results



Temas comunes

Domains

Consider information that is not simply text and that has not been thoroughly explored by IR research so far – data with restricted access, collections of *apps*, and richly connected workplace data



Temas comunes

Evaluation

A perennial issue in Information Retrieval, evaluation remains important, particularly as the field expands into new challenges. This theme includes topics that require or suggest new techniques for evaluation as well as those that need evaluation in the context of new challenges



		Not just a ranked list	Help for users	Capturing context	Not just documents	New domains	Evaluation
4.1	Conversational Answer Retrieval	X			X		
4.2	Empowering Users To Search and Learn	X	X	X			
4.3	Finding What You Need with Zero Query Terms	X		X			
4.4	Mobile Information Retrieval Analytics			X	X	X	X
4.5	The Structure Dimension				X	X	
4.6	Understanding People in Order to Improve I(R) Systems			X			X
5.1	Abstracting Information Retrieval Evaluation						X
5.2	Adapting to Various Sites, Tasks and Contexts			X			
5.3	Axiometrics – Foundations of Evaluation Metrics in IR						X
5.4	Before and After the Mobile Query			X			
5.5	Community Evaluation Service						X
5.6	Exploring the Intersection of Social and Algorithmic Search						
5.7	Getting Your Life Back: ... Personal Data					X	
5.8	Information Retrieval				X		
5.9	IR4ALL: Addressing ... Divides to Search		X				
5.10	Information Retrieval for the Ecosystem of Apps			X		X	
5.11	Information Seeking Stage Aware Search	X	X	X			
5.12	Protecting Users' Privacy in Search			X			
5.13	Search Among Secrets					X	
5.14	Simulation of Interaction	X					X
5.15	Spoken Information Retrieval		X		X		
5.16	Super Models of Information Retrieval Interaction	X					
5.17	Supporting Complex Search Tasks	X					
5.18	Time Changes Everything	X			X	X	
5.19	Understanding and Evaluating Rich Aggregated Answers	X			X		X
5.20	Understanding Opinion Engineering					X	
5.21	Understanding Search in the Workplace			X		X	

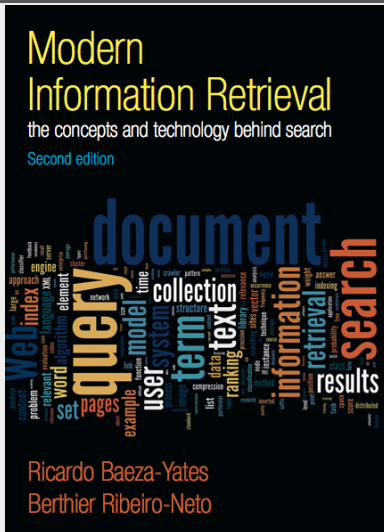
<http://www.cs.rmit.edu.au/swirl12/>

SWIRL'12: The Second Strategic Workshop on Information Retrieval. Lorne (Australia)

- James Allan, Bruce Croft, Alistair Moffat, and Mark Sanderson (eds.), "Frontiers, Challenges, and Opportunities for Information Retrieval: Report from SWIRL 2012." SIGIR Forum, 46(1):2-32, June 2012.
- An annotated list of recent papers: key challenges and developments in the IR area.

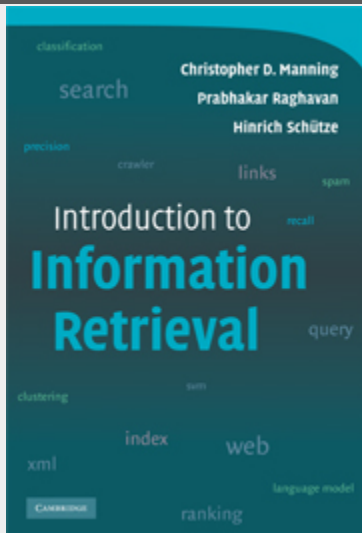
Referencias bibliográficas

www.mir2ed.org



Referencias bibliográficas

nlp.stanford.edu/IR-book/



Referencias bibliográficas



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