

CSCI-572 HW4

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STEPS FOR THE ASSIGNMENT

Step 1: Ubuntu and Solr Installation:

1. Firstly, we installed Ubuntu 16.04.7 as a virtual machine on my Windows using Oracle VM VirtualBox 5.2.44 .
2. After step 1.1, we installed Apache Solr 8.7.0 software in the previously installed Ubuntu Virtual Machine.
3. Along with that, we downloaded and extracted all the crawled files from google drive for Foxnews.

Step 2: Indexing the HTML files of the assigned News site:

1. We, first, started the Solr server using the command, "bin/solr start", and then created a core named "example572" using the command bin/solr create -c corename.
2. Then we made the required changes in the managed-schema file and solrconfig.xml files so as to make sure that all the crawled files from step 1.3 can be mapped properly.
3. After logging into Solr Admin page, we can search for any desired query using the key "_text_" and the details of all the indexed files will be displayed which may contain the query entered above.

Step 3: PHP installation for Web Server purposes:

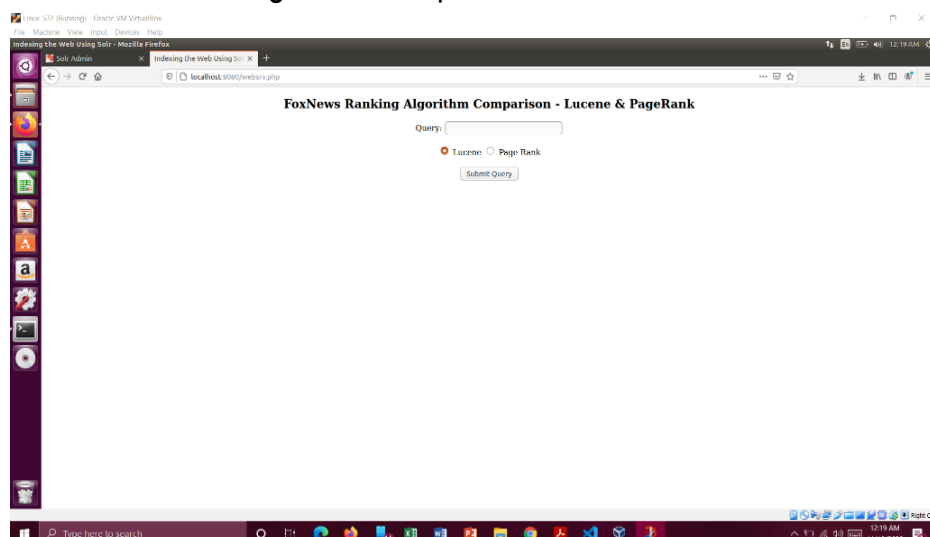
1. To run PHP files in Ubuntu from terminal, we installed Apache web server and PHP packages in the terminal.
2. We wrote a PHP code to fetch any query from the client using search box and radio button, and created a request to send it to Solr and then formatted the JSON response from Solr to display it to the client in presentable manner.
3. We also cloned the GitHub repository, solr-php-client, to serve as a client API for integrating PHP with Solr.

Step 4: Building a Dictionary of Graph and calculating the PageRank Scores:

1. Since Solr facilitates Lucene Ranking algorithm, to compare the results of a different ranking algorithm we use PageRank algorithm. To enable this method, we needed to create an External File.
2. For creating an External File, first we wrote a code in Java using JSoup library to extract the outgoing links of each downloaded web page and create a “file to URL” and “URL to File” combined mapped structure which is then stored in a file called edgeList.txt .
3. Next, we wrote a code in Python to compute the page rank values using the NetworkX library. For this, the python file parses both the extracted links and mapped files from edgelist.txt and creates a directed network graph, thereby generating the page rank values which is then stored in the file, external_pageRankFile.txt .

Step 5: Web browser processes:

1. After making the required changes in the managed_schema and solrconfig files again to enable the PageRank Algorithm, we are ready to achieve the final results of this assignment.
2. The initial web page displays a search box to take a query from the client and two radio button to choose which ranking algorithm to be used to display the results.
3. After clicking on the Submit button, it displays the top 10 results for Lucene algorithm and the 10 results for Page Rank algorithm as it is set to display the results in descending order. It also displays the total number of pages it fetched for the above entered query.
4. Then we recorded results for the given words from the assignment, and compared and computed and graph to check for any overlaps. We also took screenshots of the web browser doing the above processes.



The initial web page with Lucene as the default selected option.

FoxNews Ranking Algorithm Comparison - Lucene & PageRank

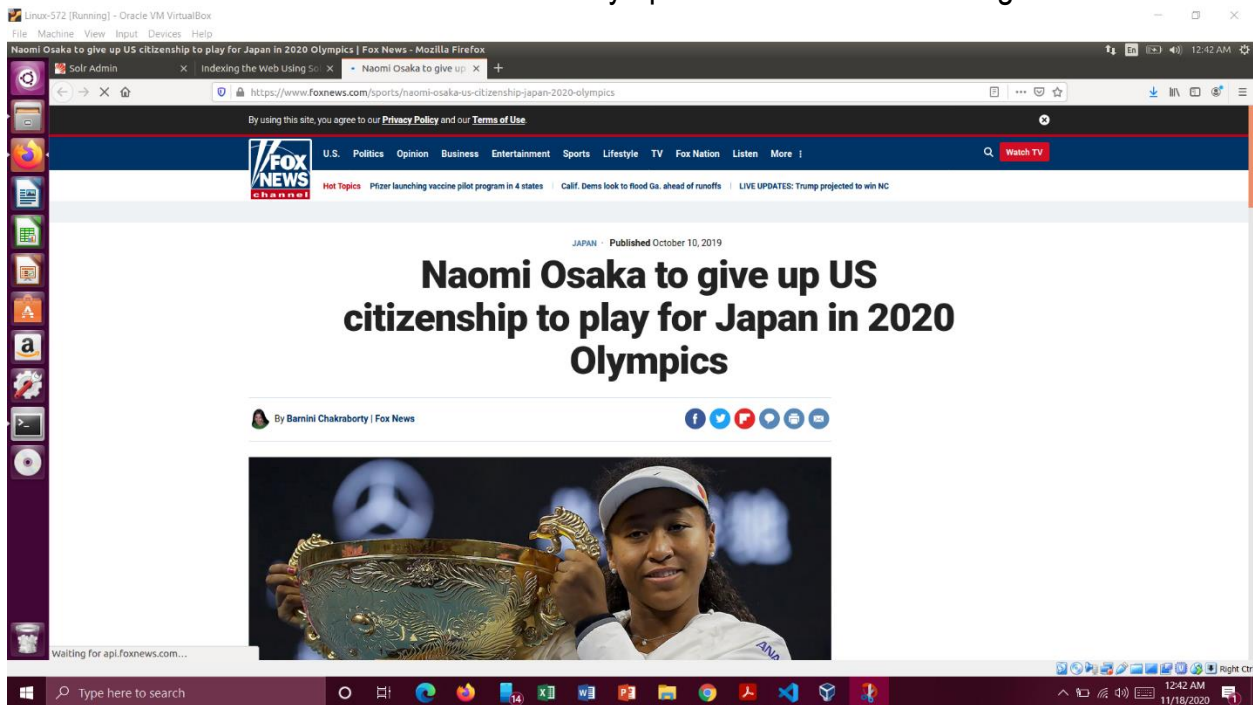
Query:

☒ Lucene ☐ Page Rank

Results 1 - 10 of 3047:

| | |
|----|--|
| 1 | <p>Title : Alex Morgan hopes to play in 2020 Olympics, just three months after childbirth Fox News URL : https://www.foxnews.com/sports/alex-morgan-2020-olympics-child-birth ID : /home/ubuntu-pr/shared/solr-8.7.0/foxnews/0eefcd2-e472-44e4-b109-c55b50c0a6f.html Description : Alex Morgan, who recently announced she was pregnant with her first child, is still hoping to be able to represent the U.S. during the 2020 Olympics in Tokyo next summer.</p> |
| 2 | <p>Title : Naomi Osaka to give up US citizenship to play for Japan in 2020 Olympics Fox News URL : https://www.foxnews.com/sports/naomi-osaka-us-citizenship-japan-2020-olympics ID : /home/ubuntu-pr/shared/solr-8.7.0/foxnews/0b308054-0e5a-4840-b007-fa961b338554.html Description : Tennis phenom Naomi Osaka is saying goodbye to the United States and hello to Japan. The 21-year-old, who was born in Japan to a Haitian father and Japanese mother but raised in the United States, has started the process to relinquish her U.S. citizenship so she can play for Japan in the 2020 Olympics in Tokyo.</p> |
| 3 | <p>Title : Olympics Fox News URL : https://www.foxnews.com/category/sports/olympics ID : /home/ubuntu-pr/shared/solr-8.7.0/foxnews/560c4e88-1ab2-4c00-9535-6b3f09640921.html Description : Olympics</p> |
| 4 | <p>Title : Russian hackers on the attack because of possible Olympic ban Fox News URL : https://www.foxnews.com/tech/russian-hackers-attack-possible-olympic-ban ID : /home/ubuntu-pr/shared/solr-8.7.0/foxnews/c70f4b99-87e5-4b52-97f6-b224eda0ae7.html Description : Russian hackers are targeting anti-doping organizations after the country was banned from the 2020 Olympics, according to a new report.</p> |
| 5 | <p>Title : Soccer Fox News URL : https://www.foxnews.com/category/sports/soccer ID : /home/ubuntu-pr/shared/solr-8.7.0/foxnews/9ed64369-fc5a-48de-be2c-17ef59f58057.html Description : Soccer</p> |
| 6 | <p>Title : Barnini Chakraborty Fox News URL : https://www.foxnews.com/person/c/barnini-chakraborty ID : /home/ubuntu-pr/shared/solr-8.7.0/foxnews/09b37052-aeb1-49f4-be13-d80e4d608700.html Description : Browse stories from Barnini Chakraborty</p> |
| 7 | <p>Title : Tennis Fox News URL : https://www.foxnews.com/category/sports/tennis ID : /home/ubuntu-pr/shared/solr-8.7.0/foxnews/a8eb941b-2a26-4c72-b520-9dde61b41cf0.html Description : Tennis is one of the most popular sports in the world. Its four majors include the Australian Open, French Open, Wimbledon and U.S. Open. Top players include Roger Federer, Serena Williams and Rafa Nadal.</p> |
| 8 | <p>Title : Alex Morgan Fox News URL : https://www.foxnews.com/category/person/alex-morgan ID : /home/ubuntu-pr/shared/solr-8.7.0/foxnews/5174069d-d317-4ed5-8421-2d70f4aa527e.html Description : Alex Morgan is one of the most recognizable female American soccer players. Morgan helped the U.S. to its third World Cup championship in 2015. She's poised to do it again in 2019.</p> |
| 9 | <p>Title : Olympic gold medalist Kikkan Randall opens up about her cancer battle, running NYC Marathon Fox News URL : https://www.foxnews.com/sports/kikkan-randall-new-york-city-marathon-skiing-cancer ID : /home/ubuntu-pr/shared/solr-8.7.0/foxnews/063bd89b-b7f8-42e4-99de-0ac5fcd9db25.html Description : American Olympic gold medalist Kikkan Randall, who competed in cross-country skiing in the 2018 Pyeongchang Winter Games, is running Sunday's New York City marathon months after beating breast cancer.</p> |
| 10 | <p>Title : Sports Fox News URL : https://www.foxnews.com/sports ID : /home/ubuntu-pr/shared/solr-8.7.0/foxnews/74812867-94ad-40e5-9aba-9191ad82efc1.html Description : Scores, player and team news, sports videos, rumors, stats, schedules, fantasy games, standings for the NFL, MLB, NBA, NHL, NASCAR, NCAA Football, Basketball and more on Fox News.</p> |

The search result for the word “Olympics 2020” with Lucene Algorithm.



One of the web pages from the Lucene ranked results mapped to the word “Olympics 2020”.

FoxNews Ranking Algorithm Comparison - Lucene & PageRank

Query:

☐ Lucene ☒ Page Rank

Results 1 - 10 of 3047:

| | |
|----|---|
| 1 | Title : Entertainment Fox News URL : https://www.foxnews.com/entertainment ID : /home/ubuntu-pr/shared/solr-8.7.0/foxnews/1b3ad753-64c8-4d4e-bd75-fa43c8d10e73.html Description : Celebrity gossip and entertainment news from FOXNews.com. Celebrity gossip, fashion, travel, lifestyle and arts and entertainment news headlines plus in-depth features and video clips. |
| 2 | Title : Opinion Fox News URL : https://www.foxnews.com/opinion ID : /home/ubuntu-pr/shared/solr-8.7.0/foxnews/061c4f94-05b3-46f4-87bc-22cf394e73be.html Description : N/A |
| 3 | Title : Fox News - Breaking News Updates Latest News Headlines Photos & News Videos URL : https://www.foxnews.com/ ID : /home/ubuntu-pr/shared/solr-8.7.0/foxnews/56d916a8-9687-43e5-88d1-045a4aee8e51.html Description : America is Watching. |
| 4 | Title : Politics Fox News URL : https://www.foxnews.com/politics ID : /home/ubuntu-pr/shared/solr-8.7.0/foxnews/fb457a87-9d58-4a4b-af2c-90293d7532aa.html Description : Presidential politics and political news from foxnews.com. News about political parties, political campaigns, world and international politics, politics news headlines plus in-depth features and video clips. |
| 5 | Title : Tech Fox News URL : https://www.foxnews.com/tech ID : /home/ubuntu-pr/shared/solr-8.7.0/foxnews/d4d2900c-a44e-47d6-922e-01f3f6ee198d.html Description : News for Hardware, software, networking, and Internet media. Reporting on information technology, technology and business news. |
| 6 | Title : Lifestyle Fox News URL : https://www.foxnews.com/lifestyle ID : /home/ubuntu-pr/shared/solr-8.7.0/foxnews/430babaf-31b7-4284-8144-d6a59b9c0949.html Description : Lifestyle, Auto, Food & Drink, and Home & Garden online news and information |
| 7 | Title : HEART HEALTH Fox News URL : https://www.foxnews.com/category/health/heart-health ID : /home/ubuntu-pr/shared/solr-8.7.0/foxnews/0520e8c6-eeb9-4d72-93a2-959b62bb53e3.html Description : HEART HEALTH |
| 8 | Title : Food & Drink Fox News URL : https://www.foxnews.com/food-drink ID : /home/ubuntu-pr/shared/solr-8.7.0/foxnews/f9cead10-2fa5-41f1-9432-be51fdd5deb6.html Description : Food and Drink brings you the latest news on FOXNews.com. Topics include delicious recipes, advice from food experts, hot restaurants, party tips, and menus. |
| 9 | Title : Celebrity News Fox News URL : https://www.foxnews.com/category/entertainment/celebrity-news ID : /home/ubuntu-pr/shared/solr-8.7.0/foxnews/f74bdce6-5dba-4219-8be2-3d60f26a408e.html Description : Celebrity News |
| 10 | Title : EXECUTIVE Fox News URL : https://www.foxnews.com/category/politics/executive ID : /home/ubuntu-pr/shared/solr-8.7.0/foxnews/e5b660ac-b0b5-4bae-af03-8e1a1d25e987.html Description : EXECUTIVE |

The search result for the word “Olympics 2020” with PageRank Algorithm.

The screenshot shows a web browser window displaying the Fox News website. The page is titled "Food & Drink" and features a large image of a meal with a cup of coffee, a plate of food, and a glass of juice. The page is displayed in a virtual machine environment (Oracle VM VirtualBox) with a Linux desktop background. The browser window shows the URL "https://www.foxnews.com/food-drink" and the page content includes a "Subscribe" button and a "Food Clips" section.

One of the web pages from the PageRank ranked results mapped to the word “Olympics 2020”.

Misc.: Configurations made to all the files and codes:

1. Added the lines to retrieve the data for Title, URL and Description along with the indexed ID in the managed_schema file.
2. Uncommented the `<copyField source="*" dest="_text_"/>` from managed_schema file.
3. Added the required code in solrconfig.xml to rectify the IO exception error occurred while indexing.
4. Uncommented the `<str name="df">_text_</str>` from solrconfig.xml file.
5. Used the following parameters for the creation of NetworkX Graph:-
alpha=0.85, personalization=None, max_iter=30, tol=1e-06, nstart=None, weight='weight',
dangling=None
6. Placed the external_pageRankFile.txt generated after Step 4 in "solr-8.7.0/server/solr/example572/data".
7. Added the following two lines in managed_schema file:-
`<fieldType name="external" keyField="id" defVal="0" class="solr.ExternalFileField" />`
`<field name="pageRankFile" type="external" stored="false" indexed="false" />`
8. Added the following two lines in solrconfig.xml file:-
`<listener event="newSearcher" class="org.apache.solr.schema.ExternalFileFieldReloader" />`
`<listener event="firstSearcher" class="org.apache.solr.schema.ExternalFileFieldReloader" />`

Why some pages have higher PageRank values than others?

PageRank calculates a rough estimation based on how appropriate a website is by counting the number of links extracted and judging the quality of those linked pages. It is possible for a website with less appropriate links to receive more incoming and outgoing traffic from other websites. Therefore, some pages might have a higher PageRank because the algorithm measures the extent of popularity and determines the score for each mapping from the file edgelist.txt accordingly as the number of incoming links is directly proportional to the weights based on term frequency and NetworkX Graph.

QUERIES

1. Cannes

| Default Solr Method | External Page rank method |
|---|---|
| fa0e2a43-8962-4f5b-9a9d-d14a9541bc06.html | 86d5761e-59b9-4962-86dd-09a4a9ca2865.html |
| a919fefc-4cfd-4275-932d-83fd5a33a8ed.html | 2a84af9f-992a-4496-88f9-fd08869a8be9.html |
| 69a8f981-9c1d-4341-8d5a-be4da1eadf00.html | 3822200e-f829-4f58-9995-fe5c4c96138d.html |
| 2a84af9f-992a-4496-88f9-fd08869a8be9.html | 357ab100-5553-40bb-afc6-bad85c8f1b5e.html |
| 33fe95a0-fdaa-4d51-a090-5f5e52ff3baf.html | 2db1db51-f0a6-4ae2-90e4-e310342d8460.html |
| 357ab100-5553-40bb-afc6-bad85c8f1b5e.html | f8651d77-3cef-4743-a083-9c7a924c812f.html |
| 6b959775-f95d-4b19-b7e8-0731fcf61dd4.html | 4174ef77-8836-4b74-91bd-6e065c690e56.html |
| fa0885b7-6a71-4c9d-b7c8-6fa80a7c2fa5.html | 4cbc755f-1ce4-4d2d-9762-41b2aafe6549.html |
| a924b2b0-35fb-4036-967e-3146873dea3d.html | fa0885b7-6a71-4c9d-b7c8-6fa80a7c2fa5.html |
| bf156e51-657e-4c58-8a78-fef03ba62da7.html | fa0e2a43-8962-4f5b-9a9d-d14a9541bc06.html |

2. Congress

| Default Solr Method | External Page rank method |
|---|---|
| c43e46e3-caf7-40e6-aadf-0ca681073865.html | 061c4f94-05b3-46f4-87bc-22cf394e73be.html |
| 24950e63-a8ff-4a59-ab6f-ffc12618f9ce.html | d4d2900c-a44e-47d6-922e-01f3f6ee198d.html |
| ac5811e8-2f2c-42e5-aa38-d92005f3d515.html | e5b660ac-b0b5-4bae-af03-8e1a1d25e987.html |
| 9b0d50a7-611b-4e0a-8d08-49147f4ccc03.html | f0514183-6c7e-4782-bcf6-b436867ebd38.html |
| 9ab02874-c639-4d5e-b104-d25dc2ee3203.html | 9147ff56-56a5-4997-a0a1-6ba7c8a4c912.html |
| 45624fe5-3ff1-4abc-9d51-c4c52514668d.html | 947e45bf-fdf3-454a-9547-b28fa17f7730.html |
| 25eb8436-359c-4169-b794-a2e4a6157c7c.html | 1550c432-db06-423f-888e-133c1c2cdf30.html |
| 02e29a0b-3a37-4420-bbeb-b349bffb36ab.html | 040e2a09-cef5-40ab-93f0-22bdbb715710.html |
| 104f898b-5a9a-4f8c-af4a-5278bac3c669.html | 41d3caa8-10a5-4228-b01e-e3d593d82513.html |
| 871567fa-8fdb-4c4b-ab75-f79cbf69f16c.html | 5625315e-cdeb-4716-aed2-fc69cdac3f18.html |

3. Democrats

| Default Solr Method | External Page rank method |
|---|---|
| 7f9b9a77-a3a8-4968-8589-5d6a7b9a2a24.html | 6ddff7f2-8b78-4743-8090-569afae9f4d.html |
| 54806d10-e13a-4427-bde1-6c8aee9779e7.html | 061c4f94-05b3-46f4-87bc-22cf394e73be.html |
| d91f4b72-971d-4045-ad28-a0b68006972b.html | 56d916a8-9687-43e5-88d1-045a4aee8e51.html |
| c0858e78-79d1-4493-a7cc-81f1b80573cc.html | fb457a87-9d58-4a4b-af2c-90293d7532aa.html |
| ec6a9e7a-c2ea-42d2-b269-858b305d2321.html | f0514183-6c7e-4782-bcf6-b436867ebd38.html |
| 2d80467d-ef6d-49be-99ad-c8f6141789fc.html | fd353ca7-a754-46f3-828c-0b87558d3ad0.html |
| 245b590d-e1d7-4929-a21d-0a45c0aa4bac.html | a6341683-86c8-40ee-a3cb-841f23093d68.html |

| | |
|---|---|
| 238de9cd-7ea2-424f-9071-933d67ded509.html | 8a5c5527-b60c-4327-96f0-1d07a129ba39.html |
| 214c9f8f-7f35-4c8b-aa67-ef53805f42cf.html | 9147ff56-56a5-4997-a0a1-6ba7c8a4c912.html |
| 8531a9d9-339e-4c2e-a6e5-ba569857d9ac.html | 39000d39-e546-4950-89fd-4b92980c0c7f.html |

4. Patriot Movement

| Default Solr Method | External Page rank method |
|---|---|
| 9b822c35-5bf2-45f6-9d97-0fdaed9d4896.html | fc258e7a-49f3-414e-9835-d004bc6457bc.html |
| 7cc51046-7bc2-41d7-af3e-a64c6555b1dd.html | 56d916a8-9687-43e5-88d1-045a4aee8e51.html |
| af627cd4-7665-4194-bac1-396a811f0fe5.html | d4d2900c-a44e-47d6-922e-01f3f6ee198d.html |
| 5cd0eb31-2245-453a-85ce-2c58681d4fe5.html | fc331802-dd85-48ce-ac37-0e76e5288b97.html |
| 1d176c53-4a0f-41e6-80a1-9df0a5703608.html | 9af29106-e7fa-4acb-8133-d6abf45ad1ab.html |
| 7e79f401-ddad-4897-a1df-4d41b941fddd.html | c45c1ea1-8fa8-473d-b487-5c65933133a7.html |
| 423b8ecd-6386-43e3-9546-a654531b5510.html | 1c035f9d-e96f-4438-81ec-d820300626dd.html |
| 1a0e4acd-c755-446e-bac8-064f9251be32.html | 2c3770b9-cdd7-4b6d-bf88-b8a2fcbcc1ff.html |
| 622e8e87-bcac-4a17-b19d-cd4745c75b0c.html | c286e3bd-a30d-4308-965e-84562516ea42.html |
| 72c6e7d6-0fd0-48fb-a7bc-36c49a12e51c.html | cb5e3197-1922-4dac-bc73-a401f8f9f837.html |

5. Republicans

| Default Solr Method | External Page rank method |
|---|---|
| 851d1bff-61b3-4280-9e0d-b98837e1ffa2.html | 061c4f94-05b3-46f4-87bc-22cf394e73be.html |
| 7edba506-b901-4d39-b1c6-3c108aaa93e4.html | 56d916a8-9687-43e5-88d1-045a4aee8e51.html |
| a5f4673f-5077-462e-99c7-dac45fc2e595.html | fb457a87-9d58-4a4b-af2c-90293d7532aa.html |
| 8b5ac20a-65ae-4d82-9a20-cefc056e0b5b.html | f0514183-6c7e-4782-bcf6-b436867ebd38.html |
| c72b93a1-c928-44dd-a36d-94963ff603d0.html | fd353ca7-a754-46f3-828c-0b87558d3ad0.html |
| 5494f23d-f41a-4a59-bb6d-60c93a544ad8.html | 8a5c5527-b60c-4327-96f0-1d07a129ba39.html |
| 717e63ae-070c-4032-95d7-bcc375ed174c.html | 39000d39-e546-4950-89fd-4b92980c0c7f.html |
| 30faed84-61c3-4c73-b084-34c22171498b.html | 1550c432-db06-423f-888e-133c1c2cdf30.html |
| 2247fb34-82fe-4f36-81ba-bd577e7333e6.html | 1dc03e21-c08b-4ae7-ba1f-132e5afd53f0.html |
| 2f2fd73e-82fa-48b4-8dc2-fe14657612ec.html | aa291d7d-357d-43ad-8b9d-8a3397844cb1.html |

6. Senate

| Default Solr Method | External Page rank method |
|---|---|
| cf6d95f5-5b4d-4f68-a288-0c1a5e620e12.html | fc258e7a-49f3-414e-9835-d004bc6457bc.html |
| 499df72c-c4ed-4430-941f-a1c4cbbd2ff2.html | abfe942f-73e9-4a06-ae70-4eafedbc9918.html |
| 85f8202e-d809-4291-89fe-8e586becd36e.html | 6d1c6f45-d9a1-47d0-a09e-f86f9e66953a.html |
| cd2e0beb-c482-47ee-8ecf-36c038f6cb5e.html | 6ddff7f2-8b78-4743-8090-569afae9f4d.html |
| f7f176bd-7832-465a-86af-f0f152598a49.html | 5c3779ca-9770-45bd-b82f-adf499df73ff.html |

| | |
|---|---|
| 8da3b3e3-ddcb-490c-b8ae-f172ee49d506.html | 1b3ad753-64c8-4d4e-bd75-fa43c8d10e73.html |
| 1ac3da34-99b7-4004-915b-477bec2226db.html | 18e251f6-3f4f-4f88-b7f9-2c6cb80a958b.html |
| 5223ce52-862c-4ce9-9387-a0295b994ee4.html | 061c4f94-05b3-46f4-87bc-22cf394e73be.html |
| 56600afd-7edb-4e3d-ae00-1478c677247a.html | 56d916a8-9687-43e5-88d1-045a4aee8e51.html |
| e3025935-db88-43ff-8c95-f147b7e3c797.html | f104b083-aa3e-418b-a763-dc447b66f7ec.html |

7. Olympics 2020

| Default Solr Method | External Page rank method |
|---|---|
| 0eefcdf2-e472-44e4-b109-cc5fb50c0a6f.html | 1b3ad753-64c8-4d4e-bd75-fa43c8d10e73.html |
| 0b308054-0e5a-4840-b007-fa961b338554.html | 061c4f94-05b3-46f4-87bc-22cf394e73be.html |
| 560c4e88-1ab2-4c00-9535-6b3f09640921.html | 56d916a8-9687-43e5-88d1-045a4aee8e51.html |
| c70f4b99-87e5-4b52-97fd-bf224eda0ae7.html | fb457a87-9d58-4a4b-af2c-90293d7532aa.html |
| 9ed64369-fc5a-48de-be2c-17ef59f58057.html | d4d2900c-a44e-47d6-922e-01f3f6ee198d.html |
| 09b37052-aeb1-49f4-be13-d80e4d608700.html | 430babaf-31b7-4284-8144-d6a59b9c0949.html |
| a8eb941b-2a26-4c72-b520-9dde61b41cf0.html | 0520e8c6-eeb9-4d72-93a2-959b62bb53e3.html |
| 5174069d-d317-4ed5-8421-2d70f4aa527e.html | e5b660ac-b0b5-4bae-af03-8e1a1d25e987.html |
| 063bd89b-b7f8-42e4-99de-0ac5fcd9db25.html | f9cead10-2fa5-41f1-9432-be51fdd5deb6.html |
| 74812867-94ad-40e5-9aba-9191ad82efc1.html | f74bdce6-5dba-4219-8be2-3d60f26a408e.html |

8. Stock

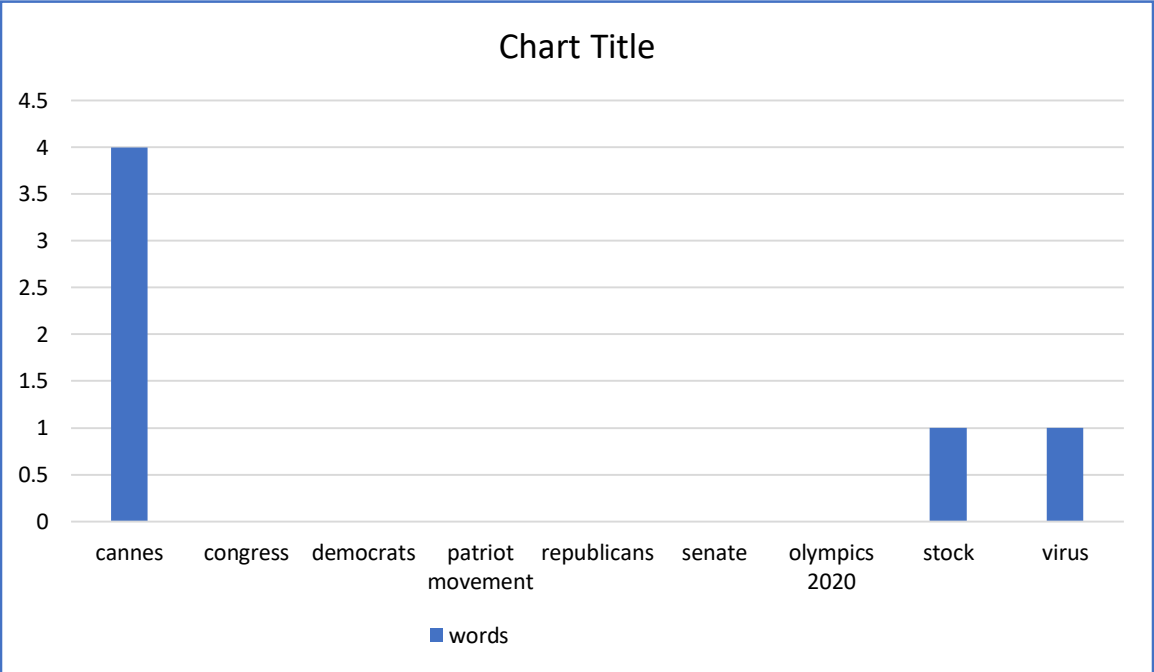
| Default Solr Method | External Page rank method |
|---|--|
| ca836953-60b0-4e4c-96f6-c4e528893bfe.html | 56d916a8-9687-43e5-88d1-045a4aee8e51.html |
| 35e747cf-ac71-4623-9e55-47c34a70339f.html | 4f5df30a-f58b-4c28-ac48-91e69bdfef254.html |
| ba68d378-019e-4d74-a46c-5bb328672d3d.html | 36eec7f4-ac44-4d4a-bceb-fa9ccb599063.html |
| 55d5a439-965f-4ef0-9a4a-6bff486a8c0f.html | 3eace440-5cbd-4790-b996-54f09d9fef44.html |
| 7efa1e6a-e223-4367-bb6b-e4ce58ac8ca9.html | 7f52a83f-d124-4929-9275-e0e8f47fd4b2.html |
| a08365dc-0362-4a2d-86fb-de4f64b17696.html | c04d2e6a-5480-4556-a305-accd7b433166.html |
| f3f52983-6946-4aa7-ac2a-154c982a8b62.html | a6a93529-6770-4110-aae3-d2dc92d7b47e.html |
| c91806d7-c699-421c-9e69-86fdf53a1d6a.html | c91806d7-c699-421c-9e69-86fdf53a1d6a.html |
| 461a6238-f3d2-4f50-9ea1-88c36fecbd1e.html | 5214befe-08e3-4198-adca-8cde83a5bfcd.html |
| 72ca0f36-f538-41ef-b6e2-f48eb72eace2.html | e4cdf7c-b2e9-4206-9ca1-8d520ae0de17.html |

9. Virus

| Default Solr Method | External Page rank method |
|---|---|
| 3bc9c695-4d47-4662-9c67-9ac13635f4de.html | fc258e7a-49f3-414e-9835-d004bc6457bc.html |
| b50346b7-6869-47e4-b756-48506fa5f3ee.html | bdde2ae3-9daf-41ca-a265-7308fdfaf346.html |
| e1093a1b-8bd3-4b34-868a-1c10b22fccb6.html | 9af29106-e7fa-4acb-8133-d6abf45ad1ab.html |

| | |
|---|--|
| c5368bbe-341c-4a51-a5fb-48be7adea13d.html | 7ba5ea0b-4bb1-48f3-a09d-785cf017d505.html |
| 6c0e5663-1871-4a0c-be01-6a6b7fade8da.html | b50346b7-6869-47e4-b756-48506fa5f3ee.html |
| 106e3d30-a0fe-401a-9800-402c6fc9b761.html | f7690f06-0046-4e5a-85bb-4ac087b2b448.html |
| 6a551cb6-c757-452a-9d55-614dc602a25c.html | e7702b30-ce4d-4d46-a5ea-8bd6f57998b1.html |
| 29ad6e60-627b-4873-a497-4d0afb202bcb.html | c286e3bd-a30d-4308-965e-84562516ea42.html |
| ee7682c8-326b-46c9-b8af-55fbe6f2306c.html | 14a76267-e6ed-4139-9791-ebf4bceec3c27.html |
| cac40eb0-6249-459d-878e-547236ddc229.html | 96cc62e0-851e-491e-b23e-5a16dc30d524.html |

OVERLAP GRAPH



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