Modeling User Feedback in Dynamic Search and Browsing

Jiyun Luo
Department of Computer Science
Georgetown University
Advisor: Grace Hui Hui Yang
Motivation

• Complex search tasks become common nowadays
  – Multiple subtopics
  – Involve learning process
  – Long search session
  – Rich user interactions

• Build a framework
  – well utilize all user feedback
  – dynamically balance search strategies to assist users
    • Help exploiting topics more deeply
    • Help exploring when needed
My Previous Work

• Model dynamic session search using a two agent POMDP framework
  – User feedback
    • query reformation
    • click through data
  – Search strategies
    • term weight adjustment
    • relevance feedback
    • result diversification etc.
Current Work

• Collect more forms of user feedback

• Automatically balance search strategies during dynamic session search
Collect more User Feedback

1. **Ebola**
   - **Topic**: Experimental Drugs
   - **Availability of Drugs**

   ** Ebola -551658b6600b59193359c294800e475fd765406f7ad98b205e4f15dedd55**
   Make investigational Ebola drugs available, say ethicists! News! Pharmaceutical Journal Cookie policy: This site uses cookies (small files stored on...the site You are here:Home News and Analysis News Medical ethics Make investigational Ebola drugs available, say ethicists The Pharmaceutical Journal, 12 AUG 2014By Debbie Andalo Debbie Andalo Corresponding Author...

   ** Ebola -ef64b3c8546e215d16120326f5b5c0e4192d8a207735169c08289074da65cba6**
   Ebola.com » drugs http://www.ebola.com Ebola Information and ResourcesFri, 09 January 2015...drugs-treat-ebola/ http://www.ebola.com/breaking-news/53-drugs-treat-ebola/#commentsWed, 17 December 2014 21:42:11 +0000http://www.ebola.com/?p=724(Time-Alexandra Sifferlin) Scientists have identified 53 existing drugs that could be effective in fighting the deadly virus. There is currently no vaccine or drug available to treat the disease, which is one of the primary reasons...

   ** Ebola -add38fe6b2ed9a815481b0a540d68870d7b4e06e24f7471d5852d7faadeeb38a7a**
   ...Oncology Ophthalmic Diseases Oral Health Otic Disorders Pain Management Poisoning & Drug Dependence Psychiatric Disorders Respiratory Disorders Urological Disorders Drug Interactions News Drug News Safety Alerts and Recalls New Products...Dependence Psychiatric Disorders Respiratory Disorders Urological Disorders Drug Interactions News Drug News Safety Alerts and Recalls New Products Drugs in the...

   ** Ebola -da37ebd6d94a1b154f9e622b09a66b9d895e908765e4a9a4799a9c6eb2c1d**
   MintPress News Ethical Questions Emerge Over Who Gets Ebola Drug - MintPress News - http://www.mintpressnews.com - Ethical Questions Emerge Over Who Gets...News - http://www.mintpressnews.com - Ethical Questions Emerge Over Who Gets Ebola Drug Posted By AP On August 11, 2014 @ 8:57 am In Daily...issues, Spain announced it had obtained a scarce U.S.-made experimental Ebola drug to treat a Spanish missionary priest infected with the killer virus. The Health Ministry statement came less than a week after the U.S. Center for Disease Control and Prevention said there were virtually no doses available of the drug that was used to treat two Americans with the disease. The drug...

   ** Ebola -57dae33d0ce89cae9bbfc3f8eb827a4a240f62dca6e2ab5a34ada665dbbf6f3b**
   Make investigational Ebola drugs available, say ethicists! News! Pharmaceutical Journal Cookie policy: This site uses cookies...
Collect User Feedback

A tool used for mining a corpus to find topics/subtopics and their relevant content

An Information Triage process
Annotation Output

• A hierarchy topic tree

User: assr1
User: assr2

Domain: Illicit_Goods

Domain: Ebola

Topic: Last Mile Health ebola efforts (topic_id : 98)
  Subtopic: Last Mile Health activities (subtopic_id : 119)
  Subtopic: Last Mile Health effectiveness (subtopic_id : 120)
  Subtopic: Last Mile Health history (subtopic_id : 121)
  Subtopic: Last Mile Health recruiting (subtopic_id : 123)

Topic: Last Mile Health ebola (topic_id : 135)

Topic: Witch ebola witchdoctor traditional healer herbalist sowe (topic_id : 146)

Topic: polaris radio-lights solar radio batteries (topic_id : 194)

Topic: songs jingles singers (topic_id : 280)

Topic: songs jingles sing vfex (topic_id : 281)

Topic: bush meat fruit bat ebola animal (topic_id : 368)

Topic: nano silver ebola (topic_id : 393)

Domain: Local_Politics

Domain: Polar

User: assr3
Procedure

(1) Initialize a query and search

Search for: availability of drugs

Results for: availability of drugs

1. availability of drugs

...Oncology Ophthalmic Disorders Oral Health Otic Disorders Pain Management Poisoning & Drug Dependence Psychiatric Disorders Respiratory Disorders Urological Disorders Drug Interactions News Drug News Safety Alerts and Recalls New Products...Dependency Psychiatric Disorders Respiratory Disorders Urological Disorders Drug Interactions News Drug News Safety Alerts and Recalls New Products Drugs in the...

4. availability of drugs

MintPress News Ethical Questions Emerge Over Who Gets Ebola Drug - MintPress News - http://www.mintpressnews.com - Ethical Questions Emerge Over Who Gets...News - http://www.mintpressnews.com - Ethical Questions Emerge Over Who Gets Ebola Drug Posted By AP On August 11, 2014 @ 8:57 am In Daily...issues, Spain announced it had obtained a scarce U.S.-made experimental Ebola drug to treat a Spanish missionary priest infected with the killer virus. The Health Ministry statement came less than a week after the U.S. Centers for Disease Control and Prevention said there were virtually no doses available of the drug that was used to treat two Americans with the disease. The drug...
Procedure

Examine search results. Click a doc to read its content.

Beware of Ebola Supplements Sold Online, Warns FDA

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The Food and Drug Administration (FDA) is warning consumers not to purchase or use products sold online claiming to prevent or treat the Ebola virus.

Since the outbreak of the Ebola virus, the FDA has seen and been notified regarding products claiming to prevent or treat the Ebola virus. Currently there are no FDA-approved vaccines or drugs to prevent or treat infection by the Ebola virus. While some experimental Ebola treatment and vaccines are under development, there are no approved vaccines, drugs, or investigational products targeting the Ebola virus available for purchase on the internet. Government regulations prohibit dietary supplements from claims of preventing or curing diseases.

RELATED: CDC: Ebola Unlikely to Spread to U.S.

Consumers who have seen or purchased these products are encouraged to report them to the FDA. Individuals promoting these unapproved and fraudulent products must take immediate action to amend or remove these claims, or face potential FDA action.

For more information visit FDA.gov.

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The government said in a statement on Friday. This week, a Liberal American candidate closed its borders to anyone who has been anywhere near the disease. And an airline scrambled to inform hundreds of passengers that they had been on a plane that carried someone who has since come down with Ebola.

From doc: ebola-6039417afe6613b2b10c63ed58d24d
- marginally relevant
- relevant
- highly relevant
- key result

Cruise Lines

Concerns about even remote chances of Ebola exposure rippled Friday from a U.S. airline to a cruise ship off Belize, with Frontier contacting hundreds who flew with an infected nurse and Carnival quarantining a health worker only tangentially linked to the case.

From doc: ebola-20109bd25b049de491e1bad2d0ee6d7c
- marginally relevant
- relevant
- highly relevant
- key result

The world's largest cruise line, Carnival Corp., has changed the itineraries of two ships that were scheduled to land in ports near disease-ravaged West African countries. Another cruise line is considering doing the same.
Create topics/subtopics whenever wanted.
Find a relevant piece of text, drag-and-drop to the corresponding subtopic.

Kentucky BioProcessing, which manufactures a version of the ZMapp drug, is working to increase production, but it will take months, company spokesman David Howard said last week, CNN reports.

Kieny defined compassionate use as access to an unapproved drug outside a clinical trial. There is a moral obligation to collect and share all data generated, she said in the AP video.

There are not adequate supplies of any of the investigational agents anywhere near ready for human use,” said Dr. Jesse Goodman, director of the Center on Medical Product Access, Safety and Stewardship at Georgetown University Medical Center, referring to all drugs being developed to treat ebola. “Not (adequate) to treat all the patients in this outbreak, even if we knew they worked.”

Some perceived the gap widening between developed and developing nations last week as reports emerged that the ebola drug was being used to treat Westerners.
Procedure

4. Find a relevant piece of text, drag and drop to the corresponding subtopic.

5. Give a grade.
Forms of Feedback

• Our feedback still include query reformulation and click through data
Forms of Feedback

- More, we have topic/subtopic names, relevant content and grade.
Forms of Feedback

- User can directly mark a doc as duplicate or irrelevant
**Forms of Feedback**

- User can directly tell us if they feel satisfied or frustrated.

[Search results for availability of drugs](http://www.ebola.com/ebola-information-and-resources)
Search Strategies

- 5 retrieval methods
- Lemur, Solr and Terrier
Search Strategies

- 5 retrieval methods
- Lemur, Solr, and Terrier
- Relevance Feedback approach, only utilizing positive signals
Relevance Feedback

• Relevance feedback is done at subtopic level
• Subtopic title and all its relevant content are utilized
• Terms are filtered by its IDF
• Top 20 terms form a new query
Search Strategies

- 5 retrieval methods
- Lemur, Solr and Terrier

Relevance Feedback approach, only utilizing positive signals

- Adaptive search approach, utilizing both positive and negative signals (provided by NIST)
  - helping user to exploit an aspect of the whole topic
  - emphasize user’s liked and disliked content
Next Step

• Add diversification algorithm to help use exploring

• Balance exploration and exploitation
  – Previous work
    • Explore during the initial search, then choose one path to exploit
    • Explore when encountering a diversified query
    • Always explore unless user click some docs
Balance Exploration and Exploitation

• My proposal
  – E-greedy, assign probability of exploration and exploitation
  – Choose one strategy, if no positive feedback received then switch
  – Guess user intent of exploration/exploitation based on their feedback signals, then acting correspondingly
Experiment Setup

• Test above balance strategies on
  – TREC DD Tracks
  – TREC Session Tracks

• Evaluation metrics
  – MAP, nDCG, $\alpha$-nDCG, nERR-IA and snDCG
  – CubeTest
    • emphasize retrieval efficiency
      – short search session
      – wide subtopic coverage
      – novel content
  – Wall Clock, CPU Cycles and Speed up
• Thank You!

• Q & A