

CSCI 572 - Information Retrieval and Web Search Engines

Homework 4 – Comparing Search Engine Ranking Algorithms

Name: Jiaqi Fan

USC ID #: 7045273947

1. Steps to complete the assignment

Step 1: Basic preparation(Mac OS)

- Downloads Apache Solr 7.7.2 and tested the software following the online tutorial.
- Downloaded all files including pages files and URLtoHTML_fox_news.csv from Google Drive for Foxnews.
- Run Apache server and test the Php environment successfully. And git clone solr-php-client repository from Github and placed it in the root.

Step 2: Indexing HTML files in Solr

- Used command **bin/solr start** to start the Solr server.
- Used command **bin/solr create -c foxnews** to create a core named foxnews.
- Used command **bin/post -c foxnews -filetypes html**
/Users/frank/Desktop/572/hw4/dataset/foxnews/ to perform indexing.
- Checked the Solr UI (<http://localhost:8983/solr>) and all files had gotten indexed.
- Configured Solr to default querying from the field `_text_` by defining the default field in the requestHandler in the solrconfig.xml file.
- Tried queries to test out Solr directly and ensured that Solr is working perfectly.

Step 3: Generating the web graph (Java)

- Constructed two map data structures (fileUrlMap and urlFileMap) from the file

URLtoHTML_fox_news.csv to get a bidirectional mapping between page id and url.

- Used external library JSoup to extract the outgoing links of every webpage by traversing all crawled files to create the edgeList.txt file.

Step 4: Computing PageRank (Python3)

- Loaded the web graph generated from Step 3 to networkx.
- The python program parsed every line from edgeList.txt and computed PageRank (PR) values with the following configuration:

alpha=0.85, personalization=None, max_iter=30, tol=1e-06, nstart=None,
weight='weight', dangling=None

- Created external_pageRankFile.txt with format <doc_id>=<page_rank_score>.

Step 5: Adding one more search algorithm in Solr

- Placed the external_pageRankFile.txt generated from Step 4 in the folder solr-7.7.2/server/solr/foxnews/data/.

- Made changes in managed-scheme for using the external pageRank file for ranking.

```
<fieldType name="external" keyField="id" defVal="0"  
class="solr.ExternalFileField"/>  
  
<field name="pageRankFile" type="external" stored="false" indexed="false"/>
```

- Added these lines to the solrconfig.xml file and reloaded the core foxnews on the Solr Admin page.

```
<listener event="newSearcher"  
class="org.apache.solr.schema.ExternalFileFieldReloader"></listener>  
  
<listener event="firstSearcher"  
class="org.apache.solr.schema.ExternalFileFieldReloader"></listener>
```

- Queried with "pageRankFile desc" in the "sort" text field to get results based on page rank (PR) values for each webpage in descending order.

Step 6: Running PHP server (PHP)

- Wrote the PHP code (main.php) to run queries using Solr based on two different ranking algorithms, retrieve results, and display them.
- The two ranking algorithms are the Solr default algorithm (Lucene) and Rank Page algorithm using external_rankPageFile.txt.
- Showed four fields of 10 results for each query including title, url, file id, and description of the news article. Title and url are clickable to original webpage. If the description is missed, showed "N/A".

Step 7: Starting querying and comparing two ranking algorithms

- Kept the PHP server running locally (port: 8080) and started Solr server locally (port: 8983)
- Run the set of queries using two ranking algorithms and saved the results.
- Compared the results of the two ranking algorithms.

Step 8: Terminating

- Recorded the results displayed on web browser and closed the PHP server and Solr server.
- Analyzed overlapping information from the results.

2. Explanation regarding why some pages have higher PageRank values

Some webpages have higher PageRank (PR) values because the algorithm computes PR for each page based on this graph using the pagerank function which is related to incoming links to itself. All data is being fetched from the file edgeList.txt we generated from the given mapping file (URLtoHTML_fox_news.csv). PageRank algorithm works by counting the number and quality of links to a page to estimate how important it is roughly. The underlying assumption is more important websites are more likely to receive more links to them. Therefore, a page with large number of incoming links and relatively fewer outlinks would receive a higher PR value.

3. The flow for any single query (Patriot Movement)

CSCI 572 Home Page x PHP Solr Client x Solr Admin x | +


localhost:8080/main.php

Search:

☒ Solr Default

☐ PageRank

Figure 1 Initial Page



- Dashboard
- Logging
- Core Admin
- Java Properties
- Thread Dump
- foxnews
 - Overview
 - Analysis
 - Dataimport
 - Documents
 - Files
 - Ping (0ms)
 - Plugins / Stats
 - Query
 - Replication
 - Schema
 - Segments info

Request-Handler (qt)

/select

common

q

Patriot Movement

fq

sort

start, rows

0 10

fl

id, title, og_url, og_description

df

Raw Query Parameters

key1=val1&key2=val2

wt

☐ indent off

☐ debugQuery

☐ dismax

☐ edismax

☐ hl

☐ facet

☐ spatial

☐ spellcheck

http://localhost:8983/solr/foxnews/select?fl=id%2C%20title%2C%20og_url%2C%20og_description&q=Patriot%20Movement

```
"responseHeader":{
  "status":0,
  "QTime":0,
  "params":{
    "q":"Patriot Movement",
    "fl":"id, title, og_url, og_description",
    "wt":"json"
  },
  "response":{"numFound":1550,"start":0,"docs":[
    {
      "id":"/Users/frank/Desktop/572/hw4/dataset/foxnews/9b822c35-5bf2-45f6-9d97-8fdaed9d4896.html",
      "og_description":["President Trump said \"major consideration\" is being given by his administration to designating t",
      "title":["Trump threatens to designate Antifa a terrorist organization ahead of expected Portland clashes | Fox New",
      "og_url":["https://www.foxnews.com/politics/trump-antifa-terrorist-portland-protests"]},
    {
      "id":"/Users/frank/Desktop/572/hw4/dataset/foxnews/7cc51046-7bc2-41d7-af3e-a6c655b1dd.html",
      "og_description":["It has been more than 3 days since Saudi Arabia's oil infrastructure was crippled, and as the in",
      "title":["Iranian cruise missiles and drones used in Saudi oil facilities, US officials say | Fox News"],
      "og_url":["https://www.foxnews.com/world/iranian-cruise-missiles-drones-saudi-oil"]},
    {
      "id":"/Users/frank/Desktop/572/hw4/dataset/foxnews/af627cd4-7665-4194-bac1-396a811f0fe5.html",
      "og_description":["Massive crowds of Fox News and Fox Nation fans lined up outside the Mahaffey Theater in St. Pete",
      "title":["Fox fans flood St. Pete for 'Patriot Awards' honoring everyday American heroes | Fox News"],
      "og_url":["https://www.foxnews.com/media/fox-nation-patriot-awards-american-heroes-st-petersburg"]},
    {
      "id":"/Users/frank/Desktop/572/hw4/dataset/foxnews/1d176c53-4a0f-41e6-80a1-9df0a5703608.html",
      "og_description":["Fox Nation Patriot Awards in St. Petersburg, Florida Wednesday evening."],
      "title":["PHOTOS: On the red carpet of the Fox Nation Patriot Awards | Fox News"],
      "og_url":["https://www.foxnews.com/media/fox-nation-patriot-awards"]},
    {
      "id":"/Users/frank/Desktop/572/hw4/dataset/foxnews/5cd0eb31-2245-452a-85ce-2c58681d4fe5.html",
      "og_description":["Marine Corps veteran Sergeant and Combat Engineer Rob Jones received the \"Most Valuable Patrio",
      "title":["Amputee veteran who ran 31 marathons and is running for Congress named 'Most Valuable Patriot' | Fox News",
      "og_url":["https://www.foxnews.com/media/marine-vet-most-valuable-patriot-awards-congress"]},
    {
      "id":"/Users/frank/Desktop/572/hw4/dataset/foxnews/423b8ecd-6386-43e3-9546-a654531b5510.html",
      "og_description":["Wounded veterans who received help and healing wanted to serve again -- and that's how \"Team Pa",
      "title":["\"Team Patriot\" bands together wounded vets to serve others through disaster relief: 'It's a new life for :",
      "og_url":["https://www.foxnews.com/faith-values/veterans-serve-disaster-relief"]},
    {
      "id":"/Users/frank/Desktop/572/hw4/dataset/foxnews/7e79f401-ddad-4897-aldf-4d41b941fddc.html",
      "og_description":["Fox Nation's Tomi Lahren delivered a special edition of her \"Final Thoughts\" to a live audienc",
      "title":["Tomi Lahren thanks US military, law enforcement at Patriot Awards: 'We are behind you' | Fox News"],
      "og_url":["https://www.foxnews.com/media/tomi-lahren-patriot-awards-fox-nation"]},
    {
      "id":"/Users/frank/Desktop/572/hw4/dataset/foxnews/1a084acd-c755-446e-bac8-064f9251be32.html",
      "og_description":["After being available since October, Netflix has pulled an episode of \"Patriot Act with Hasan Mi",
      "title":["Netflix pulls 'Patriot Act with Hasan Minhaj' episode after getting 'valid' legal complaint from Saudi Ar",
      "og_url":["https://www.foxnews.com/entertainment/netflix-pulls-patriot-act-with-hasan-minhaj-episode-after-getting-"]},
    {
      "id":"/Users/frank/Desktop/572/hw4/dataset/foxnews/e0c5f071-7a01-4a29-b1f1-bb0b065c9949.html",
      "og_description":["Vice President Mike Pence made a surprise appearance at Fox Nation's inaugural Patriots Awards o",
      "title":["Vice President Mike Pence delivers surprise address to the Fox Nation Patriot Awards | Fox News"],
      "og_url":["https://www.foxnews.com/media/vice-president-mike-pence-fox-nation-patriot-awards"]},
    {
      "id":"/Users/frank/Desktop/572/hw4/dataset/foxnews/622e8e87-bcac-4a17-b19d-cd4745c75b0c.html",
      "og_description":["Netflix CEO Reed Hastings defending the streaming platform's decision to pull an episode of \"Pa",
      "title":["Netflix boss defends pulling 'Patriot Act' episode in Saudi Arabia: 'We're not in the truth to power busi",
      "og_url":["https://www.foxnews.com/tech/netflix-defends-pulling-patriot-act-episode-in-saudi-arabia"]}
  ]}]}
```

Documentation Issue Tracker IRC Channel Community forum Solr Query Syntax

Figure 2 Query (Patriot Movement) Solr UI Using Default

The screenshot shows the Solr UI interface. On the left is a sidebar with navigation links: Dashboard, Logging, Core Admin, Java Properties, Thread Dump, foxnews (selected), Overview, Analysis, Dataimport, Documents, Files, Ping (0ms), Plugins / Stats, Query (selected), Replication, Schema, and Segments info.

The main area is divided into two sections. The top section is the 'Request-Handler (qt)' section, which contains the following fields:

- q: /select
- common: (empty)
- q: Patriot Movement
- fq: (empty)
- sort: pageRankFile desc
- start, rows: 0, 10
- df: (empty)
- id, title, og_url, og_description
- wt: (empty)
- key1=val1&key2=val2
- wt: (empty)
- indent off
- debugQuery
- dismax
- edismax
- hl
- facet
- spatial
- spellcheck
- Execute Query

The bottom section is the 'Raw Query Parameters' section, which contains the following fields:

- key1=val1&key2=val2

The right-hand pane displays the JSON response for the query. The response is a JSON object with the following structure:

```
{
  "responseHeader": {
    "status": 0,
    "QTime": 0,
    "params": {
      "q": "Patriot Movement",
      "fl": "id, title, og_url, og_description",
      "sort": "pageRankFile desc",
      "start": 0,
      "rows": 10
    }
  },
  "response": {
    "numFound": 550,
    "start": 0,
    "docs": [
      {
        "id": "/Users/frank/Desktop/572/hw4/dataset/foxnews/fc258e7a-49f3-414e-9835-d004bc6457bc.html",
        "og_description": ["Biology, astronomy, chemistry, physics on FoxNews.com. In-depth natural science news. Headline", "title": ["Science | Fox News"],
        "og_url": ["https://www.foxnews.com/science"],
        "id": "/Users/frank/Desktop/572/hw4/dataset/foxnews/56d916a8-9687-43e5-88d1-045a4aee8e51.html",
        "og_description": ["America is Watching."],
        "title": ["Fox News - Breaking News Updates | Latest News Headlines | Photos & News Videos"],
        "og_url": ["https://www.foxnews.com"],
        "id": "/Users/frank/Desktop/572/hw4/dataset/foxnews/d4d2900c-a44e-47d6-922e-01f3f6ee198d.html",
        "og_description": ["News for Hardware, software, networking, and Internet media. Reporting on information technolo", "title": ["Tech | Fox News"],
        "og_url": ["https://www.foxnews.com/tech"],
        "id": "/Users/frank/Desktop/572/hw4/dataset/foxnews/9af29106-e7fa-4acb-8133-d6abf45adiab.html",
        "og_description": ["PLANET EARTH"],
        "title": ["PLANET EARTH | Fox News"],
        "og_url": ["https://www.foxnews.com/category/science/planet-earth"],
        "id": "/Users/frank/Desktop/572/hw4/dataset/foxnews/fc331802-dd85-48ce-ac37-0e76e5288b97.html",
        "og_description": ["Movies"],
        "title": ["Movies | Fox News"],
        "og_url": ["https://www.foxnews.com/category/entertainment/movies"],
        "id": "/Users/frank/Desktop/572/hw4/dataset/foxnews/c45c1eal-8fa8-473d-b487-5c65933133a7.html",
        "og_description": ["Gwyneth Paltrow confessed she's \"not sure\" how she feels about her former working relationsh", "title": ["Gwyneth Paltrow admits to 'complicated relationship' with Harvey Weinstein | Fox News"],
        "og_url": ["https://www.foxnews.com/entertainment/gwyneth-paltrow-relationship-harvey-weinstein"],
        "id": "/Users/frank/Desktop/572/hw4/dataset/foxnews/1c035f9d-e96f-4438-81ec-d820300626dd.html",
        "og_description": ["Rep. Alexandria Ocasio-Cortez, D-N.Y., seemed to criticize billionaire and former New York Cit", "title": ["AOC appears to accuse Bloomberg of trying to 'purchase our political system' | Fox News"],
        "og_url": ["https://www.foxnews.com/politics/aoc-bloomberg-purchase-election"],
        "id": "/Users/frank/Desktop/572/hw4/dataset/foxnews/2c3770b9-cdd7-4b6d-bf88-b8a2fcbcc1ff.html",
        "og_description": ["Ukrainian forces and Russian-backed separatists began pulling back from a war-torn village in", "title": ["Ukrainian forces, Russian-backed separatists begin pullback in war-torn Donbass | Fox News"],
        "og_url": ["https://www.foxnews.com/world/ukraine-russia-separatists-pullback"],
        "id": "/Users/frank/Desktop/572/hw4/dataset/foxnews/c286e3bd-a30d-4308-965e-84562516ea42.html",
        "og_description": ["Earth's hot, gooey center and its cold, hard outer shell are both responsible for the creeping", "title": ["Earth's mantle and crust are in a fiery battle to the death - of supercontinents | Fox News"],
        "og_url": ["https://www.foxnews.com/science/earths-mantle-and-crust-are-in-a-fiery-battle-to-the-death-of-supercon"],
        "id": "/Users/frank/Desktop/572/hw4/dataset/foxnews/cb5e3197-1922-4dac-bc73-a401f8f9f837.html",
        "og_description": ["Honoring the Armed Forces."],
        "title": ["2020 Ram 1500 'Built to Serve' pickup salutes the U.S. Military | Fox News"],
        "og_url": ["https://www.foxnews.com/auto/2020-ram-1500-built-to-serve-pickup-salutes-the-u-s-military"]}
    ]
  }
}
```

At the bottom of the page, there are links to Documentation, Issue Tracker, IRC Channel, Community forum, and Solr Query Syntax.

Figure 3 Query (Patriot Movement) Solr UI Using PageRank

Search: Patriot Movement

☒ Solr Default

☐ PageRank

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Results 1 – 10 of 550:

1.	<p>Title:Trump threatens to designate Antifa a terrorist organization ahead of expected Portland clashes Fox News</p> <p>URL: https://www.foxnews.com/politics/trump-antifa-terrorist-portland-protests</p> <p>ID: /Users/frank/Desktop/572/hw4/dataset/foxnews/9b822c35-5bf2-45f6-9d97-0fdaed9d4896.html</p> <p>Description: President Trump said "major consideration" is being given by his administration to designating the far-left Antifa movement a terrorist organization, as the city of Portland, Ore., prepares for dueling protests between right-wing demonstrators and Antifa on Saturday.</p>
2.	<p>Title:Iranian cruise missiles and drones used in Saudi oil facilities, US officials say Fox News</p> <p>URL: https://www.foxnews.com/world/iranian-cruise-missiles-drones-saudi-oil</p> <p>ID: /Users/frank/Desktop/572/hw4/dataset/foxnews/7cc51046-7bc2-41d7-af3e-a64c6555b1dd.html</p> <p>Description: It has been more than 3 days since Saudi Arabia's oil infrastructure was crippled, and as the investigation continues, fingers are pointing towards Iran as not only the perpetrator, but also the launch territory.</p>
3.	<p>Title:Fox fans flood St. Pete for 'Patriot Awards' honoring everyday American heroes Fox News</p> <p>URL: https://www.foxnews.com/media/fox-nation-patriot-awards-american-heroes-st-petersburg</p> <p>ID: /Users/frank/Desktop/572/hw4/dataset/foxnews/af627cd4-7665-4194-bac1-396a811f0fe5.html</p> <p>Description: Massive crowds of Fox News and Fox Nation fans lined up outside the Mahaffey Theater in St. Petersburg, Florida, Wednesday as ticket holders waited excitedly to take part in Fox Nation's first-ever "Patriot Awards."</p>
4.	<p>Title:PHOTOS: On the red carpet of the Fox Nation Patriot Awards Fox News</p> <p>URL: https://www.foxnews.com/media/fox-nation-patriot-awards</p> <p>ID: /Users/frank/Desktop/572/hw4/dataset/foxnews/1d176c53-4a0f-41e6-80a1-9df0a5703608.html</p> <p>Description: Fox Nation Patriot Awards in St. Petersburg, Florida Wednesday evening.</p>
5.	<p>Title:Amputee veteran who ran 31 marathons and is running for Congress named 'Most Valuable Patriot' Fox News</p> <p>URL: https://www.foxnews.com/media/marine-vet-most-valuable-patriot-awards-congress</p> <p>ID: /Users/frank/Desktop/572/hw4/dataset/foxnews/5cd0eb31-2245-453a-85ce-2c58681d4fe5.html</p> <p>Description: Marine Corps veteran Sergeant and Combat Engineer Rob Jones received the "Most Valuable Patriot" award at Fox Nation's inaugural Patriot Awards in St. Petersburg, Florida on Wednesday.</p>
6.	<p>Title:'Team Patriot' bands together wounded vets to serve others through disaster relief: 'It's a new life for me' Fox News</p> <p>URL: https://www.foxnews.com/faith-values/veterans-serve-disaster-relief</p> <p>ID: /Users/frank/Desktop/572/hw4/dataset/foxnews/423b8ecd-6386-43e3-9546-a654531b5510.html</p> <p>Description: Wounded veterans who received help and healing wanted to serve again -- and that's how "Team Patriot," a new initiative of Samaritan's Purse, got started.</p>
7.	<p>Title:Tomi Lahren thanks US military, law enforcement at Patriot Awards: 'We are behind you' Fox News</p> <p>URL: https://www.foxnews.com/media/tomi-lahren-patriot-awards-fox-nation</p> <p>ID: /Users/frank/Desktop/572/hw4/dataset/foxnews/7e79f401-ddad-4897-a1df-4d41b941fddd.html</p> <p>Description: Fox Nation's Tomi Lahren delivered a special edition of her "Final Thoughts" to a live audience at the inaugural "Patriot Awards" in St. Petersburg, Florida.</p>
8.	<p>Title:Netflix pulls 'Patriot Act with Hasan Minhaj' episode after getting 'valid' legal complaint from Saudi Arabia Fox News</p> <p>URL: https://www.foxnews.com/entertainment/netflix-pulls-patriot-act-with-hasan-minhaj-episode-after-getting-valid-legal-complaint-from-saudi-arabia</p> <p>ID: /Users/frank/Desktop/572/hw4/dataset/foxnews/1a0e4acd-c755-446e-bac8-064f9251be32.html</p> <p>Description: After being available since October, Netflix has pulled an episode of "Patriot Act with Hasan Minhaj" after receiving a legal complaint from Saudi Arabia. The episode, which was heavily critical of the country's government, is no longer available to stream on the service there.</p>
9.	<p>Title:Vice President Mike Pence delivers surprise address to the Fox Nation Patriot Awards Fox News</p> <p>URL: https://www.foxnews.com/media/vice-president-mike-pence-fox-nation-patriot-awards</p> <p>ID: /Users/frank/Desktop/572/hw4/dataset/foxnews/e0c5f071-7a01-4a29-b1f1-bbdb065c9949.html</p> <p>Description: Vice President Mike Pence made a surprise appearance at Fox Nation's inaugural Patriots Awards on Wednesday evening, addressing the sold-out crowd via video.</p>
10.	<p>Title:Netflix boss defends pulling 'Patriot Act' episode in Saudi Arabia: 'We're not in the truth to power business' Fox News</p> <p>URL: https://www.foxnews.com/tech/netflix-defends-pulling-patriot-act-episode-in-saudi-arabia</p> <p>ID: /Users/frank/Desktop/572/hw4/dataset/foxnews/622e8e87-bcac-4a17-b19d-cd4745c75b0c.html</p> <p>Description: Netflix CEO Reed Hastings defending the streaming platform's decision to pull an episode of "Patriot Act with Hasan Minhaj" in Saudi Arabia this past January -- claiming that the company is not in the "truth to power business."</p>

Figure 4 Query (Patriot Movement) Result 1 - 10 Using Default

Search: Patriot Movement

☐ Solr Default

☒ PageRank

提交

Results 1 - 10 of 550:

1.	Title:Science Fox News URL: https://www.foxnews.com/science ID: /Users/frank/Desktop/572/hw4/dataset/foxnews/fc258e7a-49f3-414e-9835-d004bc6457bc.html Description: Biology, astronomy, chemistry, physics on FoxNews.com. In-depth natural science news. Headlines from the worlds of biology, astronomy, chemistry and physics.
2.	Title:Fox News - Breaking News Updates Latest News Headlines Photos & News Videos URL: https://www.foxnews.com ID: /Users/frank/Desktop/572/hw4/dataset/foxnews/56d916a8-9687-43e5-88d1-045a4aee8e51.html Description: America is Watching.
3.	Title:Tech Fox News URL: https://www.foxnews.com/tech ID: /Users/frank/Desktop/572/hw4/dataset/foxnews/d4d2900c-a44e-47d6-922e-01f3f6ee198d.html Description: News for Hardware, software, networking, and Internet media. Reporting on information technology, technology and business news.
4.	Title:PLANET EARTH Fox News URL: https://www.foxnews.com/category/science/planet-earth ID: /Users/frank/Desktop/572/hw4/dataset/foxnews/9af29106-e7fa-4acb-8133-d6abf45ad1ab.html Description: PLANET EARTH
5.	Title:Movies Fox News URL: https://www.foxnews.com/category/entertainment/movies ID: /Users/frank/Desktop/572/hw4/dataset/foxnews/fc331802-dd85-48ce-ac37-0e76e5288b97.html Description: Movies
6.	Title:Gwyneth Paltrow admits to 'complicated relationship' with Harvey Weinstein Fox News URL: https://www.foxnews.com/entertainment/gwyneth-paltrow-relationship-harvey-weinstein ID: /Users/frank/Desktop/572/hw4/dataset/foxnews/c45c1ea1-8fa8-473d-b487-5c65933133a7.html Description: Gwyneth Paltrow confessed she's "not sure" how she feels about her former working relationship with disgraced movie producer Harvey Weinstein.
7.	Title:AOC appears to accuse Bloomberg of trying to 'purchase our political system' Fox News URL: https://www.foxnews.com/politics/aoc-bloomberg-purchase-election ID: /Users/frank/Desktop/572/hw4/dataset/foxnews/1c035f9d-e96f-4438-81ec-d820300626dd.html Description: Rep. Alexandria Ocasio-Cortez, D-N.Y., seemed to criticize billionaire and former New York City Mayor Michael Bloomberg on Saturday while speaking at a rally for Sen. Bernie Sanders, I-Vt. in Iowa.
8.	Title:Ukrainian forces, Russian-backed separatists begin pullback in war-torn Donbass Fox News URL: https://www.foxnews.com/world/ukraine-russia-separatists-pullback ID: /Users/frank/Desktop/572/hw4/dataset/foxnews/2c3770b9-cdd7-4b6d-bf88-b8a2fcbcc1ff.html Description: Ukrainian forces and Russian-backed separatists began pulling back from a war-torn village in the Donbass region on Saturday, a significant move that could set the stage for a later summit between Ukraine, Russia, France and Germany in a bid to restore peace to the war-torn area.
9.	Title:Earth's mantle and crust are in a fiery battle to the death ... of supercontinents Fox News URL: https://www.foxnews.com/science/earths-mantle-and-crust-are-in-a-fiery-battle-to-the-death-of-supercontinents ID: /Users/frank/Desktop/572/hw4/dataset/foxnews/c286e3bd-a30d-4308-965e-84562516ea42.html Description: Earth's hot, gooey center and its cold, hard outer shell are both responsible for the creeping (and sometimes catastrophic) movement of tectonic plates. But now new research reveals an intriguing balance of power — the cozing mantle creates supercontinents while the crust tears them apart.
10.	Title:2020 Ram 1500 'Built to Serve' pickup salutes the U.S. Military Fox News URL: https://www.foxnews.com/auto/2020-ram-1500-built-to-serve-pickup-salutes-the-u-s-military ID: /Users/frank/Desktop/572/hw4/dataset/foxnews/cb5e3197-1922-4dac-bc73-a401f8f9f837.html Description: Honoring the Armed Forces.

Figure 5 Query (Patriot Movement) Result 1 - 10 Using PageRank

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Trump threatens to designate Antifa a terrorist organization ahead of expected Portland clashes

By Alex Papadimitriou / Fox News



Portland mayor issues warning to protesters planning violence: 'You are not welcome here'
 As Portland, Oregon braces for dueling protests between justice and far-right activists, Mayor Ted Wheeler says law enforcement is ready to respond.

President Trump said "major consideration" is being given by his administration to designating the far-left antifa movement a terrorist organization, as the city of Portland, Ore., prepares for dueling protests between right-wing demonstrators and antifa on Saturday.

"Major consideration is being given to naming ANTIFA an 'ORGANIZATION OF TERROR,' the president tweeted. "Portland is being watched very closely. Hopefully the Mayor will be able to properly do his job!"



In his tweet, the president did not mention the expected far-right groups that are expected to protest, like Proud Boys group, the white nationalist American Guard and the Three Percenters. Hate group watchdogs say the Daily Stormers, a neo-Nazi group, are also expected.



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Figure 6 1st Result Using Default

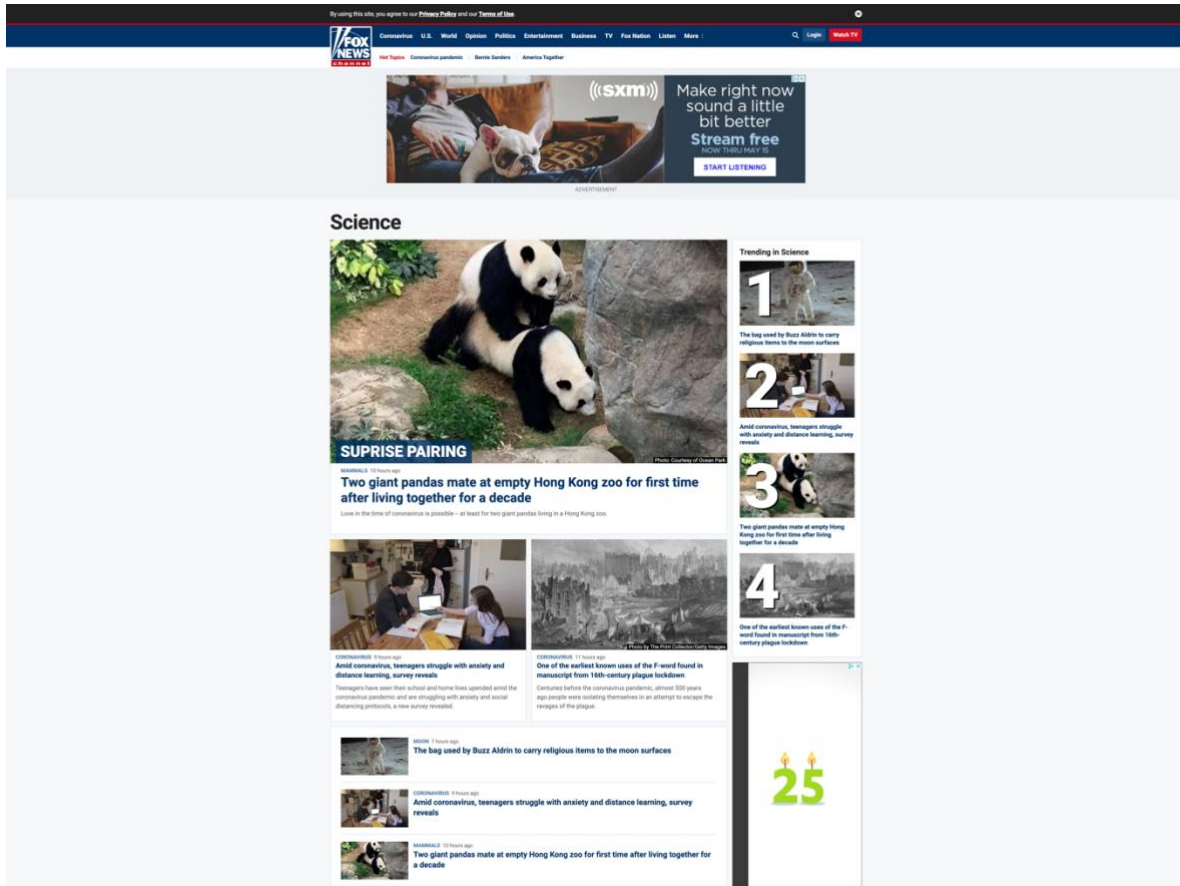


Figure 7 1st Result Using PageRank

4. Result Tables

Cannes	
Solr Default	PageRank
https://www.foxnews.com/category/entertainment/events/cannes-film-festival	https://www.foxnews.com/entertainment/french-woman-roman-polanski-rape-1975
https://www.foxnews.com/entertainment/selena-gomez-bill-murray-whispered-cannes-film-festival-reveal	https://www.foxnews.com/entertainment/ryan-gosling-eva-mendes-is-definitely-not-anti-sweatpants
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https://www.foxnews.com/entertainment/selena-gomez-new-dog-instagram	https://www.foxnews.com/category/entertainment/events/cannes-film-festival

Congress	
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https://www.foxnews.com/us/navy-vet-donates-gold-star-families-stories-to-library-of-congress	https://www.foxnews.com/opinion
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https://www.foxnews.com/opinion/gutfeld-congress-attacking-zuckerberg	https://www.foxnews.com/category/world/conflicts
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Democrats	
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https://www.foxnews.com/opinion/david-bossie-trump-impeachment-vote-is-democratic-declaration-of-war-republicans-must-declare-war-on-dems	https://www.foxnews.com/category/politics/foreign-policy

Patriot Movement	
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Republicans	
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https://www.foxnews.com/politics/trump-settles-score-with-republicans-who-didnt-embrace-him-in-midterms	https://www.foxnews.com/category/politics/house-of-representatives

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Senate	
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5. Overlap (table and graph)

Overlap Table	
Query	No. of Overlaps
Cannes	4
Congress	0
Democrats	0
Patriot Movement	0
Republicans	0
Senate	0
Olympics 2020	0
Stock	1
Virus	1

