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Biomedical Web, Collections and Meta-Analysis Literature Applications

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1. Introduction

Cause and effect of the digital revolution is the production of a lot and different kinds of web tools, applications and resources that permit optimization the retrieve, management and analysis of biomedical bibliography. The information revolution is a cause and effect of scientific and technological progress of the twentieth century, amount of information that is now produced on different scientific topics is huge plus: It can be electronic or printed, there is text, images and sounds is systematized in databases data, catalogs or lists, your query can be free or restricted, is on life or their parts, phenomena and explanations, cover publications, researchers, projects, groups and research lines, agreements, grants, scientific, institutions research and teaching, biological collections, educational institutions and societies science, to name a few. Refer to information in the twenty-first century involves the mention of terms, methods, novel and innovative theories as knowledge society, information society, globalization, info diversity, access to information, e-science, e-research, grid, collaboratories, repositories, knowledge based on literature, text mining, semantic web, impact index, cocitation, web 2.0 and 3.0, social networking, plagiarism, and free access. Those changes have been dramatically impacted the contemporary world view, scientific practice and scientific relations, social, economic, political and cultural (Russell, 2001).

Scientific society generates and receives information, it is exposed to it as a representation of thought and knowledge in all cases creates a conscious or unconscious interest transmits individually or collectively. The scientific communities recognize the value of the information, required it as a condition to perform fundamental research. Published information on biology and medicine is not exception, the quantity, diversity and complexity of digital information are so many and so different, some electronic resources through which you can access it are not simple, which has made it necessary to be informed and update on the continuing emergence and modification of these tools, while it has become a problem to solve: continuously published magazines in a large number of items. Recover strategies and analysis of information on the specific area of interest of researchers and design programs and websites constantly to achieve this (Larson, 2010a).

Electronic resources with biomedical literature can be consulted electronically Internet allows instant access to digital data collections updated with information generated by the

specialists (Faciola, 2009). The power of the new electronic technologies has increased exponential, we have designed a lot of applications that allow you to group, sort and display documents which have reduced power, cost and time required to analyze literature specialized (Hey & Trefethen, 2005). Not only that, in less than ten years has changed the practice of science, is no longer explores the reality only through experiments and models *in vivo* and / or *in vitro* but made *in silico* tools and computational methods (Atkins *et al*., 2003). This phenomenon has affected both the way we produce scientific knowledge that have developed new fields of knowledge practiced by specialists, such as bioinformatics, medical informatics, biological informatics, neuroinformatics, and literature-based discovery, among others. The change has been important even in the way recovered and analyzed the literature so much that you have proposed new ways to access the information to put aside the reductionist approach and adopt a system according to the progress of own biological discipline.

The search, access, analysis and updating of the literature in databases has become a daily task. It is usually necessary to consult several indexes to have more complete representation of the literature on the topic of interest (Zhou *et al*., 2006). But such is the quantity and diversity of papers on biomedicine, there are so many, so different and complex electronic resources (especially bibliographic databases) through which you can access that information, not just that, but change, progress and constantly updated, it is difficult to keep track of them all and identify which and how many can and should use.

2. Biomedical web

The Biomedical Science is one of the most innovative and cutting-edge in science, excellence and is recognized today. The literature in this field is applied in several biomedical practice areas, ranging from the production of new biological knowledge to resource management, assessment, management and science policy (Labarga, 2009). For these reasons essential to include an innovative course in art, sort and classify all electronic resources for the recovery and analysis of specialized information effectively and efficiently, in a review of the types and characteristics of digital information, explaining definitions basic, to explore its importance and implications, are synthesized and explain the electronic resources online more relevant and practical, especially databases and specialized software, are presented source's compendiums from which information can be extracted and understanding (Rizkallah & Sin, 2010; Weeber *et al*., 2005; Henderson, 2005) like scientometrics studies (Cokol & Rodriguez-Esteban, 2008; Uthman, 2008; Li *et al*., 2009; Boyack, 2004).

Also allow stakeholders to introduce the necessary tools to make reports to information and documents indexed journals, impact, collaboration and citation of own production commonly requested by the evaluation committees of National Foundations and councils.

This chapter presents the application of an interdisciplinary and integrative approach to use biomedical literature to extract, analyze and manage specialized literature efficient, prompt, timely, comprehensive and organized.

Contrary to common understanding now exist a lot of friendly electronic tools for non informatics specialist's that permit literature Biomedicine management, designed from informatics specialist's to all others. Previous knowledge it's not needed to use this web tools and services (Hull, *et al*., 2008; Renear, & Palmer, 2009). Most of them are open access resources. Some of their advantages are:

1. Explain in detail the cyberinfrastructure (resources, tools and services) available for the management of literature specializes in biomedicine, keeping with the needs and challenges of our time and explains the characteristics of each, Biomedicine.
2. Present the stages of document retrieval electronics and how to handle this is done in an efficient, effective and updated.
3. State the main bibliometric indicators are frequently used to evaluate literature.
4. Apply new techniques to analyze the references, the contents of scientific papers and large quantities of documents simultaneously, including network analysis and discovery based on the literature.

In this chapter we will classify, systematize and describe the most useful web-based applications for innovative retrieval and processing of biomedical literature; all of them are friendly and can be used by any scholar or biomedical specialist. We will present all resources in three categories: 1) general web applications, 2) literature collections and 3) meta-analysis tools in logic retrieval and processing literature order (Fig. 1).

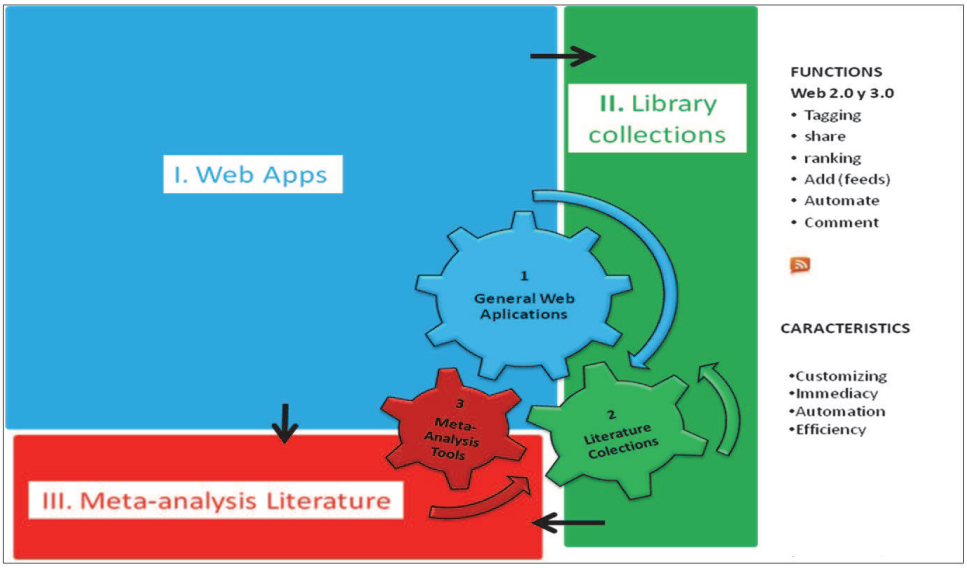


Fig. 1. The resource's classification for retrieval biomedical information.

2.1 Web literature retrieval

Digital information retrieval from the Web, in a modern sense is a personalized, automatic, multitask, integrated and immediacy process (Larson, 2010b) the stages of document retrieval electronics and how to handle this is done in an efficient, effective and updated form with specific apps. The process consists of: search (browser, search engines and collections), bookmark (Bookmarks), manage (reference management) share and analyze (Meta-analysis apps).

Every day a lot of innovative web apps appeared with Biomedical scholar interest like web pages, wikis, blogs and search engines (web 2.0 and web 3.0), social networks, feeds, reference management software and mobile resources, the most relevant for biomedicine.

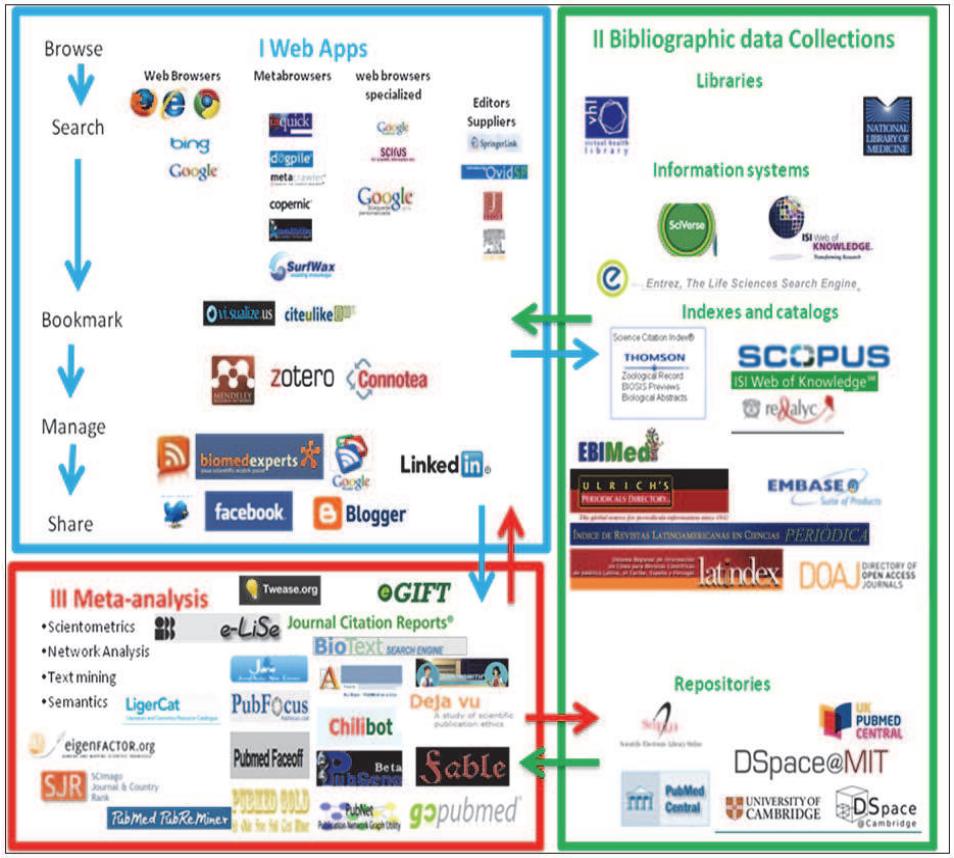


Fig. 2. Process for retrieval information.

The process for retrieve literature on the web begins with the web browser, the Merriam-Webster's dictionary (2011) defines a web browser as a computer program used for accessing sites or information on a network (as the World Wide Web). This is a simple, yet accurate description. Web browsers come in many different styles, each with their own nuances. However, the main reason a person utilizes a web browser is to view web pages on the Internet, similar to the way you are viewing this book right now. Today there are the two main open source web browsers with add-on options (something as an accessory or added feature that enhances the thing it is added to) that the search experience, Firefox from Mozilla (http://www.mozilla.com/en-US/firefox/) and Chrome from Google (http://www.google.com/Chrome) (Fig. 3), right now our favorite is the second one, because is easy and speed, but right now the first one has the most bigger gallery of complement options.

There are a lot of resources, tools and services available for the management of literature Biology specializes in keeping with the needs and challenges of our time, the most efficient could be installed in the browser for better and faster use.

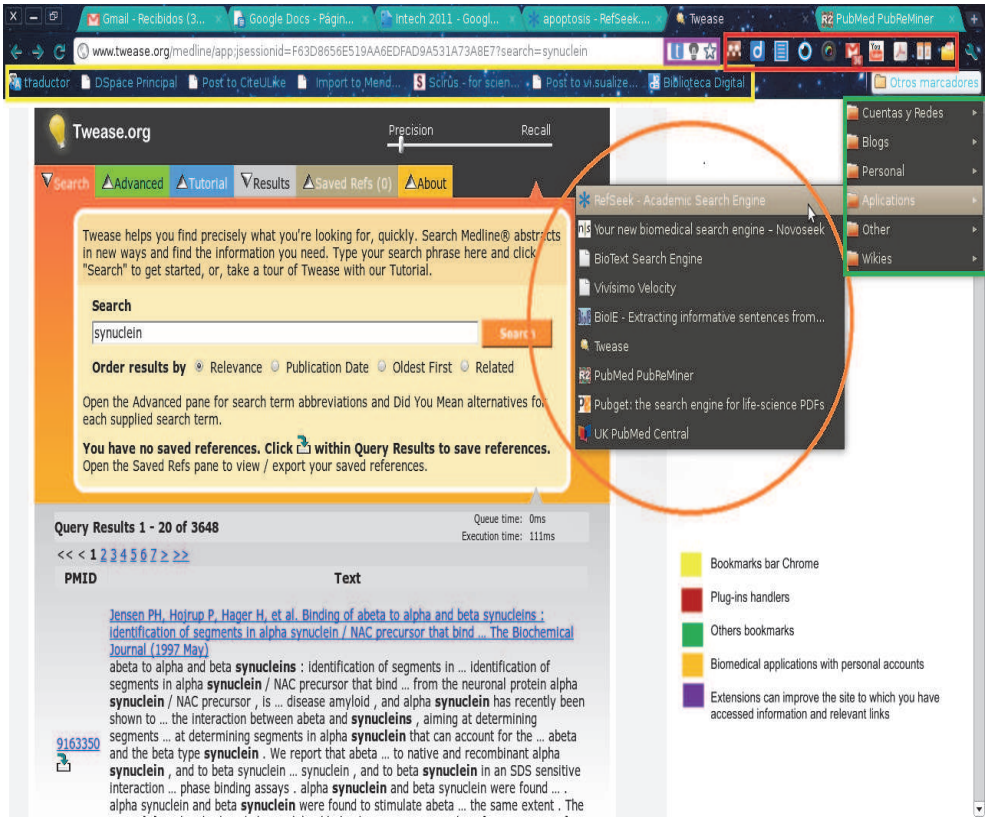


Fig. 3. Chrome personalized browser for biomedical literature retrieval.

2.1.1 Search engines and meta-searchers

There are thousands of search engines in the Internet, a program that searches documents for specified keywords and returns a list of the documents where the keywords were found. They create a web pages database that use any algorithm to classify the web pages (wikis, blogs, sites, …), the most biggest and also the most used for general research are Google, Bing, Yahoo, Altavista, Lycos, and Ask. But there are some scholar biomedical search engines that filter and index specialized and certified web pages like Scirus, Scientific WebPlus, Orefil, Nextbio or Quertle (Table 1).

Biomedical search engine	Total records	URL
Scientific WebPlus	Is an open Web search engine created by Thomson Reuters that harnesses the power of our editorial expertise, controlled vocabularies, and proprietary relevancy algorithms. It is designed to complement your search results, bringing the most relevant Web resources to the forefront for the professional researcher. WebPlus allows you to search the Web by Topic, Person/Author, Source, Institution, Organism, Drug, and Gene. Displays the 250 most important results, was help of windows live search.	http:// scientific.thomsonwebplus.com/ BasicSearch.aspx
Scirus	Covers over 410 million science-related Web pages.	http:// www.scirus.com/
Orefil	OReFiL uses DBCLS's (Database Center for Life Science). Whatever the query, which displays the maximum score is 1,000 to 10,000 results.	http://orefil.dbcls.jp/
Nextbio	NextBio indexes over 19 million abstracts from PubMed and over 130,000 full-text publications from PubMed Central. For its literature search, NextBio uses a number of heuristics, including: 1. Extensive ontology with relationships between terms, synonyms, as well as a term hierarchy 2. A customized domain-specific stop word list and analyzer that emphasizes ontology terms 3. The authority of the journal where the paper was published 4. Publication date	http:// www.nextbio.com/b/ nextbio.nb
Quertle	Creating its own database of about 250 million of relationships.	http:// www.quertle.info/v2/

Table 1. The Most popular scientific search engines. General search, retrieval from 16 February 2011, *Papers published in journals

2.2 Biomedical collections

Computing tool of choice for systematizing the documents and metadata are the databases, a computerized bibliographic records stored in tables with an established order that allows you to save, sort, retrieve and generate information. We will divide the main biomedical literature collections in five kinds: 1) Libraries, 2) Information systems, 3) Index and catalogs, 4) Bookstores or editorials (press) and 5) Repositories. We classified a sample of each one.

Literature Collection	Example	URL
e-Library	MedLine	http://www.nlm.nih.gov/databases /databases_medline.html
Information system	Entrez	http://www.ncbi.nlm.nih.gov/sites/gquery
Paper index o catalog, Journal index o catalog	PubMed Journals NCBI	http://www.ncbi.nlm.nih.gov/nlmcatalog/journals
Press	Biomed Central	http://www.biomedcentral.com/
Repository	PubMed central	http://www.ncbi.nlm.nih.gov/pmc/

Table 2. Kinds of biomedical collections

A digital library (e-Library**)** comprises digital collections, services and infrastructure to support lifelong learning, research, scholarly communication and preservation and conservation of our knowledge recorded and democratization, has a clear goal and are formed with a selection of content organized through a descriptive metadata (cataloging) and also associated with some facilities for search and use of services (Borgman, 1999), makes use of telecommunications and particularly the Internet to facilitate access to its contents remotely or locally through various connected systems that provide control and preservation of resources, while providing added services around the needs of users and information collected managed and preserved.

If a Web application allows you to consult more than one library collection simultaneously, we have named the information system (Villanova-Oliver *et al*., 2003). We define all information collection systematized into a digital database with immediate access, designed with the intention of making them available for those interested in his consultation with academic and made available through the Web.

We define also a library collections or literature as all those documents that record information about scientific research product is the result of a process of planning and balanced acquisition of library materials in various formats, mainly primary literature consists of books, magazines and conference proceedings, online resources, and other media, bibliographies, references, stored, structured and inter-linked for retrieval using a computer system.

Press is the process of production and dissemination of literature or information, the activity of making information available for public view. In some cases, authors may be their own publishers, meaning: originators and developers of content also provide media to deliver and display the content. Traditionally, the term refers to the distribution of printed works such as books (the "book trade") and newspapers. With the advent of digital information systems and the Internet, the scope of publishing has expanded to include electronic resources, such as the electronic versions of books and periodicals, as well as micropublishing, websites, blogs and video games.

There is necessary for a better information retrieval to know the main characteristics of the datasets for search like temporal coverage, geographic coverage, topic coverage, size coverage and typological coverage. For better understand we present a key card with the dissection of PubMed the most used bibliographic biomedical database (Table 3).

CHARACTERISTICS	DESCRIPTION
Name	PubMed
Editor/Producer	National Center for Biotechnology Information, U.S. National Library of Medicine.
Access	Free
Language	English
Typological coverage	Scientific articles, online books, case reports, clinical conferences, clinical trials, comparative studies, conferences, commentaries, dictionaries, directories, editorials, evaluation studies, government publications, historical articles, interactive tutorials, interviews, letters, newspaper articles, revisions, retractions of publications, technical reports, twin studies, web-cast. Is accompanied by other resources contained in other databases under the responsibility of NCBI as sequences of genes and proteins, and analysis.
Subject coverage	Biomedical and life sciences. As well as dentistry, nursing, veterinary, pharmaceutical, and other related.
Temporal coverage	1951
Start date	1997
Geographical coverage	"World" (70 countries)
Language of documents	Usually in English. Also French, German, Italian, Japanese, Russian, Spanish, Albanian, Catalan, Korean, Polish, Portuguese, Romanian, Serbian, Slovenian, Turkish, and Vietnamese among others.
Thesaurus	Yes, through MeSH.
Total records	Journals: 23,000. Records: 20 million.
Update	Every 2 days
Number of records displayed per page	5, 10, 20, 50, 100 y 200
Access full text	Yes, when the document is freely available, is in PubMed Central, or have the relevant subscription to the journal.
Search fields	Title, abstract, author, book, corporate author, creation date, number EC / RN, editor, filter, first author, author's full name, full name of investigator, ISBN, issue, volume, journal, language , last author, ID, location, name of substances.
Save the query	If you have a My NCBI account.
Advanced search	Affiliation [AD] Article Identifier [AID] All Fields [ALL]

	Author [AU] Book [book] Comment Corrections Corporate Author [CN] Create Date [CRDT] EC/RN Number [RN] Editor [ED] Entrez Date [EDAT] Filter [FILTER] First Author Name [1AU] Full Author Name [FAU] Full Investigator Name [FIR] Grant Number [GR] Investigator [IR] ISBN [ISBN] Issue [IP] Journal Title [TA] Language [LA] Last Author [LASTAU] Location ID [LID] MeSH Date [MHDA] MeSH Major Topic [MAJR] MeSH Subheadings [SH] MeSH Terms [MH] NLM Unique ID [JID] Other Term [OT] Owner Pagination [PG] Personal Name as Subject [PS] Pharmacological Action MeSH Terms [PA] Place of Publication [PL] PMCID & MID Publication Date [DP] Publication Type [PT] Secondary Source ID [SI] Subset [SB] Substance Name [NM] Text Words [TW] Title [TI] Title/Abstract [TIAB] Transliterated Title [TT] UID [PMID] Volume [VI]
Export records	Yes, via e-mail and bibliography managers EndNote, Reference Manager, and ProCite.
Citation analysis	No.
List of journal indexed	Yes, by downloading a file.

Displayed documents references	No
Links to full text electronic document	Yes
Search by keyword	No
Abstract	Yes
Interface language	English
URL	http://www.ncbi.nlm.nih.gov/pubmed
Related document	Yes
Web 2.0 apps	RSS, bookmarks, alerts, saved search results by e-mail.
Document selection criteria	Is based on the magazine Coverage: Articles mainly on basic biomedical research. Quality: validity, relevance, originality and contribution to the field coverage of content. Editorial quality, objectivity, credibility and quality of its contents, peer review, ethical quality, timely correction of errors. Production Quality: Design, printing, graphics and illustrations (but not pre-requisite) Audience: health professions: researchers, practitioners, educators, administrators and students. Content type: Reports of original research, original clinical observations accompanied by analysis and discussion, analysis of philosophical, ethical, social or health professions or biomedical sciences, critical commentaries, statistical compilations, descriptions of evaluation methods or procedures, case reports with discussions. Language: At least title and abstract in English. Geographic coverage: Generally not be selected for indexing if the contents are subjects already well represented in MEDLINE or published to a local audience.
Records meta-analysis*	No
Tools	My NCBI. Save searches, results, bibliography, and has an automatic update option. My NCBI preferences. Storage, highlight search terms, abstract screen, additional data. Furthermore, filtering of search results, view recent activity and the establishment of Link Out, document delivery service.
Advantages	Database more important, most used, most popular in biomedical information. Very short time to upgrade. It is complemented with other resources and information bases by the NCBI. Using multiple and varied fields of search.
Disadvantages	Few or no options for meta-analysis. Ambiguity in the identification of authors and documents.

Table 3. Characteristics of PubMed database. *Meta-analysis details are explained below.

Index and catalog. Although the biomedical community uses mainly PubMed database for literature retrieval, there are a lot of restricted/open, regional/global and monothematic/multithematic collections that are important to obtain an exhaustive review of the publisher papers. There are more useful catalogs: with documents and journals (Table 4).

Collection	Temporal coverage	Geographic coverage	Topic coverage	Total records
Web of Science http://apps.isiknowledge.com/WOS_GeneralSearch_input.do?highlighted_tab=WOS&product=WOS&last_prod=WOS&search_mode=GeneralSearch&SID=1CpkLf29P65GF7GiHI9	1899	Global	Scholarly literature in the sciences, social sciences, arts, and humanities; examined proceedings of international conferences, symposia, seminars, colloquia, workshops, and convention. Original research articles, reviews, editorials, chronologies, abstracts, and more.	Over 40 million records
Scopus http://www.scopus.com/home.url	20.5 millions of records previous 1996 which go back as far as 1823.	Global	Scopus covers the following subject areas: Life Sciences, Health Sciences, Social Sciences and Physical Sciences. Through international publishers, conference proceedings, trade publications, book series and patents.	More than 42.5 million records
Biological Abstracts http://apps.isiknowledge.com/BIOABS_GeneralSearch_input.do?highlighted_tab=BIOABS&product=BIOABS&last_prod=BIOABS&SID=1CpkLf29P65GF7GiHI9&search_mode=GeneralSearch	1926	Global	Citations, meetings, conferences, references to review articles, patents, reviews and references for books, CD-ROMs and other life sciences media. */RRM® (Reports, Reviews, Meetings)*	More than 11.3 million records.
PubMed http://www.ncbi.nlm.nih.gov/pubmed/	1950	Global emphasis on research in the U.S.	Books, electronic journals, scientific articles, brochures and web pages	20,603,313

Bireme http://regional.bvsalud.org/php/index.php?lang=en	1967	Latin America and Caribbean, Portugal and Spain	Systematic Reviews, Clinical Trials, Evidence Summaries, Economic Evaluations in Health, Health Technology Assessments, Clinical Practice Guidelines	19,643,741 of records 1,749,767 full text
Embase http://www.embase.com/info/	1988	Global	Agriculture & Food Sciences, Bioengineering & Biotechnology, Clinical Medicine, Computer Science & Technology, Dentistry, Earth & Environmental Sciences, Enginery, Evidence-Based Medicine, Geology, Life Sciences, Neurology & Neurosciences, Nursing & Allied Health, Pharmacy & Pharmacology Philosophy & Religion, Physics, Psychology & Psychiatry, Social Sciences & the Humanities, Technical Sciences, Veterinary Medicine, Zoology	Over 100 bibliographic and full-text databases

Table 4. The most popular databases for biomedical literature (Date of access: March 2011).

The Merriam Webster dictionary (2011) defines a repository as one that contains or stores something nonmaterial<considered the book a *repository* of knowledge>. Repositories of literature are understood as large files that store digital texts composed of a group of services designed to capture, store, manage, preserve and redistribute the documentation to a certain audience or a specific user community (Pappalardo and Fitzegerald, 2007). Emerged from the so-called e-print community, concerned to maximize the spread and impact of scientific works deposited in them (Melero, 2005). An e-print (e-paper) is the digital version of a research paper (usually a journal article, but could be a thesis, papers, book chapters, or book) is available online because it has been deposited in a digital repository (Swan and Brown, 2005), which comprises five components essential to its operation: interactivity, design, integration, aggregation and mobility. Digital versions of research papers called e-prints include both pre-prints (articles before they are evaluated by peers) and post-prints (version result of peer review).

Repositories whose main function the storage of files and their creation is linked with the movement of information from open access (open access), a term that describes the online public access without restriction to scientific articles (Suber et al., 2010), has two forms: free

and open. Repositories are dynamic tools, consisting of the infrastructure, programs, personal information and keeping it and consultation. They constantly recorded and scholars put their scientific production, as are the basic units of construction of the global scholarly communication, and therefore of scientific collaboration (Table 5).

Repository	Kind	Total Records
PubMed Central http://www.ncbi.nlm.nih.gov/pmc/	National	2 million articles
PubMed UK http://ukpmc.ac.uk/	National	1.8 million full text, peer reviewed published journal articles covering all fields of biomedical and health research (the UK PubMed Central repository) 24 million PubMed and PubMed Central abstracts
Dspace MIT http://dspace.mit.edu/	Institutional	47,133 titles 2,500 scholar articles 25,000 theses completed

Table 5. The biggest repositories

2.3 Automatic meta-analysis apps

We will present in meta-analysis topic around five dozens of web applications that process thousands of bibliographic records simultaneously, automatic and instantaneous for patterns identification, visualization or better retrieval goals. Apply new techniques of analysis of the references and the contents of scientific papers to analyze large quantities of documents simultaneously, including bibliometrics, text mining, semantic or networks analysis (Table 6).

Method	Description
Bibliometrics	Bibliometrics involves the quantitative assessment of certain events in the literature and therefore scientific literatures, main bibliometric indicators (publication counts, impact factors and received citations, for example) are frequently used to retrieve and evaluate literature (Koskinen *et al*., 2008). In this way the bibliometric analysis is a good tool to assess the impact of an investigation in the context of others scientific investigations and it's possible compares the relative contributions of research groups or institutions, infer patterns and trends (Rosas *et al*., 2011).
Text mining	Text mining involves the processes of information retrieval, automated information extraction and data mining from electronically published sources. It is used to generate new knowledge interesting, plausible, and intelligible (Ananiadou *et al*., 2006). Linking two or more literature concepts that have so far not been linked (i.e., disjoint) through the use of software and algorithms designed for this purpose (Rodriguez-Esteban, 2009).

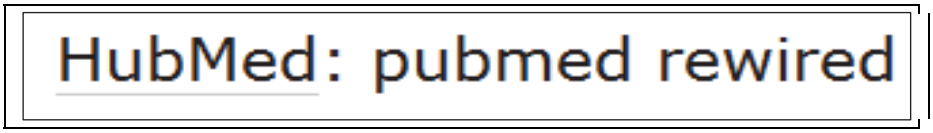
	To perform text mining, it must be structured (pre-processing) to analyze texts or discovering interesting patterns that generate new knowledge (Krallinger *et al*., 2008). Depending on the methods used in the pre-processing is the type of representation of the contents of the texts constructed, and according to this representation, is the kind of patterns discovered (Harmston *et al*., 2010).
Semantic	Based on the ontologies, that formulate a conceptual scheme (a map of concepts and their relationships) in a given domain, the semantic expresses the meaning of data, the properties of objects and the complex relationships between them by a series of formal rules (Robu *et al*., 2006).
Networks analysis	Networks are open structures that can expand without limit of integration of new nodes based on the communication possibilities that exist in your environment and share communications code compatible. It is done through the study of theories of structural behavior, the dynamics, and influence within the biomedical issues, to establish a likely explanation for the growth and evolution of real networks in any advanced biomedical subject.

Table 6. Most frequent literature automatic meta-analysis methods.

Right now exist dozens of scholar free web programs that process literature with one or more bibliographic meta-analysis methods. Most of those resources are based on PubMed literature because it is open access records, normalized and robustness information. For this chapter we choose some of them for details, a list with most of them is in Append.

2.3.1 Bibliometric analysis

HubMed



HubMed (http://www.hubmed.org/) retrieval information from the PubMed´s database and produces one interface focused basically on browsing, organizing and gathering information from the biomedical literature. Shows the results arranged by relevance, you can perform grouping and graphic representation of related articles, can export metadata in different formats for further analysis.

Twease

Twease is a web-based tool to search in the abstracts for Medline. Index the words of Medline and provides features to expand a query and thereby find what you are looking for. Finally, Twease can automatically discover common abbreviations for search phrases.

(http://twease.org/medline/app;jsessionid=2ACC96312364DDB1E50519CE8EC316BB?component=clearSettingsDirectLink&page=Home&service=direct&session=T)

2.3.2 Text-mining

PubReMiner

PubReMiner (http://bioinfo.amc.uva.nl/human-genetics/pubreminer/) process the results of a query based in PubMed´s database and display its results in frequency tables, get all abstracts and generate metric statistics that include journals, authors and most productive countries, analyze your query words in the title, abstract, keywords and name of substances, allows extract metadata for further metric analysis.

LitMiner

Application that is known for scoring the key terms in the abstracts of articles and predict the relationships between key terms from biomedical literature into four categories: genes, chemicals, diseases and organs.
Also performs statistical analysis of co-citation of annotated key terms to infer relationships (http://andromeda.gsf.de/litminer).

2.3.3 Ontology-based literature search (semantic)

Go PubMed

Search PubMed for biomedical research articles (http://www.gopubmed.org/web/gopubmed/1?WEB10O00h00100090000). Your keywords are submitted to PubMed and the resulting abstracts are classified using Gene Ontology and Medical Subject Headings (MeSH).

MeSH is a hierarchical vocabulary covering biomedical and health-related topics.
GeneOntology is a hierarchical vocabulary for molecular biology covering cellular components, biological processes and molecular functions.

PIKB: Pathways and Interaction Knowledge Base

PIKB (http://linkedlifedata.com/) allows you to execute arbitrary queries in the semantic network. For example: "Select pathways controlled by the expression of genes located in a specific chromosome". You can also use sets of declarative rules to customize the criteria for identifying redundant information. For example: "All molecular interactions composed by a related Uniprot accession number, a Uniprot cross-reference identifier or an Entrez-Gene identifier and coming from different data sources are equivalent".

2.3.4 Networks analysis

Ali Baba PubMed

Shows the connection of separate record of terms such as cells, drugs, tissues, diseases, reactions, enzymes and compounds of the KEGG (Kyoto encyclopedia of genes and genomes), nutrients, proteins and genes, UniProt and NCBI Taxonomy species. Once the sample has identified links of the articles found as protein-protein interactions, localization of proteins, nutrients and genes (http://alibaba.informatik.hu-berlin.de/).

PubGene

Find the proteins and genes related documents. It shows the quantity of items for each node and its relationships (http://www.pubgene.org/tools/Network/Subset.cgi).

3. Conclusion

The use of web apps investigated in this work makes it possible to extract, analyze and manage an automated literature, efficient, prompt, timely, comprehensive and organized to facilitate handling of large amounts of documentary records simultaneously, choose from the vast amount of the most relevant information available, handle the selected records and learn the ways of analysis of latest digital literature, from which it can and must extract information according to the needs and challenges of our time. Because the constantly actualization and the release of new and innovative internet tools, we have a blog with news about Biomedical Web, Collections and Meta-Analysis Literature Applications: http://biiiogeek.blogspot.com/

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5. Append

Web apps that process literature with one or more bibliographic meta-analysis methods
Batch Citation Matcher
http://www.ncbi.nlm.nih.gov/entrez/citmatch_help.html#JournalLists
PubMed Retractions
http://pmretract.heroku.com/journals
e-LiSe - text mining tool for Medline data - run
http://miron.ibb.waw.pl/elise/run.html
eGIFT - extracting Gene Information From Text
http://biotm.cis.udel.edu/eGIFT/index.php
Biomedical Informatics Group : PubDNA Finder
http://servet.dia.fi.upm.es:8080/pubdnafinder
BOND Web Portal
http://bond.unleashedinformatics.com/Action?
eGIFT - extracting Gene Information From Text
http://biotm.cis.udel.edu/eGIFT
MEDSUM - THE MEDLINE/PubMed SUMMARY TOOL: research PubMed and Medline data
http://webtools.mf.uni-lj.si/public/medsum.html
Meva - MedLine Postprocessor
http://www.med-ai.com/meva/index.html
Twease
http://twease.org/medline/app?component=clearSettingsDirectLink&page=Home&service=direct&session=T
BioText: Project Homepage
http://biotext.berkeley.edu/
BITOLA - Biomedical Discovery Support System
http://ibmi.mf.uni-lj.si/bitola/?oe=bitola

EBIMed
http://www.ebi.ac.uk/Rebholz-srv/ebimed
FABLE - Fast Automated Biomedical Literature Extraction
http://fable.chop.edu/?hgsid=null&submitbutton=View+browser&submithit=true
LitMiner
http://www.litminer.com
MEDIE - Semantic retrieval engine for MEDLINE
http://www-tsujii.is.s.u-tokyo.ac.jp/medie
MedKit
http://metnetdb.gdcb.iastate.edu/medkit
MedMiner - MetaBase
http://biodatabase.org/index.php/MedMiner
PubMed-EX
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http://www.unboundmedicine.com/medline/ebm
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http://ligercat.ubio.org/articles
EGQuery Entrez Utility
http://eutils.ncbi.nlm.nih.gov/corehtml/query/static/egquery_help.html
Pubget: the search engine for life-science PDFs
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Taxonomy Home
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PubSearch Fast, efficient PubMed® searching on your Mac and your iPhone / iPod Touch
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Deja vu

http://dejavu.vbi.vt.edu/dejavu/duplicate
ConceptLink
http://project.cis.drexel.edu/conceptlink
ARMiner Info Index
http://www.cs.umb.edu/%7Elaur/ARMiner
PubGene. Browse literature or sequence neighbours.
http://www.pubgene.org/tools/Network/Subset.cgi
Kleio @ NaCTeM
http://www.nactem.ac.uk/software/kleio
Acromine dictionary
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http://arrowsmith.psych.uic.edu/cgi-bin/arrowsmith_uic/AnneOTate.cgi
GoPubMed®
http://www.gopubmed.com/web/gopubmed/1?WEB10O00h01000900001
PubMed Gold
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< *MEDLINE/PubMed Multilanguage Search*
http://babelmesh.nlm.nih.gov
PubMed global biomedical research community - BioWizard
http://www.biowizard.com
BITOLA - Biomedical Discovery Support System
http://ibmi.mf.uni-lj.si/bitola
PubCrawler Web Service
http://pubcrawler.gen.tcd.ie

askMEDLINE
http://askmedline.nlm.nih.gov/ask/ask.php
iHOP - Information Hyperlinked over Proteins
http://www.ihop-net.org/UniPub/iHOP
NCBO BioPortal: Welcome to the NCBO BioPortal
http://bioportal.bioontology.org
Gene-L'EXPO
http://www.genelexpo.jp/genelexpo
Home - BioMedLib™ search engine
http://www.relemed.com
BioIE - Extracting informative sentences from the biomedical literature
http://www.bioinf.manchester.ac.uk/dbbrowser/bioie
PubMed Assistant
http://metnet.vrac.iastate.edu/browser
e-LiSe - text mining tool for Medline data
http://miron.ibb.waw.pl/elise/index.html
FACTA - Finding Associated Concepts with Text Analysis
http://text0.mib.man.ac.uk/software/facta/main.html
FABLE - Fast Automated Biomedical Literature Extraction
http://fable.chop.edu
Journal / Author Name Estimator
http://biosemantics.org/jane
Ali Baba — PubMed as a graph
http://alibaba.informatik.hu-berlin.de
PubNet: Publication Network Graph Utility
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Pubget: the search engine for life-science PDFs
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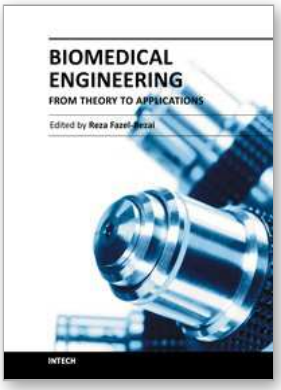

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In all different areas in biomedical engineering, the ultimate objectives in research and education are to improve the quality life, reduce the impact of disease on the everyday life of individuals, and provide an appropriate infrastructure to promote and enhance the interaction of biomedical engineering researchers. This book is prepared in two volumes to introduce a recent advances in different areas of biomedical engineering such as biomaterials, cellular engineering, biomedical devices, nanotechnology, and biomechanics. It is hoped that both of the volumes will bring more awareness about the biomedical engineering field and help in completing or establishing new research areas in biomedical engineering.

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