APPLICATION OF COMPUTER IN PHARMACY

For Class- B.Pharmacy 2nd Semester

Subject- COMPUTER APPLICATIONS IN PHARMACY (BP205T)

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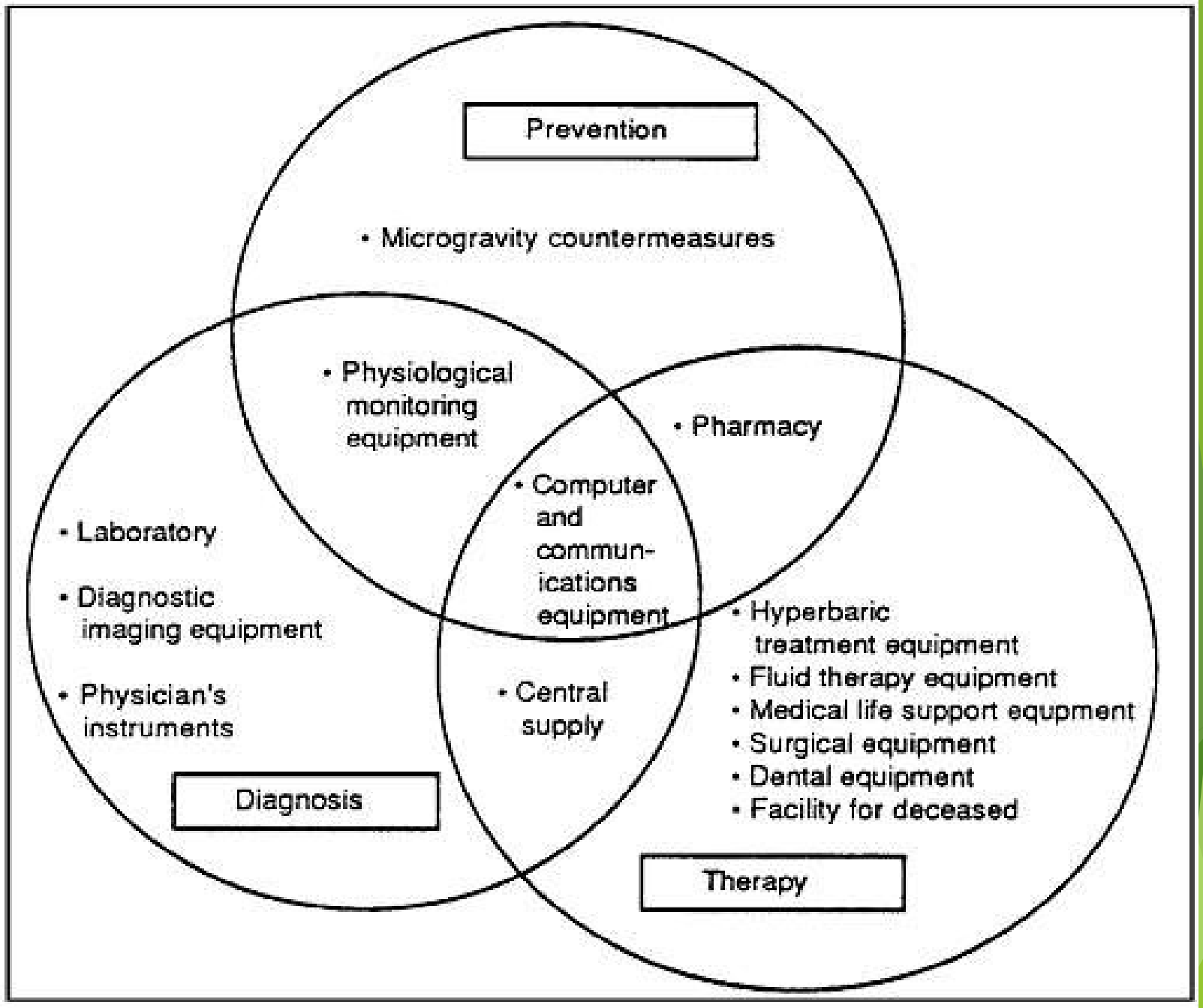
Computers and Pharmacy

- Right now computers and pharmacy go hand in hand.
- Drug and patient database management; order entry systems; drug information; billing; purchasing; automated dispensing units; and on and ON!
- Today we can exchange health information and provide services across geographic, time and social boundaries.


Prevention
• Microgravity countermeasures
• Physiological monitoring equipment
• Pharmacy
• Computer and communications equipment
• Laboratory
• Diagnostic imaging equipment
• Physician's instruments
• Central supply
• Hyperbaric treatment equipment
• Fluid therapy equipment
• Medical life support equpment
• Surgical equipment
• Dental equipment
• Facility for deceased
Diagnosis
Therapy

Advantages

- Pharmacy plays crucial role in patient care.
- Requires huge management and manpower
- Effective use of computer started in Pharmacy started in 1980.
- Advantages like reduction in time, accuracy, reduction in man power, speed, multitasking.

Use of internet in Pharmacy

- Internet is collection of huge data which is accessible with few clicks.
- Availability of soft copies of books has made it more useful for pharmacists.
- Access to huge amount of research journals published online has made very useful tool for literature survey.

Computer in Retail Pharmacy

- Accounting functions
- Managerial functions
- Purchasing and Inventory control
- Drug Information

Hospital and Clinical Pharmacy and Computer

- Hospital pharmacy performs the function of receiving and allotment of drugs and other professional items. Dispensing and manufacturing are also integral parts.
- Patient record maintenance
- Purchase and inventory control
- Therapeutic Drug monitoring

Computers in Pharmaceutical Analysis

- Analytical instruments use computer designed software.
- Data storage and processing
- Building up libraries
- HPLC, MS, GLC , spectrophotometers and all other instruments

Computer Aided Drug Design

- Integral Part of Drug Discovery
- Rational Drug design
- Chemical modifications of molecules
- Generation of lead molecules
- Docking studies using 3-D models of proteins

Computers in Publications

- Versatile and effortless writing
- Ease of editing, reviewing and modifications
- Micrsoft word, wordpad, notepad for writing pruposes
- Microsoft Excel, Access for presentation of data
- Endnote for referencing
- Internet for publishing

Computers in Education

- From “ Chalk to talk” to “Display and Deliver”
- Computer aided learning “CAL”
- Hypertext video chats, web based education, multimedia based education, digital libraries, simulation laboratories, tele-education
- E-learning
- Digital libraries

Simulations

- Because medicine involves hands-on work, medical students need to practice procedures before they do the procedure for real on a patient. Use computer programs that simulate surgery and other procedures to meet this need.

Pharmacy informatics

- Bio-medical and Pharmacy informatics
- An integral part of pharmacy education
- use and integration of data, information, knowledge, and technology involved with medication use processes
- informatics have ranged from improving pharmaceutical care in oncology, to providing clinical decision support (CDS) for antimicrobial stewardship and pharmacokinetics, to containing costs in managed care

Drug Information Services

- Pharmaceutical companies are responsible for providing updated, relevant information on the efficacy, safety and quality of drugs.
- This system is incorporated into an on-line network system, and can be directly accessed by thousands of people all over the world.
- Moreover, Drug and poison centers can work on the basis of same principal which may respond to queries regarding drugs.
- DPIC, UVAS, Lahore.

Telepharmacy

- Provides pharmaceutical care at a distance to patients in rural and medically underserved areas
- Licensed pharmacists at a central pharmacy site can supervise a registered pharmacy technician at a remote site via teleconferencing
- The technician prepares the prescription for dispensing, while the pharmacist communicates face-to-face in real time with both the technician and the patient

Internet Pharmacies

- Since about the year 2000, Internet pharmacies have been established worldwide
- similar to community pharmacies
- The primary difference is the method by which the medications are requested and received.
- Internet pharmacies (also known as Online Pharmacies) are also recommended to some patients by their physicians if they are homebound.

Information Storage & Retrieval

Information storage and retrieval

- Systematic process of collecting and cataloging data so that they can be located and displayed on request. Computers and data processing techniques have made possible to access the high-speed and large amounts of information for government, commercial, and academic purposes.

- A branch of computer or library science relating to storage, locating, searching and selecting, upon demand , relevant data on a given subject.

(Encyclopedia of Medical concept)

Basic concept of information storage

It can refer to a place like a storage room where paper records are kept. It can also refer to a storage device such as a computer hard disk, CD, DVD, or similar device which can hold data.

Types of Information storage media

Storage keeps data and information for use in the future. Common storage mediums are:

1. Hard Drive
2. Floppy Disk
3. CD&DVD
4. USB Flash Drive

1. Hard Drive

i. It is always inside the computer.

ii. It stores all the programs that the computer needs to work.

2. Floppy Disk

i. It is a portable storage medium.

ii. Put it into the computer save your information

Hard Drive

Floppy Disk

3. CD&DVD

i. It is a portable storage.

ii. It allows you to save information on it.

4. USB Flash Drive

i. It is very easy to carry

ii. It holds more data than a floppy disk.

iii. It is very small device than others.

CD&DVD

USB Flash Drive

Basic concept of Information Retrieval

"An information retrieval system is an information system, that is, a system used to store items of information that need to be processed, searched, retrieved, and disseminated to various user populations" (Salton, 1983)

Major Components of IR

Information retrieval can be divided into several major constitutes which include:

1. Database
2. Search mechanism
3. Language
4. Interface

Database

A system whose base, whose key concepts, is simply a particular way of handling data & its objective is to record and maintain information.

Search mechanism

- Information organized systematically that can be searched and retrieved when a corresponding search mechanism is provided.
- Search procedures can be categorized as basic or advance search procedure.
- Capacity of search mechanism determines what retrieval techniques will be available to users and how information stored in databases can be retrieved.

Language

- Information relies on language when being processed, transferred or communicated.
- Language can be identified as natural language and controlled vocabulary.

Natural Language

Natural language concerned with the interaction between computer and human interaction. In which:

i. Any user-created terms assigned to images by users, such as tags, folksonomies, and keywords

ii. Up-to-date, new terms are immediately available

iii. Words of author used

iv. Unstructured data

v. Easier exchange of material between databases

Controlled Vocabulary

Controlled vocabularies are structured hierarchies of terms used to categorize images.

i. Such vocabularies are typically created and maintained by a particular institution of authority

ii. No immediate up to date

iii. Words of author liable to be misconstrued

iv. Structure Data

v. Incompatibility a barrier to easy exchange

Interface

Interface regularly considered whether or not an information retrieval system is user friendly.

- Quality of interface checked by interaction mode
- Determines the ultimate success of a system for information retrieval

Retrieval Techniques

Major retrieval techniques are:

1. Basic Retrieval Techniques
2. Advanced Retrieval Techniques

1. **Basic Retrieval Techniques**

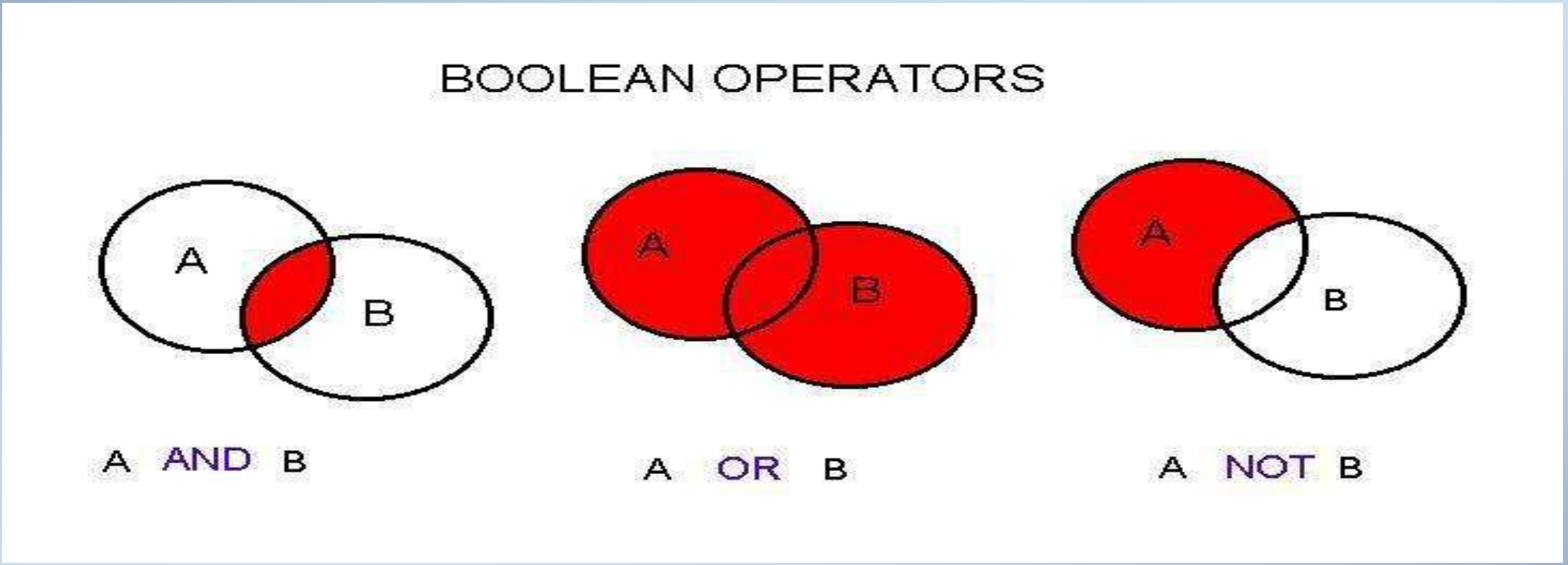
- Boolean Searching
- Case sensitivity searching
- Truncation
- Proximity searching
- Range searching

Boolean Searching

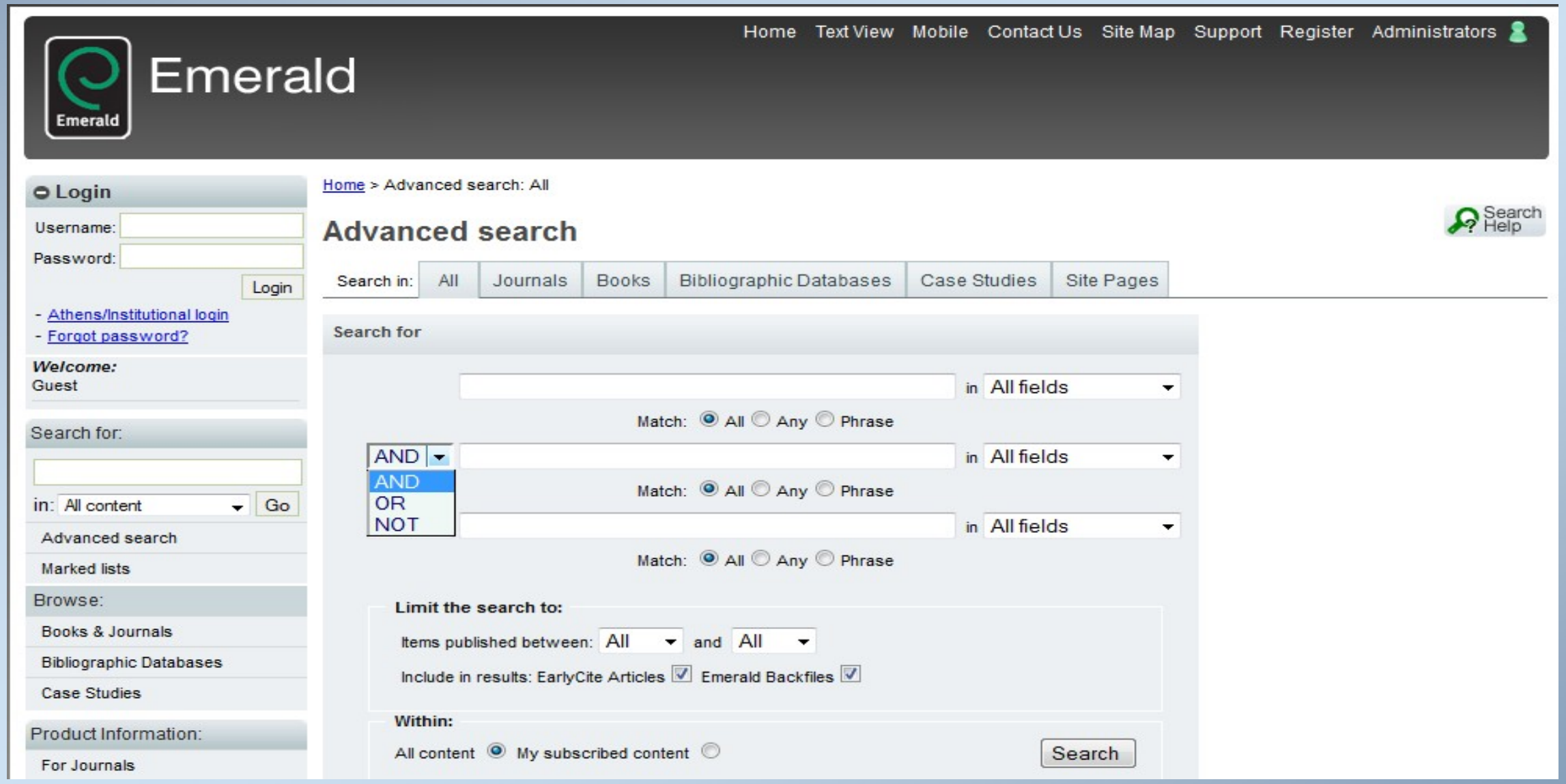
Logical operations are also known as Boolean Logic. When Boolean logic is applied to information retrieval, the three operators, called Boolean operators.

- ✓ The AND operate for narrowing down a search
- ✓ The OR operate for broadening a search
- ✓ The NOT operator for excluding unwanted results

Cont....



Boolean Operators at Emerald



Case sensitivity searching

- Text sometimes exhibits case sensitivity; that is, words can differ in meaning based on differing use of uppercase and lowercase letters. Words with capital letters do not always have the same meaning when written with lowercase letters.
- For example, Bill is the first name of former U.S. president William Clinton, who could sign a bill
- The opposite term of "case-sensitive" is "case-insensitive“
- For example, Google searches are generally case-insensitive and Gmail is case-sensitive by default.

Truncation

- Truncation allows a search to be conducted for all the different forms of a word having the same common roots
- Used symbol (Question mark? , asterisk* and pound sign #) for truncation purpose.
- A number of different options are available for truncation like Left truncation, Right truncation and middle truncation.

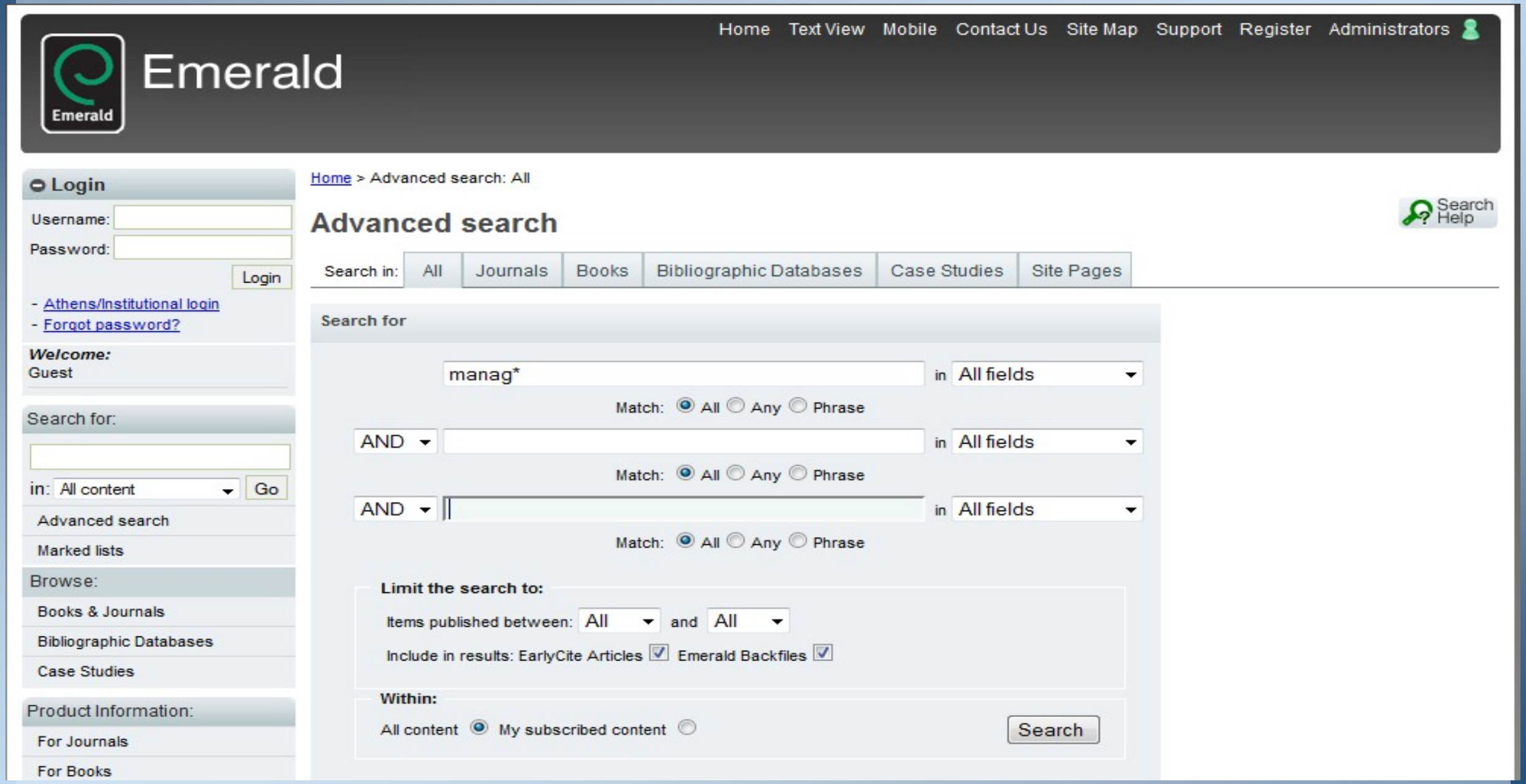
Cont.…

- **Left truncation** retrievals all the words having the same characteristics at the right hand part, for example, *hyl will retrieval words such as “methyl” and “ethyl”

- **Right truncation**, for example the term of Network* as a query results in retrieving documents on networks and networking.

- Similarly **middle truncation** retrieval the words having the same characteristics at the left hand and right hand part, for example, “Colo*r” will retrieval both the term “colour” and “color”.

Truncation


Home Text View Mobile Contact Us Site Map Support Register Administrators
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- Forgot password?
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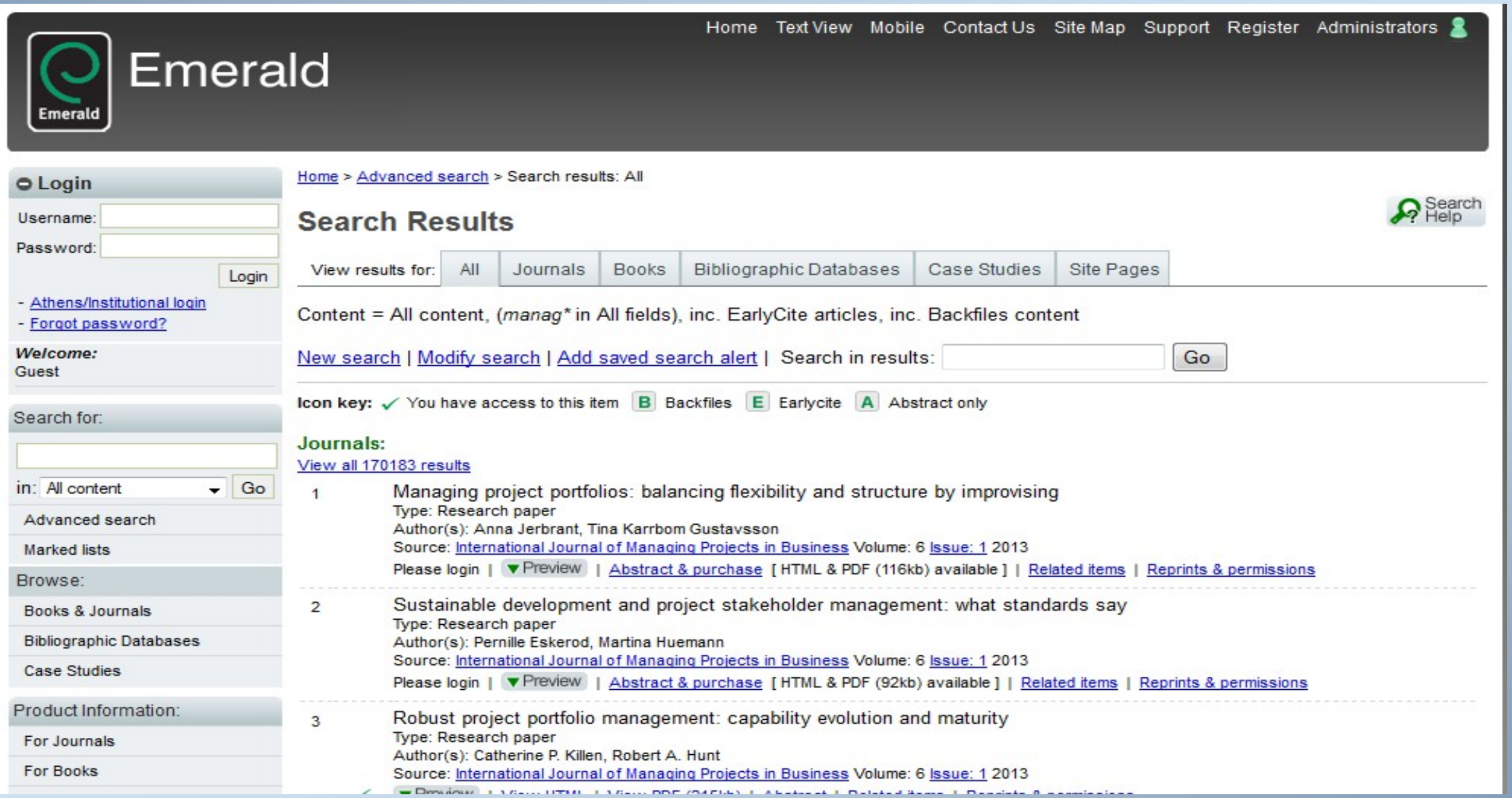
Include in results: EarlyCite Articles Emerald Backfiles
Within:
All content My subscribed content
Search

Truncation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Content = All content, (manag* in All fields), inc. EarlyCite articles, inc. Backfiles content
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Type: Research paper
Author(s): Catherine P. Killen, Robert A. Hunt
Source: International Journal of Managing Projects in Business Volume: 6 Issue: 1 2013

Truncation

Google

Sadaf Rafiq

+ Shar

Advanced Search

Find pages with...		To do this in the search box.
all these words:	manag*	Type the important words: `tri-colour rat terrier`
this exact word or phrase:		Put exact words in quotes: `"rat terrier"`
any of these words:		Type `OR` between all the words you want: `miniature OR`
none of these words:		Put a minus sign just before words that you don't want: `-rodent, -"Jack Russell"`
numbers ranging from:	to	Put two full stops between the numbers and add a unit of mea `10..35 kg, £300..£500, 2010..2011`

Then narrow your results by...

language:	any language	Find pages in the language that you select.
region:	any region	Find pages published in a particular region.

Proximity searching

A proximity search allows you to specify how close two (or more) words must be to each other in order to register a match.

There are three types of proximity searches:

- Word proximity
- Sentence proximity
- Paragraph proximity

Proximity searching

Google "content collection"/5

Web Images Videos More Search tools

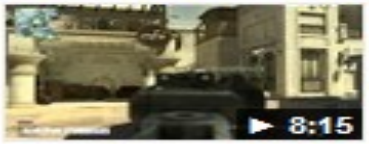
About 432,000 results (0.23 seconds)

MW3 Collection 4 - Call of Duty
www.callofduty.com/mw3/**content/collection**-4
Drop 1 - Liberation · Drop 2 - Piazza · Drop 3 - Overwatch · Drop 4 - Black Box · Drop **5** - Black Ice · Drop 6 - Negotiator · Drop 7 - Sanctuary · Drop 8 - Foundation ...

Copying Files to the **Content Collection** - Blackboard Help
https://help.blackboard.com/...**Content_Collection**/020_Copying_Files_to...
Apr 16, 2013 – Items that are added through to the **Content Collection** may be used in ... It does not detect **Content Collection** items that have been added to a ...

Navigating the **Content Collection** - Blackboard Help
https://help.blackboard.com/...**Content_Collection**/010_Navigating_the_...
Dec 18, 2012 – After logging into Blackboard Learn, select the **Content Collection** tab at ... If you have difficulty finding the **Content Collection** after logging in, ...

Call Of Duty - Modern Warfare 3 - **Content Collection** 2 - Oasis ...



www.youtube.com/watch?v=-IN2THNaHT8
Jun 22, 2012 - Uploaded by BlockWalkthroughs
Call Of Duty - Modern Warfare 3 - **Content Collection** 2 - Oasis - Episode **5**. BlockWalkthroughs-509 videos ...

More videos for **"content collection"/5** »

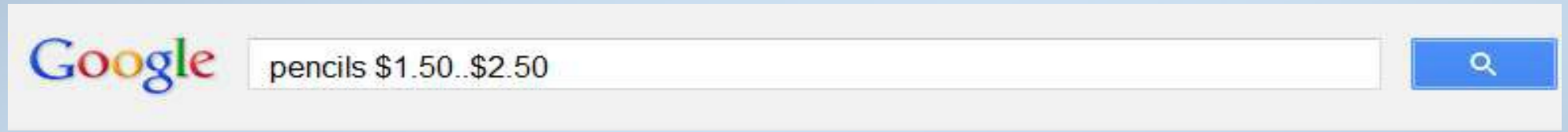
Range searching

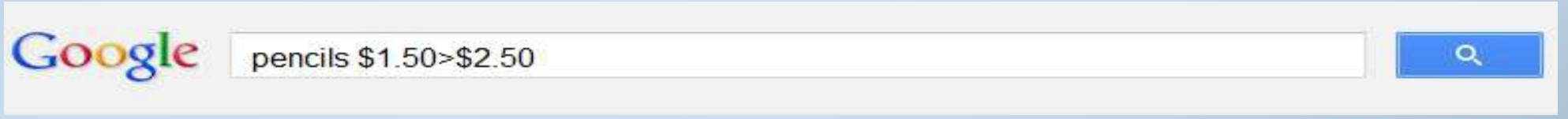
It is most useful with numerical information. The following options are usually available for range searching

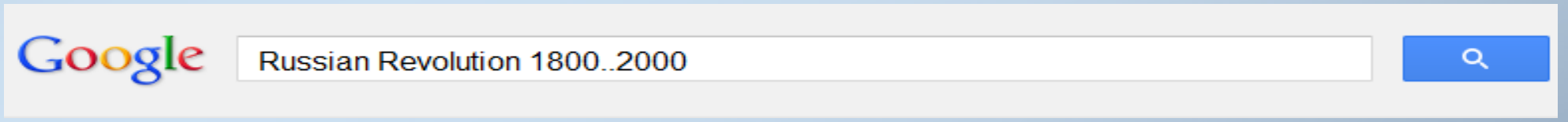
- greater than (>) less than (<)
- equal to (=)
- not equal to (/= or o)
- greater than equal to (>=)
- less than or equal to (<=)

Example of Range Searching

To search for documents or items that contain numbers within a range, type your search term and the range of numbers separated by two periods (“..”). For example, to search for pencils that costs between $1.50 and $2.50, type the following:







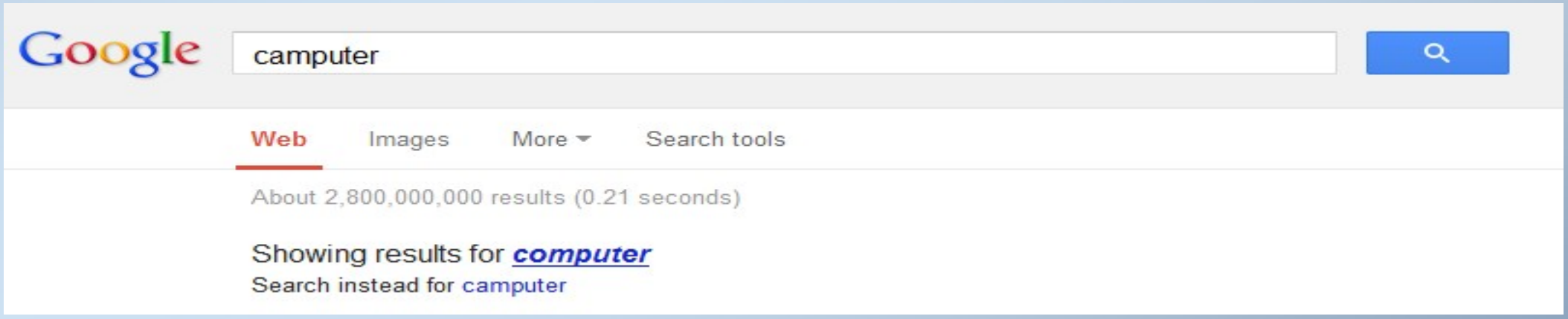
Advanced Retrieval Techniques

- Fuzzy searching
- Query expansion
- Multiple databases searching

Fuzzy searching

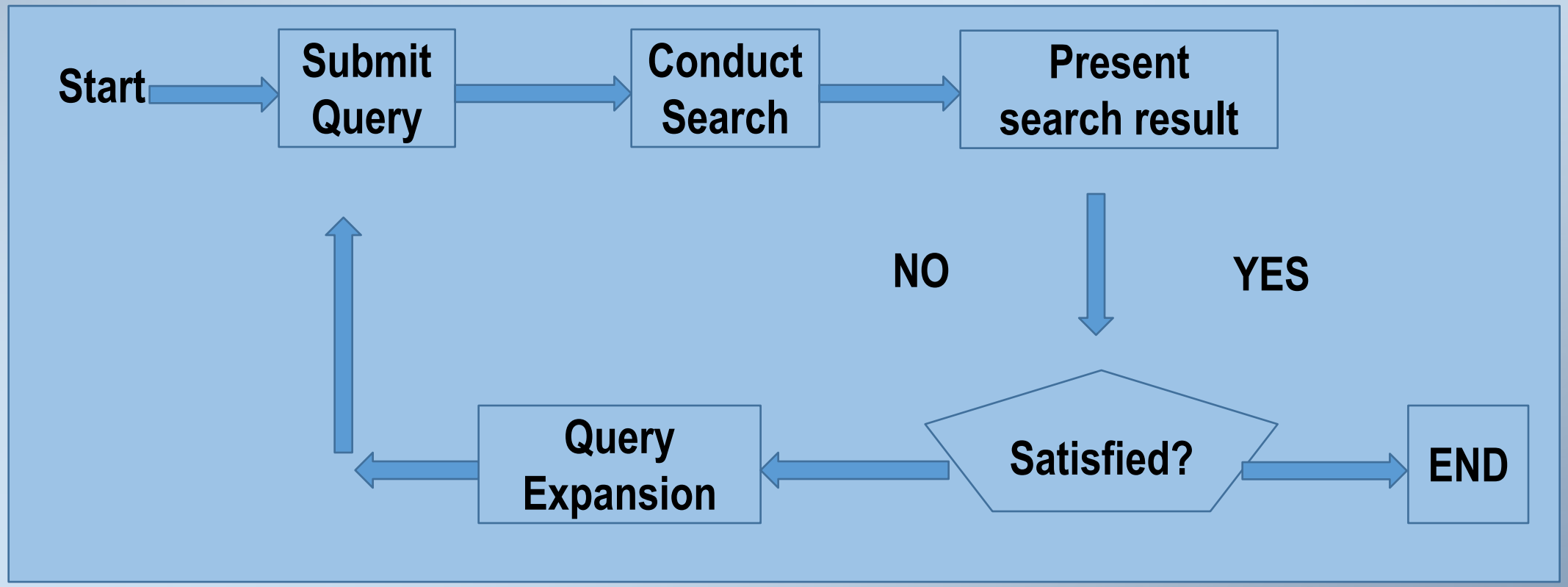
It is designed to find out terms that are spelled incorrectly at data entry and query point.

For example the term computer could be misspelled as compter, compiter, or comyter. Optical Character Recognition (OCR) or compressed texts could also result in erroneous results. Fuzzy searching is designed for detection and correction of spelling errors that result from OCR and text compression.



Query expansion

Query expansion is a retrieval technique that allows the end user to improve retrieval performance by revising search queries based on results already retrieved



Multiple Database Searching

It means searching more than one IR systems. The need for searching multiple databases seems threefold.

1. First, searching in single IR system may not get what the user is looking for.
2. Secondly, multiple databases searching can serve as a selection tool if the user is not sure which systems would be the best choice for a given query .
3. Third, result obtained from multiple databases searching can suggest or indicate suitable systems for the user to conduct further searches.

Examples:

EBSCOhost, ProQuest

Information Retrieval Systems

- Online systems
- CD-ROM systems
- OPAC
- Web information Retrieval Systems

Online systems

Online information retrieval systems allow the user to search databases located remotely with the help of the computer and telecommunication technology.

- Basic searching techniques
- Advanced retrieval techniques

Examples:

Library of Congress, University of Punjab Library

CD-ROM systems

- CD-ROM systems are usually searched locally and it works if the systems are not networked.
- Basic retrieval techniques are supported in CD-ROM systems while advanced search facilities are applied in limited scope.
- The data which is stored on compact disc (CD) can to read by any computer operating systems and any CD-ROM drive.

Example:

LISA

OPAC

- Online public access catalogs (OPACs) are traditional catalogs executed in a different medium.
- Different features of OPACs are

➢ First, OPACs contains bibliographic information about library resources.

➢ Second, OPACs can be considered as an extension of MARC records.

➢ Third, OPACs support at least field searching, keyword searching and Boolean searching.

Examples

Library of congress catalogue

University of Punjab online catalogue

Web information Retrieval Systems

- It deals with text as well as multimedia information resources that are linked with other documents and there is no target user's community as such.
- Basically web is a platform where anyone from anywhere can publish virtually any information, in any language or in any format.

Examples,

Google, Alta Vista

Evaluation of information Retrieval Systems

Lancaster states that we can evaluate an information retrieval system by considering the following three issues.

- How well the system is satisfying its objectives, how well it is satisfying the demands placed upon it
- How efficiently it is satisfying its objectives and finally
- Whether the system justifies its existence

Evaluation Measures for Information Retrieval

Recall and Precision

Measure of whether or not a particular item is retrieved or the extent to which the retrieval of wanted items occurs

- The performance of a system is often measured by **recall** ratio, which denotes the percentage of relevant items retrieved in a given situation.

$$\text{Recall} = \frac{\text{Number of relevant items retrieve}}{\text{Total number of relevant items in the collection}} \times 100$$

Cont.

- By **precision** we mean how precisely a particular system functions. It is quite obvi•ous that when the system retrieves items that are relevant to a given query it also retrieves some documents that are not relevant

$$\text{Precision} = \frac{\text{Number of relevant items retrieved}}{\text{Total number of items retrieved}} \times 100$$

Fallout & Generality

- Fallout describes what proportion of non-relevant items has been retrieved in a given search. This is often termed as fallout ratio.

- Generality describes what proportion of relevant documents in the collection for a given query.

Possible Retrieval Outcomes

Judgment / Result	Relevant	Not Relevant	Total
Retrieved	a (Hits)	B (Noise)	a+b (all retrieved)
Not retrieved	c (misses)	D (rejects)	c+d (all non-retrieved)
Total	a+c (all relevant)	b+d (all non-relevant)	a+b+c+d (total in the system)

Retrieval Measures

Symbol	Evaluation Measure	Formulas	Explanation
R	Recall	a/(a+c)	Proportion of relevant items retrieved
P	Precision	a/(a+b)	Proportion of relevant items that are relevant
F	Fallout	b/(b+d)	Proportion of non-relevant items retrieved
G	Generality	(a+c)/(a+b+c+d)	Proportion of relevant items per query

Limitations of Recall & Precision

1. Recall assumes all relevant items have the same value which is not true
2. Measuring recall is difficult because it is often difficult to know how many relevant records exist in a database. Different users want different level of recall.

Steps for Evaluation

- Designing the scope of evaluation
- Designing the evaluation program
- Execution of the evaluation
- Analysis and interpretation of results, and
- Modifying the system in the light of the evaluation results

Future Trends in Online Information Retrieval Systems

- A great increase in the number of information services that can be accessed from around the world,
- Specialized systems will be more “user oriented,” easily accessible
- They should be oriented to natural language rather than controlled vocabularies
- Computer aided instruction should be incorporated into systems.
- Future of on-line systems must require less effort to use. They should adapt to the user rather than expecting the user to adapt to them.

Conclusion

Internet and web developments have brought significant changes to the economics of the information industry, from which end-users are benefits. Through the information storage and retrieval system, Users can freely or on payment of a fee access the relevant information.

Mathematical Models

INTRODUCTION

- Mathematical models turns out to be very useful, in this best case, the prediction of release kinetics before the release systems are realized.
- Measurement of some physical parameters such as, drug diffusion coefficient and resorting to model fitting on experimental release data.
- Mathematical models are used to evaluate the kinetics and mechanisms of drug release from dosage form.

- Drug release: It is a process by which a drug leaves a drug product and is subjected to ADME and eventually becoming available for pharmacological action.
- Mathematical models are based on different mathematical functions, which describe the dissolution profile.
- It includes the zero,first,higuchi,korsmeyer-peppas,hixson-crowell,weibull etc

ZERO ORDER MODEL

Drug dissolution from dosage forms that do not disaggregate and release the drug slowly can be represented by equation:

$$Q_O - Q_T = Kot$$

QO=initial amount of drug in the pharmaceutical dosage form, QT=

amount of drug in the pharmaceutical dosage form in time t

Ko=zero order release constant

t= time period

$$ft = Kot$$

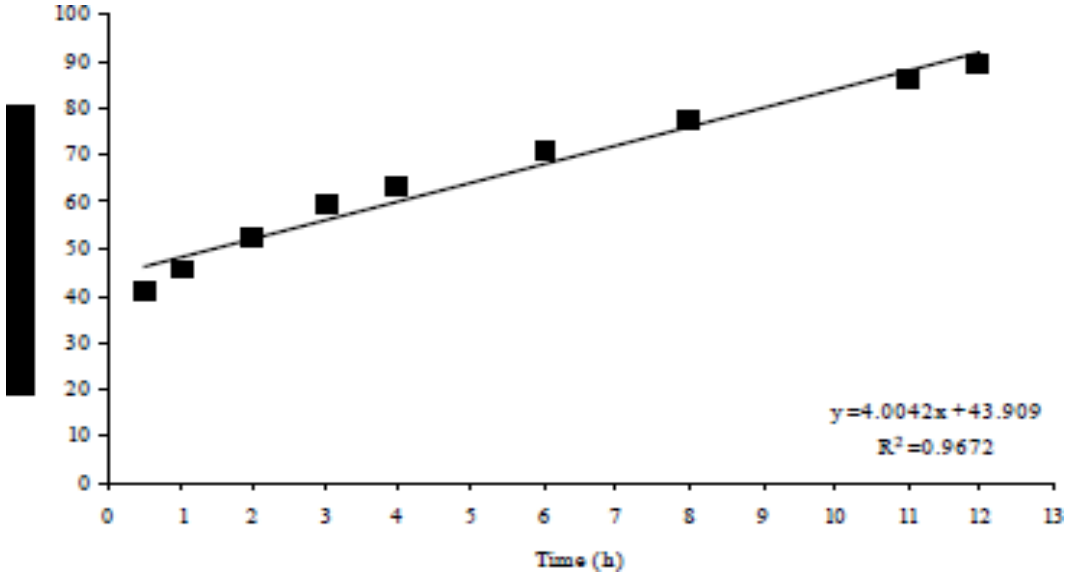
Ft=fraction of drug release in time t & ko apparent release constant.

Application –modified release pharmaceutical dosage form

Like coated form, osmotic system, transdermal system etc.

Example:Ibuprofen sustain release

Graph is plotted between cumulative % drug release on Y-axis and time on X-axis



FIRST ORDER MODEL

- This model is used to describe absorption and/or elimmination of some drug,although it is difficult to conceptualize this mechanism on a theoretical basis.
- The release of drug which followed first order kinetics can be expressed by equation:

$$Q_t = Q_o e^{-k1t}$$

(Or)

$$\ln Q_t/Q_o = k_1 t$$

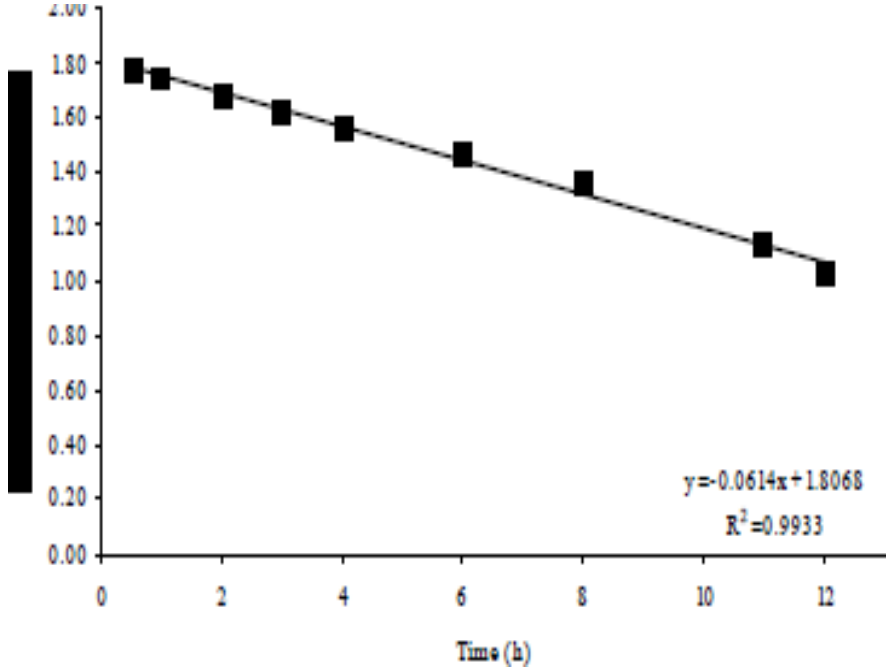
$$\log Q_t = \log Q_o - k_1 t/2.303$$

Qt=amount of drug release in time t.
Qo=initial amount of drug consant.

Drug release proportional to amount of drug remaining

Application-water soluble drug in porous matrix(mule&turco,1995.)

- Graph is plotted between log % drug remaining vs time



HIGUCHI MODEL

First example of mathematical model aimed to describe drug release from a matrix system was proposed by huguchi in 1961.

Model based on hypotheses that-

- Intial drug concentration in matrix is much higher than drug solubility
- Drug diffusion takes place only one dimension
- Drug particles are much smaller than system thickness
- Drug diffusivity is constant.
- Perfect sink conditions are maintained

- Higuchi describe drug release as a diffusion process based in fick's law,squre root of time denpendent.

According to model expression:

$$f_t = Q = A\sqrt{D(2C - Cs)Cst}$$

where,

- *Q* is the amount of drug released in time *t* by surface unity,
- *C* is the initial concentration of the drug,
- Cs is drug solubility in matrix media
- D is diffusivity og drug molecules in matrix substances

To study the dissolution from a planar heterogeneous matrix system, where the drug concentration in the matrix is lower than its solubility and the release occurs through pores in the matrix, the obtained relation was the following

$$f_t = Q = \sqrt{D\epsilon(2C - \epsilon Cs)Cst/\Gamma'}$$

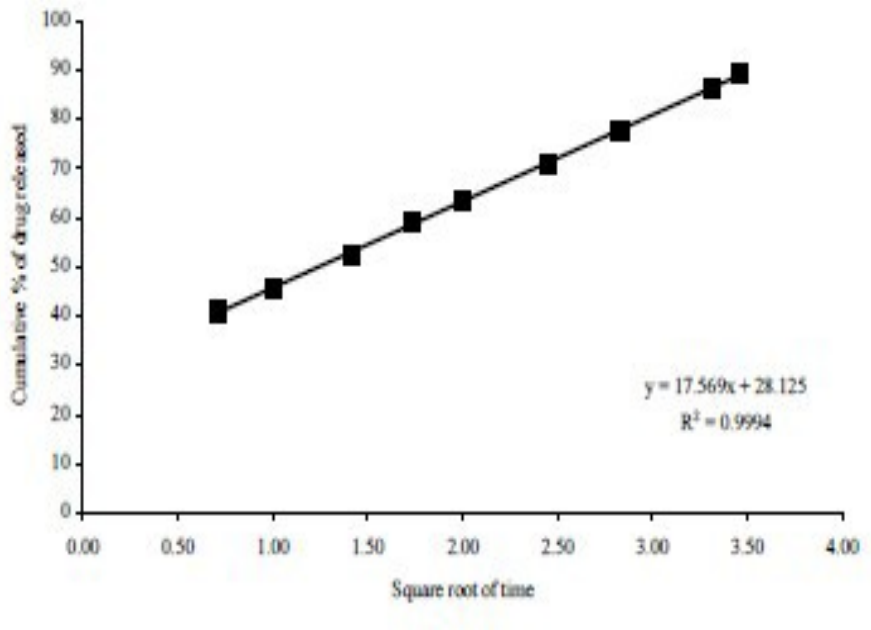
Where,

- Q is the amount of drug released in time t by surface unity,
- C is the initial concentration of the drug,
- ϵ is the matrix porosity,
- Γ' is the toruosity factor of the capillary system,
- C is the drug solubility in the matrix / s excipient media and D the difussion constant

Application:Water soluble drugs

- Low soluble drug incorporated in semi solid /solid polymer matrix.

A graph is plotted between cumulative % drug release vs √T



WEIBULL MODEL

- Describes for different dissolution process as equation

$$m=1-\exp[-(t-T_i)^b/a]$$

Where,

M=amount of drug dissolved

Mo=total amount of drug being released

t = time

T =lag time

a = scale parameter describes,time dependence

b = shape of dissolution curve progession

Application: useful for comparing the release properties of matrix type drug delivery.

Limitations:

- there is not any kinetic fundament and could only describe,but doesnot adequately characterize the dissolution kinetics properties of drug.
- There is not any single parameter releated with the intrinsic dissolution rate of the drug.
- It is not limited use for establishing *in-vivo in-vitro* correlation.
- A graph is plotted between log drug release vs log tine

HIXSON-CROWELL MODEL

- Hixson-crowell recognised that the particles regular area is proportional to the cube root of its volume

They derived the equation:

$$W_0^{1/3} - W_t^{1/3} = K_s t$$

Where, *Wo* is the initial amount of drug in dosage form,

- *Wt* is the remaining amount of drug *t* in the dosage form at time *t* and *Ks* is a constant incorporating the surface–volume relation.

It describes the drug release by dissolution and considers thesurface area and geometrical shape of dissoving entity.

This model used to describes the release profile keeping in mind the diminishing surface of drug particles during dissolution.

A graph is plotted between cube root of drug % remeaining vs time

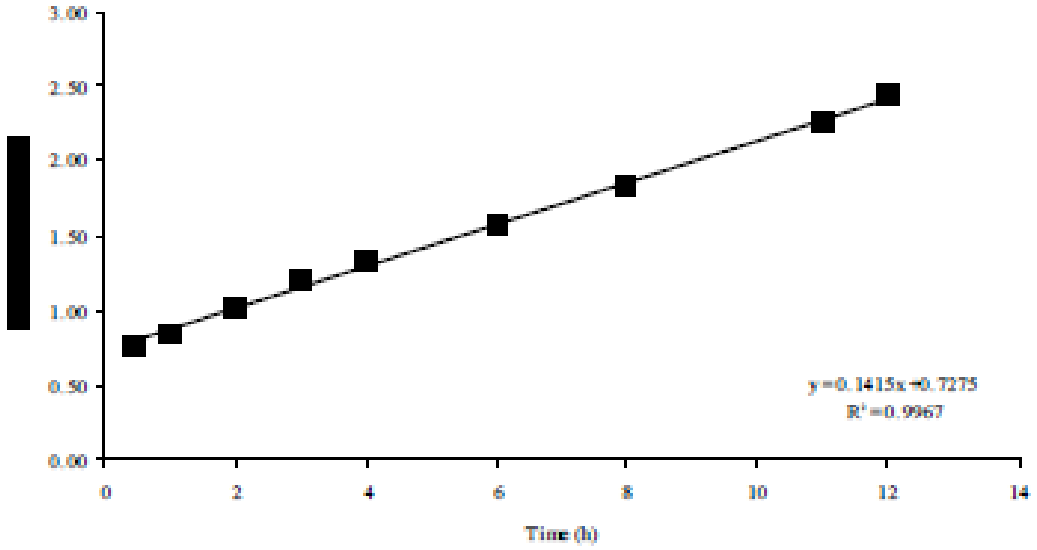


Fig. 5: Hixson-Crowell cube root plots of Ibuprofen sustained release formulation.

KORSMEYER-PEPPAS MODEL

- Koremeyer et all derived a simple relationship which described drug release from a polymeric system equation.
- To find out the mechanism of drug release,first 60%drug release data were fitted in peppas model

According to model the equation:

$$M_t/M_\infty = kt^n$$

Where,

n is the release exponent, indicative of the drug release mechanism, and the function of *t* is M_t/M_∞ fractional release of drug.

Application-This model is generally used to analyse the release of pharmaceutical polymeric dosage forms, when the release mechanism is not well known or when more than one type of release phenomena could be involved.

A graph is plotted between log cumulative % drug release vs log time

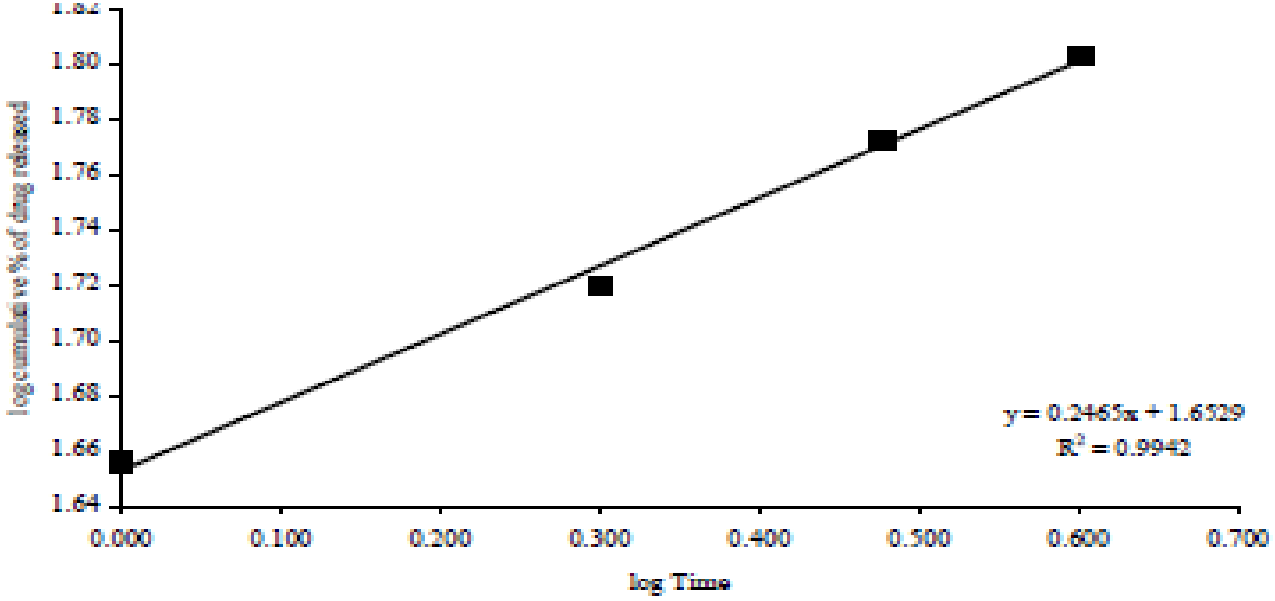


Fig. 6: Korsmeyer – Peppas Model for mechanism of drug release (first 60% drug release)

In this model, n value characterizes the release mechanism of drug

Release exponent (n)	Drug transport mechanism	Rate as function of time
0.5	Fickian	t -0.5
0.45<n=0.89	Non-Fickian	t n-1
0.89	Case 2	Zero order release
>0.89	Super case 2	t n-1

RELEASE KINETIC MODELS

MATHEMATICAL MODELS

NO.	MODEL NAME	MODEL
1.	ZERO ORDER	$F=k_0t$
2.	FIRST ORDER	$\log Q_t=\log Q_0-k_1t/2.303$
3.	HIGUCHI	$Q=\sqrt{t}DC_s(2C-C_s)$
4.	WEIBULL	$m=1-\exp[-(t-T_i)^b/a]$
5.	HIXSON-CROWELL	$W_0^{1/3}-W_0^{1/3}=Kt$
6.	KORSMEYER-PEPPAS	$f_t=at^n$
7.	POWER LAW	$M_t/M_\infty=at^n$

Conclusion

- Hence this conclusion can be drawn that the invitro drug release kinetics is necessary step to be done to study the drug release patterns from the dosage form.
- Graph obtained from kinetics data states the efficiency of drug release from the dosage form.

ELECTRONIC PRESCRIBING AND ROBOTICS

WHAT IS E-PRESCRIBING?

- e-Prescribing is an electronic avenue that sends prescrip tions directly from the physician's office to the pharmacy while storing prescription data in the patient's electronic medical record (EMR) or electronic health record (EHR).

- To the patients, e-prescribing is simply the electronic ver sion of a paper prescription order.

- The supporting technology also covers the entire proces s of order creation, tracking, fulfillment of prescriptions, a s well as the database maintenance of the prescribing ph ysicians, clinic locations, pharmacies, and benefits check ing

WHAT ARE NEEDED IN E-PRESCRIBING?

When a patient visits the doctor and is pre scribed medications, a physician who e-pr escribes will have already been set up with

1) an Electronic Medical Record (EMR) sy stem that supports e-prescribing, and
2) an account with an e-prescribing technol ogy provider which serves as a data cle aringhouse for electronic prescriptions.

BASIC PROCESS OF E-PRESCRIBING

- A physician or staff member enters prescriptio n information on a computer using e-Prescripti on software which is simultaneously integrated and recorded to the corresponding patient's el ectronic medical record.

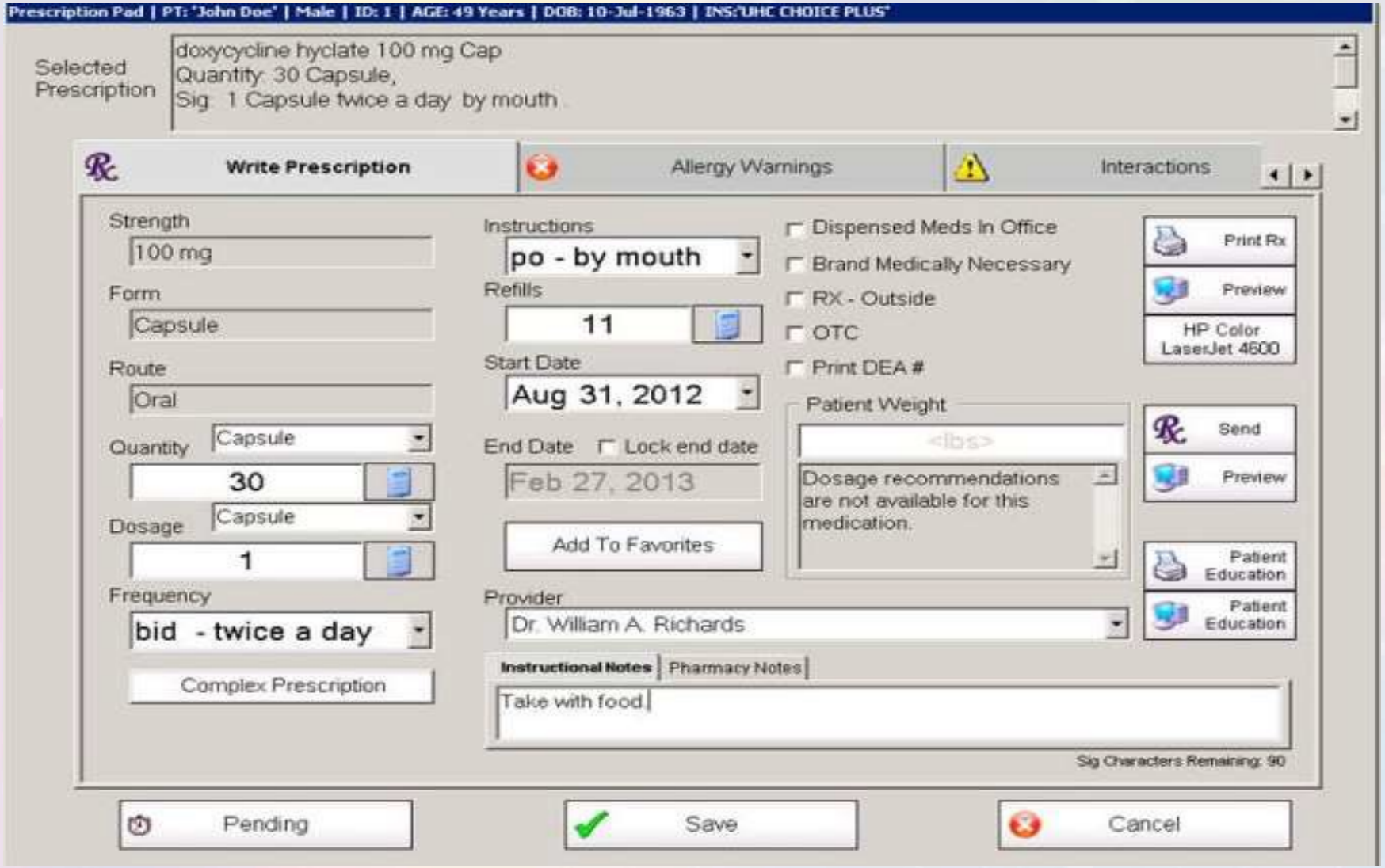
- The e-Prescription is then automatically trans mitted to the patient's preferred pharmacy thro ugh a secure private network.

COMPLETE PROCESS

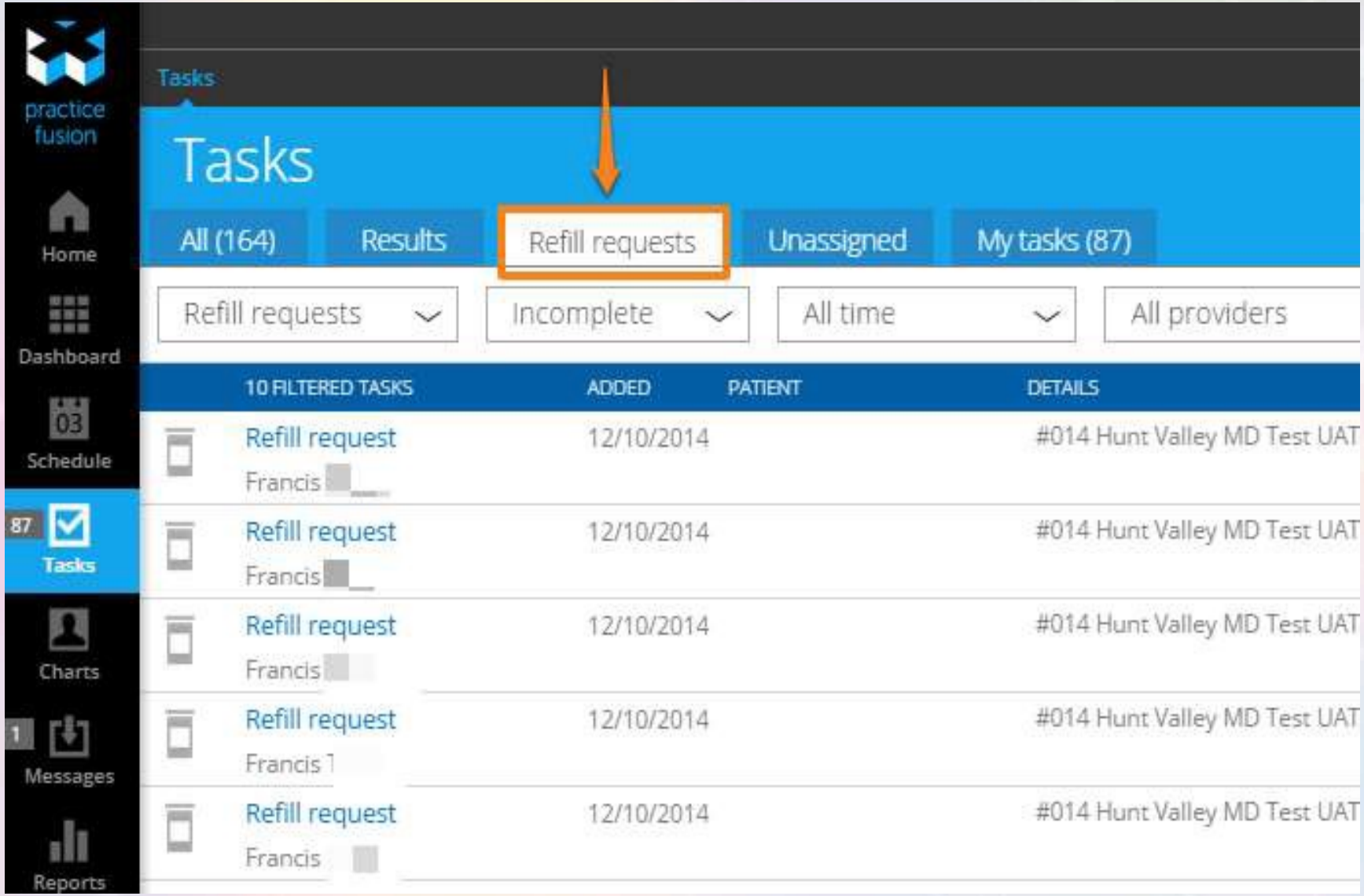
- Before writing the prescription, the doctor will ask the patient where they want to pick up their prescriptions.
- The patient's preferred pharmacy is verified in the EM R and the prescription is written.
- An electronic transaction goes to the patient's preferre d pharmacy immediately.
- The patient then visits the pharmacy to pick up the pre scription.
- To the patient, everything is seamless, and the prescri ption is delivered just like any other, except that they d on't have to drop off a paper prescription at the pharm acy, then either wait or come back later.

COMPLETE PROCESS

SAMPLE E-PRESCRIPTION (DOCTOR'S)



SAMPLE E-PRESCRIPTION (PHARMACIST'S)



ADVANTAGES

- **Increases patient safety** done through warning systems a nd alerts at the point of prescription that flag potentially har mful drug interactions, drug allergies, and dosage errors.

- **Eliminates legibility errors** and aids in stream lining the o verall prescription process by reducing the need for call-ba cks from pharmacists to verify prescription information.

- **Refills Helps request**, receive and authorize refills much e asier.

- **Convenience** provides a great amount of convenience and flexibility to the physician.

DISADVANTAGES

Cost

May be prohibitive for a small practice

Training, maintenance and upgrades can be expensive.

Learning Curve

Transition time may result in lost time and efficiency.

Other

Illegible handwriting could be replaced by data entry errors.

Possibility of downtime due to network problems or loss of electricity necessitates fall-back procedures.

TOPICS FOR ROBOTICS

1

2

3

Topic 1
ROBOTICS IN HEALTHCARE SYSTEM

Topic 2
ADVANTAGES AND DISADVANTAGES

Topic 3
USES AND TYPES

INTRODUCTION

- The healthcare robot system is designed to serve bedridden patients by performing simple services such as operating electrical appliances or bringing patient's bedside according to the patients spoken request.

The healthcare robot, however , is not supposed to apply any medical treatment to the patient.

ROBOTICS IN HEALTHCARE

- By 2050 one in four people in the world will be over the age of 65. The healthcare system will be unable to cope with the likely increases in chronic illness.

- To meet these challenges, health and local authority services must reconfigure, placing greater emphasis on community care and the effective use of technology. One promising technology is robotics.

ROBOTICS IN HEALTHCARE

- Robotics is the engineering science and technology of robots, and their design, manufacture, application, and structural disposition.

- Robotics is related to electronics, mechanics and software.

- The term robotics was coined by Issac Asimov in his 1941

ADVANTAGES

- **Addressing cognitive decline**: for example reminding patient to drink, take medicine or of an appointment.
- **Enabling patients and caregivers** to interact thereby reducing the frequency of personal visits
- **Collecting data and monitoring patients**, emergencies such as heart failure and high blood sugar level , could be avoided.
- **Assisting people with domestic tasks-** many give up independent living because of arthritis.
- **Accuracy:** robot once instructed can perform a task without fatigue and with accuracy, even after long hour of operation

OTHER ADVANTAGES

- **1.Help with heavy lifting.** Caregiver injuries are common and lead to missed work for the caregiver and sometimes leaves an older adult without a caregiver.

- **2. Serve as a communication tool.** Technology is changing at record speeds.. If an older adult can't (because of low vision or dementia, for example) or doesn't want to learn to use the latest machine, they can simply ask the robot to serve that function. Imagine: "Robot, call my daughter," and the robot makes the connection with Skype or FaceTime-type technology.

OTHER ADVANTAGES

3.Provide reminders. To take medications, go to appointments, eat, exercise, and anything else relevant to each individual person. Sure, people make lists but too often they forget to check them.

4.Help with monitoring. Home monitoring has proven benefits in diseases such as heart failure and diabetes. Robots might monitor many medical conditions and relay that data back to a nurse or doctor who could then have a more informed meeting — in person, or via robo-chat — with the patient.

OTHER ADVANTAGES

- **5. Preserve dignity-** People find help with toileting humiliating – bad if from a stranger, often worse from a family member.
- **6. Promote independence-** A robot that helped with basic chores might delay or diminish the need for unwanted human help.
- **7.Decrease burden on family and friends.** Many of my patients report that their greatest source of distress is the burden they feel they place on their families. If robots could help so that families spent more time enjoying each other's company,
- **8. Fill care gaps.** many humans avoid the very old and even the most devoted family and friends have other things to attend to.
- **9. Offer endless patience.** When a person has dementia, they often ask the same question over and over. Most humans lose patience answering 5, 15 or 40 times. A robot doesn't.
- **10. Provide companionship.** This is the most controversial function of robots. But the goal is *not* to replace humans; it's to **SUPLLEMENT AND COMPLEMENT** them. Granted there are many un- and underemployed humans as well as many humans in need of care, and a better solution would be to more appropriately reward, economically and socially, the very challenging work of care giving

DISADVANTAGES

- **1.COST OF THEM:** Like anything else, with good comes bad. The few disadvantages the Nursebots have are what ultimately make them such a work in progress that won't hit mass production for a little while longer. One disadvantage of Nursebots is the cost of them. Nursebots are not being produced in multiples anywhere yet.

- **2. SURVEILLANCE** :This surveillance could lead to ethical issues of privacy. "Moreover, what if the patient agreed to take the medicine, and then forgot? Should the robot stay and monitor the patient until the medicine is taken, or is that a violation of privacy? When and how should the robot inform the doctor if anything goes wrong?" Many people will most likely have an issue with these robots monitoring a person's daily activities on something very similar to a surveillance camera.

3.COMPARISION WITH HUMAN: One last disadvantage of the Robotic Nurses that brings great debate to this topic is the fact that many people feel a robot will never compare to a human.

USES OF ROBOTIC IN HEALT HCARE

- Surgery
- Procedure
- Treatment (pre and post)
- planning
- Simulation
- Guiding

TYPES OF ROBOTIC IN HEALTHCARE

- **RIBA**(robot for interactive body assistance)

- "**Giraffplus**" a humanoid robot that serve as a vacuum cleaner, standing mirror a video chat android that stands in for family time and doctor visits

TYPES OF ROBOTIC IN HEALTHCARE

Care-o-bot 4 is programmed to be charming, to express emotion and to follow the rules of etiquette. The objective to remove cold exterior of a robot by introducing empathy. Using simple gesture and emotions

CODY: There is lot can to be done around the home bedside take care of the individuals.