

# HW4 report

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## 1. Steps to complete assignment

[Step 1] Install Apache Solr and perform indexing

I created “myexample” core under /Users/jiayuan/Downloads/solr-7.1.0/server/solr/ directory and modified the managed-schema file and solrconfig.xml file according to the instruction. Then I indexed pages from the USA Today news site.

The screenshot shows the Apache Solr admin interface for the 'myexample' core. The left sidebar lists various Solr management options like Dashboard, Logging, Core Admin, Java Properties, Thread Dump, myexample (selected), Overview, Analysis, Dataimport, Documents, Files, Ping, Plugins / Stats, Query, Replication, Schema, and Segments info. The main content area is divided into several panels:

- Statistics:** Last Modified: less than a minute ago, Num Docs: 18517, Max Doc: 18517, Heap Memory Usage: -1, Deleted Docs: 0, Version: 494, Segment Count: 1, Optimized: ✓, Current: ✓.
- Instance:** CWD: /Users/jiayuan/Downloads/solr-7.1.0/server, Instance: /Users/jiayuan/Downloads/solr-7.1.0/server/solr/myexample, Data: /Users/jiayuan/Downloads/solr-7.1.0/server/solr/myexample/data, Index: /Users/jiayuan/Downloads/solr-7.1.0/server/solr/myexample/data/index, Impl: org.apache.solr.core.NRTCachingDirectoryFactory.
- Replication (Master):** Shows two master nodes: Master (Searching) at version 1510267224591, generation 68, size 484.15 MB; and Master (Replicable) at version 1510267224591, generation 68, size -.
- Healthcheck:** Ping request handler is not configured with a healthcheck file.

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

[Step 2] Create external page rank file.

I wrote a Java program to compute the EdgeList from the mapping files. With this EdgeList file, I computed PageRank using NetworkX library in Python. Then I placed the “external\_PageRankFile.txt” file under ‘myexample’ core data folder in Solr and reloaded the core. I modified the managed-schema file and solrconfig.xml file according to the instruction

Parameters for creating graph:

alpha=0.85, personalization=None, max\_iter=30, tol=1e-06, nstart=None, weight= ‘weight’, dangling=None

[Step 3] Create a Web server for querying the Solr.

I used Apache web server and PHP for developing webpages. The PHP

file calls the Solr PHP Client for querying the Solr. For external PageRank results, the query to the solr is sent along with parameter ‘sort=pageRankFile desc’ .

#### [Step 4] Compare search result

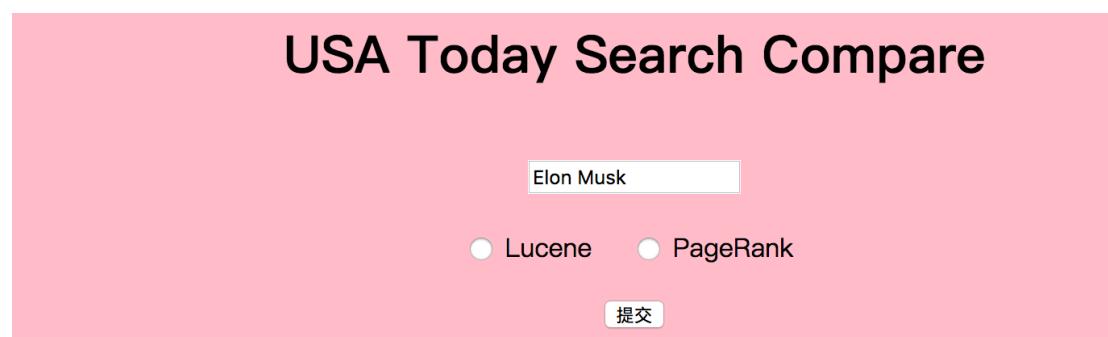
I compared search result between Lucene Solr search and external PageRank search and computed overlaps.

#### **2. Explanation regarding why some pages have higher PageRank values than others.**

The page rank value of a page depends on the number of links pointing to the page, their page rank values and the number of outgoing links in each of these pages. It does not consider the relevant content or any content for that matter while computing the page rank. That’s why some of the pages have higher page rank values because of the large number of incoming links pointing to this page. Each incoming link pointing to the page will act as a vote and signify the importance of that page. Hence some pages that have many other pages pointing to it will always have higher page rank compared to other pages.

#### **3. Document the flow for any single query using screenshots**

Screenshot of initial page where you enter the query “Elon Musk” in input box :



Screenshot of page which shows the results for Lucene(Default):

## USA Today Search Compare

Elon Musk  
 Lucene     PageRank

Results 1 – 10 of 182:

1. 

**Title** Elon Musk: Artificial intelligence fight could lead to World War III  
**URL** <https://www.usatoday.com/story/tech/talkingtech/2017/09/05/elon-musk-artificial-intelligence-battle-most-likely-cause-wwiii/632362001/>  
**ID** /Users/jiayuan/Downloads/solr-7.1.0/USAToday/USAToday/2cf4e790d6a6861d8d67a447c7ed8db125caf86619a72c8637cf2407805a1a97.html  
**Description** CEO of Tesla, SpaceX outspoken about fears over growth of artificial intelligence.
2. 

**Title** Elon Musk delays self-driving truck to focus on Model 3, Puerto Rico power  
**URL** <https://www.usatoday.com/story/tech/2017/10/06/elon-musk-delays-self-driving-truck-focus-model-3-puerto-rico-power/741050001/>  
**ID** /Users/jiayuan/Downloads/solr-7.1.0/USAToday/USAToday/07a88a8d38b69081d3269db3c8e063ed9d3511d74c2a43359b09c2afcfcace71.html  
**Description** 'Production hell' for new Tesla model as well as plans to help Puerto Rico with solar power have diverted the CEO.
3. 

**Title** Tesla to start Model 3 electric car production, CEO Elon Musk says  
**URL** <https://www.usatoday.com/story/money/cars/2017/07/03/tesla-model-3/447465001/>  
**ID** /Users/jiayuan/Downloads/solr-7.1.0/USAToday/USAToday/9f110a9bbc922a279b48255a150739c427f8119237aee4e20243cf6d6024ec0.html  
**Description** Tesla will begin production of its first mass-market electric vehicle, CEO Elon Musk said, meeting an ambitious goal that was widely questioned.
4. 

**Title** Elon Musk: Tesla can help fix Puerto Rico's ruined electrical grid  
**URL** <https://www.usatoday.com/story/money/2017/10/06/elon-musk-tesla-can-help-fix-puerto-ricos-ruined-electrical-grid/738782001/>  
**ID** /Users/jiayuan/Downloads/solr-7.1.0/USAToday/USAToday/ade3fb061e9dc4d93216b4859b936290b8ed0c401ebbb73b5cb1a045499959528.html  
**Description** Elon Musk pledged to meet with Puerto Rico's governor to discuss how he could help rebuild the island's ruined electrical grid with renewable energy.
5. 

**Title** Elon Musk: What we learned about Mars, moon base  
**URL** <https://www.usatoday.com/story/tech/nation-now/2017/09/29/elon-musk-speech-what-we-learned/715703001/>  
**ID** /Users/jiayuan/Downloads/solr-7.1.0/USAToday/USAToday/562debe17f3fe93467e6a577c539ba3bc12d50b274ba49e6f894842776d620.html  
**Description** The SpaceX CEO admitted that cost prompted him to scale back the new rocket system's physical size in favor of a new system known as the BFR.
6. 

**Title** Tesla eyes hurricane-ravaged Caribbean, could shape power grids  
**URL** <https://www.usatoday.com/story/news/nation-now/2017/10/01/tesla-eyes-hurricane-ravaged-caribbean-could-shape-power-grids/721986001/>  
**ID** /Users/jiayuan/Downloads/solr-7.1.0/USAToday/USAToday/70611b7aaa81412312ba6fea07c26576ac8670c85843806a8550e4d70917f976.html  
**Description** Tesla eyes an expansion into storm-ravaged islands of the Caribbean — and it could become a key player in shaping grids of the future.
7. 

**Title** Elon Musk shares video of SpaceX rocket fails  
**URL** <https://www.usatoday.com/story/tech/talkingtech/2017/09/14/you-must-watch-elon-musk-video-rocket-fails/665166001/>  
**ID** /Users/jiayuan/Downloads/solr-7.1.0/USAToday/USAToday/bec3d4634924e4c2755a907d7eca4bb90432c7440eb0b7f8b5da9a99bc03f400.html  
**Description** This is what happens when SpaceX rockets have trouble landing or taking off.
8. 

**Title** Elon Musk believes Tesla can rebuild Puerto Rico's power grid  
**URL** <https://www.usatoday.com/videos/money/2017/10/06/elon-musk-believes-tesla-can-rebuild-puerto-ricos-power-grid/106363188/>  
**ID** /Users/jiayuan/Downloads/solr-7.1.0/USAToday/USAToday/9cec1470d5c37941d1efd5151985e8e00bbd748d22192fa4bd2f53356aa562e6.html  
**Description** Tesla founder Elon Musk believes he can rebuild Puerto Rico's power grid.
9. 

**Title** Amber Heard, Elon Musk make 'Cheeky' public debut together  
**URL** <https://www.usatoday.com/story/life/entertainthis/2017/04/24/amber-heard-elon-musk-dating-public-debut-instagram-posts/100834568/>  
**ID** /Users/jiayuan/Downloads/solr-7.1.0/USAToday/USAToday/78ff9b5d3d3a3b3b570cddec8d2883c9344276263bfa06d983e96c3e19c6b946.html  
**Description** The actress and Tesla CEO, who have been spotted together, have made things IG official.
10. 

**Title** Tesla CEO Elon Musk: 'I don't hate Apple'  
**URL** <https://www.usatoday.com/story/driveon/2015/10/09/tesla-elon-musk-apple-hate/73689838/>  
**ID** /Users/jiayuan/Downloads/solr-7.1.0/USAToday/USAToday/9551fd38927f6f4da4fe7155cf31a3543bc7f2512d099e47c31e9a261de9ce0.html  
**Description** Let's just be clear: Tesla Motors CEO Elon Musk says he doesn't hate Apple. But given earlier comments in which he referred to the tech giant as a "Tesla graveyard," you've got to wonder. Sounding more like

Screenshot of page which shows the results for PageRank:

Elon Musk  
 Lucene     PageRank

Results 1 – 10 of 182:

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**Title** Technology and Electronics Reviews – USATODAY.com  
**URL** <https://www.usatoday.com/tech/>  
**ID** /Users/jiayuan/Downloads/solr-7.1.0/USAToday/USAToday/d079a8a0740bb41affea1a52940c7d84eb21f77ba25f13157cca7ad3ea137da1.html  
**Description** Power up with breaking news on personal technology, electronics, gaming and computers.
2. 

**Title** Travel News, Tips, and Guides – USATODAY.com  
**URL** <https://www.usatoday.com/travel/>  
**ID** /Users/jiayuan/Downloads/solr-7.1.0/USAToday/USAToday/4e2748038c90c804cfcb504b2ba48e367e304e91970b423db8245740ec5a187.html  
**Description** The latest travel information, deals, guides and reviews from USA TODAY Travel.
3. 

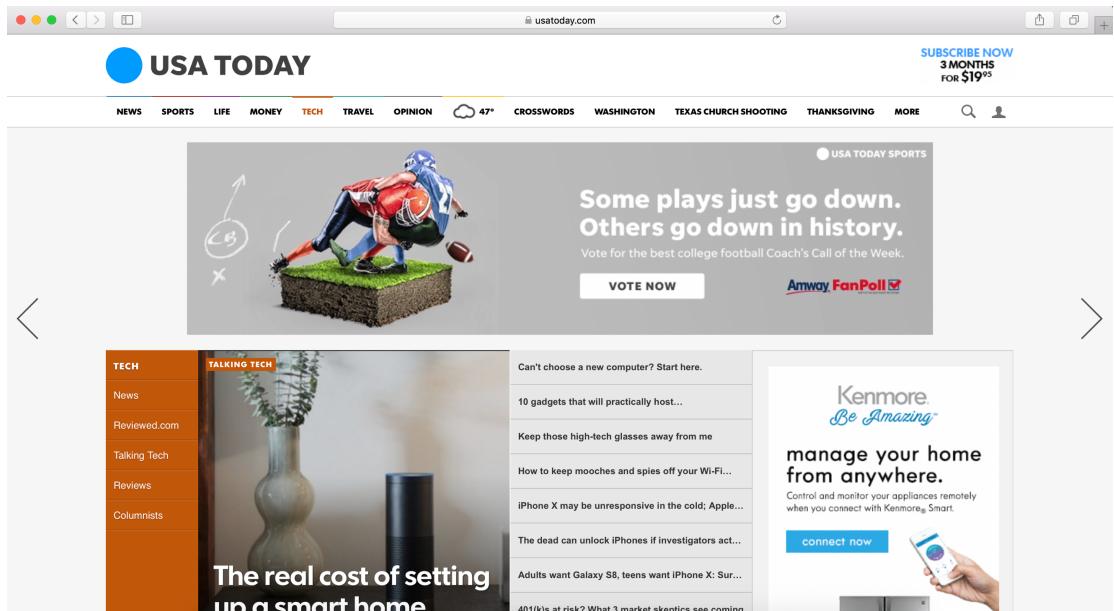
**Title** Car Reviews and News – USATODAY.com  
**URL** <https://www.usatoday.com/money/cars/>  
**ID** /Users/jiayuan/Downloads/solr-7.1.0/USAToday/USAToday/3da6115b99a08ca6456c4511fce8236513393c27d05cd891a71a8615491ad772.html  
**Description** Get ready to hit the open road with reviews on the newest autos and car news.

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Screenshot of the actual webpage that opens when clicking on one of the result's link:

Results 1 – 10 of 182:								
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The result of link that opens in a new tab with actual real web page:



**4. A table containing list of URLs of the top ten results produced by both ranking methods for each query.**

1)

Elon Musk	
Lucene Solr	PageRank
<a href="https://www.usatoday.com/story/tech/talkingtech/2017/09/05/elon-musk-artificial-intelligence-battle-most-likely-cause-wwiii/632362001/">https://www.usatoday.com/story/tech/talkingtech/2017/09/05/elon-musk-artificial-intelligence-battle-most-likely-cause-wwiii/632362001/</a>	<a href="https://www.usatoday.com/tech/">https://www.usatoday.com/tech/</a>
<a href="https://www.usatoday.com/story/tech/2017/10/06/elon-musk-delays-self-driving-truck-focus-model-3-puerto-rico-power/74105001/">https://www.usatoday.com/story/tech/2017/10/06/elon-musk-delays-self-driving-truck-focus-model-3-puerto-rico-power/74105001/</a>	<a href="https://www.usatoday.com/travel/">https://www.usatoday.com/travel/</a>
<a href="https://www.usatoday.com/story/money/cars/2017/07/03/tesla-model-3/447465001/">https://www.usatoday.com/story/money/cars/2017/07/03/tesla-model-3/447465001/</a>	<a href="https://www.usatoday.com/money/cars/">https://www.usatoday.com/money/cars/</a>
<a href="https://www.usatoday.com/story/money/2017/10/06/elon-musk-tesla-can-help-fix-puerto-ricos-ruined-electrical-grid/738782001/">https://www.usatoday.com/story/money/2017/10/06/elon-musk-tesla-can-help-fix-puerto-ricos-ruined-electrical-grid/738782001/</a>	<a href="https://www.usatoday.com/money/business/">https://www.usatoday.com/money/business/</a>

<a href="https://www.usatoday.com/story/tech/nation-now/2017/09/29/elon-musk-speech-what-we-learned/715703001/">https://www.usatoday.com/story/tech/nation-now/2017/09/29/elon-musk-speech-what-we-learned/715703001/</a>	<a href="https://www.usatoday.com/topic/Hurricane-Maria/local">https://www.usatoday.com/topic/Hurricane-Maria/local</a>
<a href="https://www.usatoday.com/story/news/nation-now/2017/10/01/tesla-eyes-hurricane-ravaged-caribbean-could-shape-power-grids/721986001/">https://www.usatoday.com/story/news/nation-now/2017/10/01/tesla-eyes-hurricane-ravaged-caribbean-could-shape-power-grids/721986001/</a>	<a href="https://www.usatoday.com/sports/ncaab/standings/">https://www.usatoday.com/sports/ncaab/standings/</a>
<a href="https://www.usatoday.com/story/tech/talkingtech/2017/09/14/you-must-watch-elon-musk-video-rocket-fails/665166001/">https://www.usatoday.com/story/tech/talkingtech/2017/09/14/you-must-watch-elon-musk-video-rocket-fails/665166001/</a>	<a href="https://www.usatoday.com/sports/ncaab/scores/">https://www.usatoday.com/sports/ncaab/scores/</a>
<a href="https://www.usatoday.com/videos/money/2017/10/06/elon-musk-believes-tesla-can-rebuild-puerto-ricos-power-grid/106363188/">https://www.usatoday.com/videos/money/2017/10/06/elon-musk-believes-tesla-can-rebuild-puerto-ricos-power-grid/106363188/</a>	<a href="https://www.usatoday.com/sports/ncaa/sagarin/">https://www.usatoday.com/sports/ncaa/sagarin/</a>
<a href="https://www.usatoday.com/story/life/entertainthis/2017/04/24/amber-heard-elon-musk-dating-public-debut-instagram-posts/100834568/">https://www.usatoday.com/story/life/entertainthis/2017/04/24/amber-heard-elon-musk-dating-public-debut-instagram-posts/100834568/</a>	<a href="https://www.usatoday.com/sports/ncaab/sagarin/">https://www.usatoday.com/sports/ncaab/sagarin/</a>
<a href="https://www.usatoday.com/story/driveon/2015/10/09/tesla-elon-musk-apple-hate/73689838/">https://www.usatoday.com/story/driveon/2015/10/09/tesla-elon-musk-apple-hate/73689838/</a>	<a href="https://www.usatoday.com/sports/ncaab/teams/">https://www.usatoday.com/sports/ncaab/teams/</a>

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<b>Star Wars</b>	
Lucene Solr	PageRank
<a href="https://www.usatoday.com/story/life/movies/2015/11/03/star-wars-the-force-awakens-masks-lightsabers-amc-">https://www.usatoday.com/story/life/movies/2015/11/03/star-wars-the-force-awakens-masks-lightsabers-amc-</a>	<a href="https://www.usatoday.com/policing/">https://www.usatoday.com/policing/</a>

<a href="http://cinemark/75089340/">http://cinemark/75089340/</a>	
<a href="https://www.usatoday.com/story/life/movies/2015/12/16/review-star-wars-the-force-awakens/77342318/">https://www.usatoday.com/story/life/movies/2015/12/16/review-star-wars-the-force-awakens/77342318/</a>	<a href="https://www.usatoday.com/section/global/virtuallythere/">https://www.usatoday.com/section/global/virtuallythere/</a>
<a href="https://www.usatoday.com/story/life/movies/2015/12/14/harrison-ford-star-wars-the-force-awakens/77243366/">https://www.usatoday.com/story/life/movies/2015/12/14/harrison-ford-star-wars-the-force-awakens/77243366/</a>	<a href="https://www.usatoday.com/media/latest/videos/news/">https://www.usatoday.com/media/latest/videos/news/</a>
<a href="https://www.usatoday.com/story/life/movies/2015/12/13/jj-abrams-star-wars-the-force-awakens/76911016/">https://www.usatoday.com/story/life/movies/2015/12/13/jj-abrams-star-wars-the-force-awakens/76911016/</a>	<a href="https://www.usatoday.com/money/">https://www.usatoday.com/money/</a>
<a href="https://www.usatoday.com/story/life/entertainthis/2015/12/04/star-wars-need-to-know/76685854/">https://www.usatoday.com/story/life/entertainthis/2015/12/04/star-wars-need-to-know/76685854/</a>	<a href="https://www.usatoday.com/story/news/2013/01/09/corrections-clarifications/1821023/">https://www.usatoday.com/story/news/2013/01/09/corrections-clarifications/1821023/</a>
<a href="https://www.usatoday.com/story/life/entertainthis/2015/12/11/star-wars-movie-definitive-ranking/77137480/">https://www.usatoday.com/story/life/entertainthis/2015/12/11/star-wars-movie-definitive-ranking/77137480/</a>	<a href="https://www.usatoday.com/tech/">https://www.usatoday.com/tech/</a>
<a href="https://www.usatoday.com/story/life/movies/2017/09/12/j-j-abrams-return-star-wars-direct-episode-ix-replacing-colin-trevorrow/657203001/">https://www.usatoday.com/story/life/movies/2017/09/12/j-j-abrams-return-star-wars-direct-episode-ix-replacing-colin-trevorrow/657203001/</a>	<a href="https://www.usatoday.com">https://www.usatoday.com</a>
<a href="https://www.usatoday.com/story/life/movies/2017/08/31/star-wars-five-best-ways-celebrate-the-last-jedi-force-friday-ii/618268001/">https://www.usatoday.com/story/life/movies/2017/08/31/star-wars-five-best-ways-celebrate-the-last-jedi-force-friday-ii/618268001/</a>	<a href="https://www.usatoday.com/travel/">https://www.usatoday.com/travel/</a>
<a href="https://www.usatoday.com/story/money/business/small-business-central/2017/10/08/star-wars-last-">https://www.usatoday.com/story/money/business/small-business-central/2017/10/08/star-wars-last-</a>	<a href="https://www.usatoday.com/life/">https://www.usatoday.com/life/</a>

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<a href="https://www.usatoday.com/story/life/movies/2017/10/09/new-star-wars-last-jedi-trailer-hints-troubling-tie-between-rey-and-kylo-ren/748730001/">https://www.usatoday.com/story/life/movies/2017/10/09/new-star-wars-last-jedi-trailer-hints-troubling-tie-between-rey-and-kylo-ren/748730001/</a>	<a href="https://www.usatoday.com/topic/Las-Vegas-shooting/local">https://www.usatoday.com/topic/Las-Vegas-shooting/local</a>

3)

<b>North Korea</b>	
Lucene Solr	PageRank
<a href="https://www.usatoday.com/story/news/world/2017/06/17/three-americans-still-detained-north-korean-jails/102948008/">https://www.usatoday.com/story/news/world/2017/06/17/three-americans-still-detained-north-korean-jails/102948008/</a>	<a href="https://www.usatoday.com/policing/">https://www.usatoday.com/policing/</a>
<a href="https://www.usatoday.com/story/news/2017/06/19/north-korean-treatment-western-prisoners-bizarre-not-always-physically-brutal/103022748/">https://www.usatoday.com/story/news/2017/06/19/north-korean-treatment-western-prisoners-bizarre-not-always-physically-brutal/103022748/</a>	<a href="https://www.usatoday.com/opinion/">https://www.usatoday.com/opinion/</a>
<a href="https://www.usatoday.com/story/news/world/2016/01/06/north-korea-hydrogen-bomb/78345074/">https://www.usatoday.com/story/news/world/2016/01/06/north-korea-hydrogen-bomb/78345074/</a>	<a href="https://www.usatoday.com/story/news/2013/01/09/corrections-clarifications/1821023/">https://www.usatoday.com/story/news/2013/01/09/corrections-clarifications/1821023/</a>
<a href="https://www.usatoday.com/story/news/world/2017/04/28/seoul-north-korea-test-fires-missile/101044820/">https://www.usatoday.com/story/news/world/2017/04/28/seoul-north-korea-test-fires-missile/101044820/</a>	<a href="https://www.usatoday.com/news/">https://www.usatoday.com/news/</a>
<a href="https://www.usatoday.com/story/news/2017/07/04/north-korea-ballistic-missile-south-korea/449341001/">https://www.usatoday.com/story/news/2017/07/04/north-korea-ballistic-missile-south-korea/449341001/</a>	<a href="https://www.usatoday.com/media/latest/photos/news/">https://www.usatoday.com/media/latest/photos/news/</a>
<a href="https://www.usatoday.com/story/news/world/2017/09/02/north-korea/">https://www.usatoday.com/story/news/world/2017/09/02/north-korea/</a>	<a href="https://www.usatoday.com/policing/data-casualties">https://www.usatoday.com/policing/data-casualties</a>

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<a href="https://www.usatoday.com/story/news/world/2017/07/17/united-states-missile-defense-north-korea-threats/470177001/">https://www.usatoday.com/story/news/world/2017/07/17/united-states-missile-defense-north-korea-threats/470177001/</a>	<a href="https://www.usatoday.com/sports/ncaaf/">https://www.usatoday.com/sports/ncaaf/</a>
<a href="https://www.usatoday.com/story/news/world/2017/08/29/north-korea-fires-ballistic-missile-over-japan/611119001/">https://www.usatoday.com/story/news/world/2017/08/29/north-korea-fires-ballistic-missile-over-japan/611119001/</a>	<a href="https://www.usatoday.com/olympics-rio-2016/">https://www.usatoday.com/olympics-rio-2016/</a>
<a href="https://www.usatoday.com/story/news/world/2017/08/08/report-north-korea-has-nuke-fits-inside-missile/549188001/">https://www.usatoday.com/story/news/world/2017/08/08/report-north-korea-has-nuke-fits-inside-missile/549188001/</a>	<a href="https://www.usatoday.com/news/nation/">https://www.usatoday.com/news/nation/</a>
<a href="https://www.usatoday.com/story/news/politics/2017/06/13/north-korea-releases-us-citizen-otto-warmbier-tillerson-says/102806222/">https://www.usatoday.com/story/news/politics/2017/06/13/north-korea-releases-us-citizen-otto-warmbier-tillerson-says/102806222/</a>	<a href="https://www.usatoday.com/opinion/voices/">https://www.usatoday.com/opinion/voices/</a>

4)

<b>LA Dodgers</b>	
Lucene Solr	PageRank
<a href="https://www.usatoday.com/sports/mlb/salaries/2016/player/all/">https://www.usatoday.com/sports/mlb/salaries/2016/player/all/</a>	<a href="https://www.usatoday.com/topic/E01C4890-85A2-4E0B-A3DD-58BD88E71251/interactive-graphics/">https://www.usatoday.com/topic/E01C4890-85A2-4E0B-A3DD-58BD88E71251/interactive-graphics/</a>
<a href="https://www.usatoday.com/sports/mlb/salaries/2015/player/all/">https://www.usatoday.com/sports/mlb/salaries/2015/player/all/</a>	<a href="https://www.usatoday.com/story/news/2013/01/09/corrections-clarifications/1821023/">https://www.usatoday.com/story/news/2013/01/09/corrections-clarifications/1821023/</a>
<a href="https://www.usatoday.com/sports/mlb/dodgers/">https://www.usatoday.com/sports/mlb/dodgers/</a>	<a href="https://www.usatoday.com/life/">https://www.usatoday.com/life/</a>
<a href="https://www.usatoday.com/media/l">https://www.usatoday.com/media/l</a>	<a href="https://www.usatoday.com/olympic">https://www.usatoday.com/olympic</a>

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<a href="https://www.usatoday.com/sports/mlb/salaries/2012/player/all/">https://www.usatoday.com/sports/mlb/salaries/2012/player/all/</a>	<a href="https://www.usatoday.com/sports/mlb/">https://www.usatoday.com/sports/mlb/</a>
<a href="https://www.usatoday.com/sports/mlb/salaries/">https://www.usatoday.com/sports/mlb/salaries/</a>	<a href="https://www.usatoday.com/sports/boxing/">https://www.usatoday.com/sports/boxing/</a>
<a href="https://www.usatoday.com/sports/mlb/salaries/2017/player/all/">https://www.usatoday.com/sports/mlb/salaries/2017/player/all/</a>	<a href="https://www.usatoday.com/sports/horse-racing/">https://www.usatoday.com/sports/horse-racing/</a>
<a href="https://www.usatoday.com/story/sports/mlb/2017/10/09/leading-off-watching-weather-in-boston-greinke-vs-dodgers/106458414/">https://www.usatoday.com/story/sports/mlb/2017/10/09/leading-off-watching-weather-in-boston-greinke-vs-dodgers/106458414/</a>	<a href="https://www.usatoday.com/travel/us-today-eats/">https://www.usatoday.com/travel/us-today-eats/</a>
<a href="https://www.usatoday.com/sports/mlb/salaries/2014/player/all/">https://www.usatoday.com/sports/mlb/salaries/2014/player/all/</a>	<a href="https://www.usatoday.com/sports/nba/">https://www.usatoday.com/sports/nba/</a>
<a href="https://www.usatoday.com/sports/mlb/salaries/2009/player/all/">https://www.usatoday.com/sports/mlb/salaries/2009/player/all/</a>	<a href="https://www.usatoday.com/travel/experience-america/">https://www.usatoday.com/travel/experience-america/</a>

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<b>Puerto Rico</b>	
Lucene Solr	PageRank
<a href="https://www.usatoday.com/story/news/politics/2017/09/29/acting-homeland-security-director-calls-reach-hurricane-maria-a-good-news-story-mayor-san-juan-outra/716464001/">https://www.usatoday.com/story/news/politics/2017/09/29/acting-homeland-security-director-calls-reach-hurricane-maria-a-good-news-story-mayor-san-juan-outra/716464001/</a>	<a href="https://www.usatoday.com/opinion/">https://www.usatoday.com/opinion/</a>
<a href="https://www.usatoday.com/story/news/nation-now/2017/10/04/torres-aid-mission-puerto-rico/734371001/">https://www.usatoday.com/story/news/nation-now/2017/10/04/torres-aid-mission-puerto-rico/734371001/</a>	<a href="https://www.usatoday.com/media/latest/videos/news/">https://www.usatoday.com/media/latest/videos/news/</a>
<a href="https://www.usatoday.com/story/news/nation-now/2017/10/08/aid-makes-needy-hurricane-maria-survivors-puerto-rico/744978001/">https://www.usatoday.com/story/news/nation-now/2017/10/08/aid-makes-needy-hurricane-maria-survivors-puerto-rico/744978001/</a>	<a href="https://www.usatoday.com/weather/">https://www.usatoday.com/weather/</a>

<a href="https://www.usatoday.com/story/news/politics/2017/09/29/trump-hurricane-damaged-puerto-rico-weve-never-seen-situation-like-this/716531001/">https://www.usatoday.com/story/news/politics/2017/09/29/trump-hurricane-damaged-puerto-rico-weve-never-seen-situation-like-this/716531001/</a>	<a href="https://www.usatoday.com/story/news/2013/01/09/corrections-clarifications/1821023/">https://www.usatoday.com/story/news/2013/01/09/corrections-clarifications/1821023/</a>
<a href="https://www.usatoday.com/story/news/nation-now/2017/10/05/husband-wife-have-surprise-reunion-puerto-rico-airport/737828001/">https://www.usatoday.com/story/news/nation-now/2017/10/05/husband-wife-have-surprise-reunion-puerto-rico-airport/737828001/</a>	<a href="https://www.usatoday.com/tech/">https://www.usatoday.com/tech/</a>
<a href="https://www.usatoday.com/story/news/world/2017/09/20/puerto-rico-braces-direct-hit-hurricane-maria/684121001/">https://www.usatoday.com/story/news/world/2017/09/20/puerto-rico-braces-direct-hit-hurricane-maria/684121001/</a>	<a href="https://www.usatoday.com/">https://www.usatoday.com/</a>
<a href="https://www.usatoday.com/story/news/nation/2017/09/26/why-puerto-rico-faces-monumental-recovery-effort/703515001/">https://www.usatoday.com/story/news/nation/2017/09/26/why-puerto-rico-faces-monumental-recovery-effort/703515001/</a>	<a href="https://www.usatoday.com/news/">https://www.usatoday.com/news/</a>
<a href="https://www.usatoday.com/story/news/2017/09/24/puerto-rico-damholding-some-local-officials-say-threat-overblown/697748001/">https://www.usatoday.com/story/news/2017/09/24/puerto-rico-damholding-some-local-officials-say-threat-overblown/697748001/</a>	<a href="https://www.usatoday.com/media/latest/photos/news/">https://www.usatoday.com/media/latest/photos/news/</a>
<a href="https://www.usatoday.com/story/news/world/2017/09/21/puerto-ricans-hurricane-maria/688060001/">https://www.usatoday.com/story/news/world/2017/09/21/puerto-ricans-hurricane-maria/688060001/</a>	<a href="https://www.usatoday.com/tech/talkingtech/">https://www.usatoday.com/tech/talkingtech/</a>
<a href="https://www.usatoday.com/story/weather/hurricanes/2017/10/05/puerto-rico-clean-water/734813001/">https://www.usatoday.com/story/weather/hurricanes/2017/10/05/puerto-rico-clean-water/734813001/</a>	<a href="https://www.usatoday.com/travel/roadwarriorvoices/">https://www.usatoday.com/travel/roadwarriorvoices/</a>

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<b>Hurricane Harvey</b>	
Lucene Solr	PageRank
<a href="https://www.usatoday.com/story/opinion/2017/09/29/what-can-be-done-to-fix-puerto-ricos-water-supply/797301001/">https://www.usatoday.com/story/opinion/2017/09/29/what-can-be-done-to-fix-puerto-ricos-water-supply/797301001/</a>	<a href="https://www.usatoday.com/policing/">https://www.usatoday.com/policing/</a>

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<a href="https://www.usatoday.com/story/news/nation/2017/09/04/houston-open-business/631151001/">https://www.usatoday.com/story/news/nation/2017/09/04/houston-open-business/631151001/</a>	<a href="https://www.usatoday.com/opinion/">https://www.usatoday.com/opinion/</a>
<a href="https://www.usatoday.com/story/news/nation/2017/08/28/heartbreak-texas-harvey-drive-30-000-shelters-fema-says/607224001/">https://www.usatoday.com/story/news/nation/2017/08/28/heartbreak-texas-harvey-drive-30-000-shelters-fema-says/607224001/</a>	<a href="https://www.usatoday.com/section/global/virtuallythere/">https://www.usatoday.com/section/global/virtuallythere/</a>
<a href="https://www.usatoday.com/story/news/2017/08/27/cajun-navy-heads-texas-aid-rescues/606883001/">https://www.usatoday.com/story/news/2017/08/27/cajun-navy-heads-texas-aid-rescues/606883001/</a>	<a href="https://www.usatoday.com/topic/E01C4890-85A2-4E0B-A3DD-58BD88E71251/interactive-graphics/">https://www.usatoday.com/topic/E01C4890-85A2-4E0B-A3DD-58BD88E71251/interactive-graphics/</a>
<a href="https://www.usatoday.com/story/opinion/faith-in-america/2017/08/30/storm-the-church-bigger-than-j Joel Osteens-building/618795001/">https://www.usatoday.com/story/opinion/faith-in-america/2017/08/30/storm-the-church-bigger-than-j Joel Osteens-building/618795001/</a>	<a href="https://www.usatoday.com/washington/">https://www.usatoday.com/washington/</a>
<a href="https://www.usatoday.com/story/news/nation-now/2017/08/28/harvey-nursing-home-residents-rescued-after-viral-photo-safe-warm-dry/610575001/">https://www.usatoday.com/story/news/nation-now/2017/08/28/harvey-nursing-home-residents-rescued-after-viral-photo-safe-warm-dry/610575001/</a>	<a href="https://www.usatoday.com/media/latest/videos/news/">https://www.usatoday.com/media/latest/videos/news/</a>
<a href="https://www.usatoday.com/story/news/nation-now/2017/08/27/harvey-nursing-home-residents-rescued-floodwaters-after-photo-goes-viral/606987001/">https://www.usatoday.com/story/news/nation-now/2017/08/27/harvey-nursing-home-residents-rescued-floodwaters-after-photo-goes-viral/606987001/</a>	<a href="https://www.usatoday.com/weather/">https://www.usatoday.com/weather/</a>

<a href="https://www.usatoday.com/story/news/nation-now/2017/08/31/hurricane-harvey-devastated-texas-see-wreckage-drone/619985001/">https://www.usatoday.com/story/news/nation-now/2017/08/31/hurricane-harvey-devastated-texas-see-wreckage-drone/619985001/</a>	<a href="https://www.usatoday.com/money/">https://www.usatoday.com/money/</a>
<a href="https://www.usatoday.com/story/news/nation/2017/08/30/joel-osteen-we-never-turned-away-hurricane-harvey-flooding-victims/615569001/">https://www.usatoday.com/story/news/nation/2017/08/30/joel-osteen-we-never-turned-away-hurricane-harvey-flooding-victims/615569001/</a>	<a href="https://www.usatoday.com/story/news/2013/01/09/corrections-clarifications/1821023/">https://www.usatoday.com/story/news/2013/01/09/corrections-clarifications/1821023/</a>
<a href="https://www.usatoday.com/media/cinematic/gallery/104899472/tropical-depression-harvey-batters-texas/">https://www.usatoday.com/media/cinematic/gallery/104899472/tropical-depression-harvey-batters-texas/</a>	<a href="https://www.usatoday.com/shop/">https://www.usatoday.com/shop/</a>

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<b>iPhone X</b>	
Lucene Solr	PageRank
<a href="https://www.usatoday.com/story/tech/reviewedcom/2017/09/12/should-you-upgrade-to-the-new-iphone-8-or-iphone-x/105546142/">https://www.usatoday.com/story/tech/reviewedcom/2017/09/12/should-you-upgrade-to-the-new-iphone-8-or-iphone-x/105546142/</a>	<a href="https://www.usatoday.com/policing/">https://www.usatoday.com/policing/</a>
<a href="https://www.usatoday.com/story/tech/2017/09/13/iphone-x-too-good-iphone-8-8-plus-may-soon-find-out/663345001/">https://www.usatoday.com/story/tech/2017/09/13/iphone-x-too-good-iphone-8-8-plus-may-soon-find-out/663345001/</a>	<a href="https://www.usatoday.com/opinion/">https://www.usatoday.com/opinion/</a>
<a href="https://www.usatoday.com/story/tech/reviewedcom/2017/09/25/7-great-cases-that-will-work-with-the-new-iphone-8-and-8-plus/105985358/">https://www.usatoday.com/story/tech/reviewedcom/2017/09/25/7-great-cases-that-will-work-with-the-new-iphone-8-and-8-plus/105985358/</a>	<a href="https://www.usatoday.com/section/global/vrtuallythere/">https://www.usatoday.com/section/global/vrtuallythere/</a>
<a href="https://www.usatoday.com/story/tech/columnist/baig/2017/09/12/iphone-8-how-removing-home-">https://www.usatoday.com/story/tech/columnist/baig/2017/09/12/iphone-8-how-removing-home-</a>	<a href="https://www.usatoday.com/topic/E01C4890-85A2-4E0B-A3DD-58BD88E71251/interactive-">https://www.usatoday.com/topic/E01C4890-85A2-4E0B-A3DD-58BD88E71251/interactive-</a>

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<a href="https://www.usatoday.com/story/tech/talkingtech/2017/09/11/apples-iphone-event-heres-how-watch/653065001/">https://www.usatoday.com/story/tech/talkingtech/2017/09/11/apples-iphone-event-heres-how-watch/653065001/</a>	<a href="https://www.usatoday.com/washington/">https://www.usatoday.com/washington/</a>
<a href="https://www.usatoday.com/story/tech/columnist/2017/09/09/iphone-8-how-sell-your-old-iphone-most-money/649373001/">https://www.usatoday.com/story/tech/columnist/2017/09/09/iphone-8-how-sell-your-old-iphone-most-money/649373001/</a>	<a href="https://www.usatoday.com/media/latest/videos/news/">https://www.usatoday.com/media/latest/videos/news/</a>
<a href="https://www.usatoday.com/picture-gallery/tech/2017/06/23/iphone-8-evolution-of-the-iphone-over-the-years/103144056/">https://www.usatoday.com/picture-gallery/tech/2017/06/23/iphone-8-evolution-of-the-iphone-over-the-years/103144056/</a>	<a href="https://www.usatoday.com/weather/">https://www.usatoday.com/weather/</a>
<a href="https://www.usatoday.com/media/cinematic/gallery/103144056/iphone-8-evolution-of-the-iphone-over-the-years/">https://www.usatoday.com/media/cinematic/gallery/103144056/iphone-8-evolution-of-the-iphone-over-the-years/</a>	<a href="https://www.usatoday.com/money/">https://www.usatoday.com/money/</a>
<a href="https://www.usatoday.com/story/tech/talkingtech/2017/09/13/skip-iphone-x-and-8-if-you-need-iphone-better-deal/660743001/">https://www.usatoday.com/story/tech/talkingtech/2017/09/13/skip-iphone-x-and-8-if-you-need-iphone-better-deal/660743001/</a>	<a href="https://www.usatoday.com/story/news/2013/01/09/corrections-clarifications/1821023/">https://www.usatoday.com/story/news/2013/01/09/corrections-clarifications/1821023/</a>
<a href="https://www.usatoday.com/story/tech/talkingtech/2017/09/19/apple-iphone-consumers-waiting-iphone-x/681952001/">https://www.usatoday.com/story/tech/talkingtech/2017/09/19/apple-iphone-consumers-waiting-iphone-x/681952001/</a>	<a href="https://www.usatoday.com/shop/">https://www.usatoday.com/shop/</a>

8)

Paris Climate Deal	
Lucene Solr	PageRank
<a href="https://www.usatoday.com/story/news/nation/2017/05/31/only-two-nations-out-197-oppose-climate-">https://www.usatoday.com/story/news/nation/2017/05/31/only-two-nations-out-197-oppose-climate-</a>	<a href="https://www.usatoday.com/policing/">https://www.usatoday.com/policing/</a>

pact---and-us-may-next/102360164/	
<a href="https://www.usatoday.com/story/news/2017/06/01/trump-withdraw-paris-climate-deal-5-things-you-need-know-thursday/102286628/">https://www.usatoday.com/story/news/2017/06/01/trump-withdraw-paris-climate-deal-5-things-you-need-know-thursday/102286628/</a>	<a href="https://www.usatoday.com/opinion/">https://www.usatoday.com/opinion/</a>
<a href="https://www.usatoday.com/story/news/politics/2017/09/16/reports-trump-administration-may-not-pull-out-paris-climate-agreement/673988001/">https://www.usatoday.com/story/news/politics/2017/09/16/reports-trump-administration-may-not-pull-out-paris-climate-agreement/673988001/</a>	<a href="https://www.usatoday.com/media/latest/videos/news/">https://www.usatoday.com/media/latest/videos/news/</a>
<a href="https://www.usatoday.com/story/news/world/2017/06/01/trump-paris-agreement-climate-change-world-reaction/102390936/">https://www.usatoday.com/story/news/world/2017/06/01/trump-paris-agreement-climate-change-world-reaction/102390936/</a>	<a href="https://www.usatoday.com/story/news/2013/01/09/corrections-clarifications/1821023/">https://www.usatoday.com/story/news/2013/01/09/corrections-clarifications/1821023/</a>
<a href="https://www.usatoday.com/story/news/politics/2016/02/09/supreme-court-halts-obamas-emissions-rule/80085182/">https://www.usatoday.com/story/news/politics/2016/02/09/supreme-court-halts-obamas-emissions-rule/80085182/</a>	<a href="https://www.usatoday.com/sports/">https://www.usatoday.com/sports/</a>
<a href="https://www.usatoday.com/staff/2089/mike-james/">https://www.usatoday.com/staff/2089/mike-james/</a>	<a href="https://www.usatoday.com/tech/">https://www.usatoday.com/tech/</a>
<a href="https://www.usatoday.com/story/news/2017/04/20/science-march-war-truth-political-polarization/100636124/">https://www.usatoday.com/story/news/2017/04/20/science-march-war-truth-political-polarization/100636124/</a>	<a href="https://www.usatoday.com/">https://www.usatoday.com/</a>
<a href="https://www.usatoday.com/story/opinion/2017/10/02/north-korea-trump-needs-china-but-hes-doing-it-wrong-max-baucus-ryan-hass-column/721378001/">https://www.usatoday.com/story/opinion/2017/10/02/north-korea-trump-needs-china-but-hes-doing-it-wrong-max-baucus-ryan-hass-column/721378001/</a>	<a href="https://www.usatoday.com/travel/">https://www.usatoday.com/travel/</a>

<a href="https://www.usatoday.com/story/news/2014/12/01/five-things-to-know-monday/19703739/">https://www.usatoday.com/story/news/2014/12/01/five-things-to-know-monday/19703739/</a>	<a href="https://www.usatoday.com/life/90/oren-dorell/">https://www.usatoday.com/life/90/oren-dorell/</a>
<a href="https://www.usatoday.com/staff/1090/oren-dorell/">https://www.usatoday.com/staff/1090/oren-dorell/</a>	<a href="https://www.usatoday.com/news/90/oren-dorell/">https://www.usatoday.com/news/90/oren-dorell/</a>

## 5. An overlap graph showing the amount of overlap between the two ranking strategies for all queries.

Elon Musk	0
Star Wars	0
North Korea	0
LA Dodgers	0
Puerto Rico	0
Hurricane Harvey	0
iPhone X	0
Paris Climate Deal	0

There is no overlap between two ranking strategies for all queries.