

# CSCI-572 Information Retrieval - Assignment 4

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## A. STEPS FOLLOWED TO COMPLETE THE ASSIGNMENT

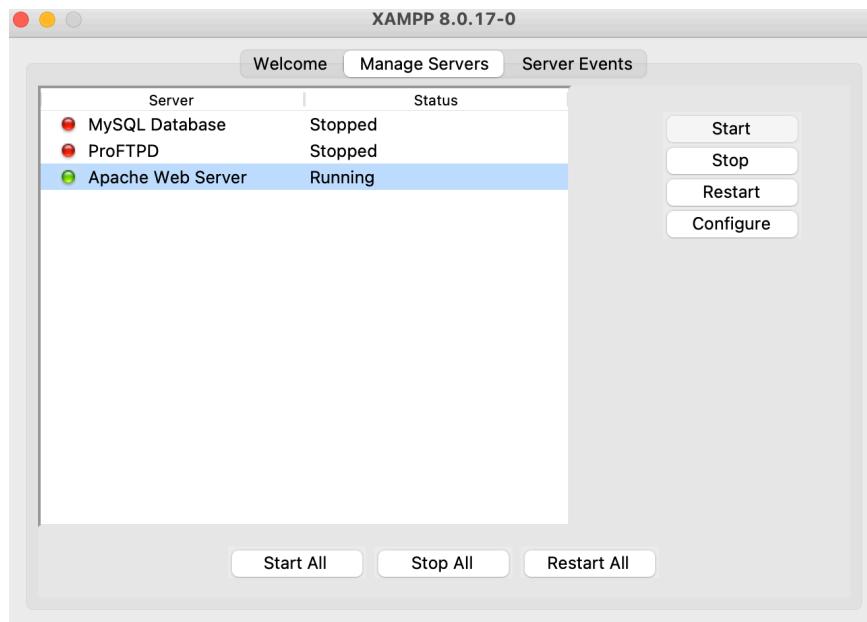
### 1. Installation of XAMPP

XAMPP is a free and open-source cross-platform web server solution stack package developed by Apache Friends, consisting mainly of the Apache HTTP Server, interpreters for scripts written in the PHP and Perl programming languages.

1.1 Installed XAMPP from [Apache Friends](#) which came bundled with PHP 8.0.17 and Apache.

1.2 Created a folder in the ‘XAMPP/htdocs’, with the name of ‘solr-web’. This folder was then used to write all the PHP source code.

1.3 Go to the XAMPP application and start the apache server.



### 2. Installation of Solr

2.1 Downloaded the solr-7.7.3.zip from <https://solr.apache.org/downloads.html>.

2.2 Unzipped the contents of the downloaded file.

2.3 Started solr using ‘bin/solr start’. It starts by default on port 8983.

2.4 Created a new core named ‘myexample’. One can do this from <http://localhost:8983/> or from the terminal.

2.5 Went to the conf folder of the core “myexample”. Opened a file named – “managed-schema” and uncommented the following line

```
<copyField source="*" dest="_text_"/>
```

2.6 Configured Solr to default querying from the field `_text_` by defining the default field in the requestHandler in solrconfig.xml file.

```
(base) - Shreyas-MacBook-Pro:solr-7.7.3 shreyagupta$ bin/solr start
*** [WARN] *** Your open file limit is currently 256.
It should be set to 65000 to avoid operational disruption.
If you no longer wish to see this warning, set SOLR_ULIMIT_CHECKS to false in your profile or solr.in.sh
*** [WARN] *** Your Max Processes Limit is currently 1392.
It should be set to 65000 to avoid operational disruption.
If you no longer wish to see this warning, set SOLR_ULIMIT_CHECKS to false in your profile or solr.in.sh
Waiting up to 180 seconds to see Solr running on port 8983 [-]
Started Solr server on port 8983 (pid=60683). Happy searching!
```

### 3. Downloaded the HTML Crawled Pages from Drive Link

- 3.1 Downloaded the LATIMES zipped file from the drive link provided to us.
- 3.2 Unzip the folder.
- 3.3 Move the unzipped folder to the same directory as of solr-7.7.3.

### 4. Performed Indexing using TIKA Parser

- 4.1 Used Apache TIKA post command, to index all of the crawled data in the ‘myexample’ core.
- 4.2 Successfully indexed 19193 files.
- 4.3 Tested the query as “Cannes” from user interface provided by Solr.

The screenshot shows the Solr Core Overview page at [localhost:8983/solr/#/myexample/core-overview](http://localhost:8983/solr/#/myexample/core-overview). The left sidebar lists various Solr management options like Dashboard, Logging, Core Admin, Java Properties, Thread Dump, and a dropdown menu for the 'myexample' core. The main content area has two tabs: 'Statistics' and 'Instance'. The 'Statistics' tab displays metrics such as Last Modified (about 20 hours ago), Num Docs (19193), Max Doc (19193), Heap Memory Usage (-1), Deleted Docs (0), Version (240), Segment Count (21), and Current (✓). The 'Instance' tab shows GWD and Instance paths, Data path, and Indexer implementation details. The 'Replication (Master)' section shows a table with columns Version, Gen, and Size, listing Master (Searching) and Master (Replicable) entries. A note indicates that a healthcheck file is not configured. At the bottom, links to Documentation, Issue Tracker, IRC Channel, Community forum, and Solr Query Syntax are available.

## 5. Construction of Edgelist.txt

5.1 Download the jsoup jar from <https://jsoup.org/download>

5.2 Created a java file which uses jsoup library to extract the link structure from the downloaded web pages and created an edgelist.txt file.

5.3 The created edgelist.txt file was then used to compute the page-rank for each page.

## 6. Construction of external\_PageRankFile.txt

6.1 Used NetworkX (python package) to create a directional graph such that the vertex/node represented document ids and the edges represented the links.

6.2 Calculated the page rank using the DiGraph.

*The following parameters were used to compute the scores:*

Alpha	0.85
Max iterations	30
Error Tolerance	1e-06
Personalization	None
Nstart	None
Weight	'weight'
Dangling	None

6.3 The file external\_PageRankFile.txt created after running the python script.

6.4 It was then placed in the ‘solr/myexample/data’ folder.

6.5 Added fieldType external and file entries in managed-schema. Also, added listeners in the solrconfig.xml file. The core was then reloaded.

6.6 Tested in Solr UI a query with keyword “Cannes” and sort parameter as “pageRankFile desc”.

The screenshot shows the Solr Admin interface at <http://localhost:8983/solr/myexample/query>. The left sidebar shows the 'myexample' core selected. In the main area, the 'Request-Handler (qt)' dropdown is set to '/select'. The query parameters are: q=Cannes, fq=, sort=pageRankFile desc, start:0, rows:10. The results pane displays a JSON response for 144 documents, with the first few entries showing details about Carrie Fisher.

```

{
  "responseHeader": {
    "status": 0,
    "QTime": 4,
    "params": {
      "q": "Cannes",
      "sort": "pageRankFile desc",
      "start": "0"
    }
  },
  "response": {
    "numFound": 144,
    "start": 0,
    "docs": [
      {
        "id": "/Users/shreyagupta/Documents/USC Classes/Spring 2022/GSCI-572/HW4/solr-7.3...//LATIMES/latimes/87655b28-6c-09_image": "https://ca-times.brightspotcdn.com/dims4/default/c876230/2147483647/strip/true/crop/1530x803+0+29/rel_og_image_width": 1280,
        "article_published_time": "1987-07-31T08:00:00Z",
        "twitter_card": "summary_large_image",
        "brightspot_cached": "[4sec]",
        "stream_content_type": "text/html",
        "og_site_name": "Los Angeles Times",
        "keywords": "novel, Postcards from the Edge, book,Carrie Fisher",
        "description": "Actress and author Carrie Fisher, the child of two Hollywood icons who rose to fame as Princess Leia and Han Solo, died Saturday at age 60. She was 60.",
        "og_image_type": "image/jpeg",
        "title": "Carrie Fisher: Over the edge and back in her first novel - Los Angeles Times",
        "og_image": "https://ca-times.brightspotcdn.com/dims4/default/058c729/2147483647/strip/true/crop/1530x861+0+29/twitter_image_alt": "Carrie Fisher",
        "twitter_title": "Carrie Fisher: Over the edge and back in her first novel - Los Angeles Times",
        "content_encoding": "UTF-8",
        "content_type": "text/html; charset=UTF-8",
        "stream_size": 215230,
        "x_parsed_by": "org.apache.tika.parser.DefaultParser",
        "org.apache.tika.parser.html.HtmlParser",
        "og_image_alt": "Carrie Fisher",
        "og_type": "article",
        "article_section": "Entertainment & Arts",
        "twitter_title": "From the Archives: Carrie Fisher: Over the edge and back in her first novel"
      }
    ]
  }
}

```

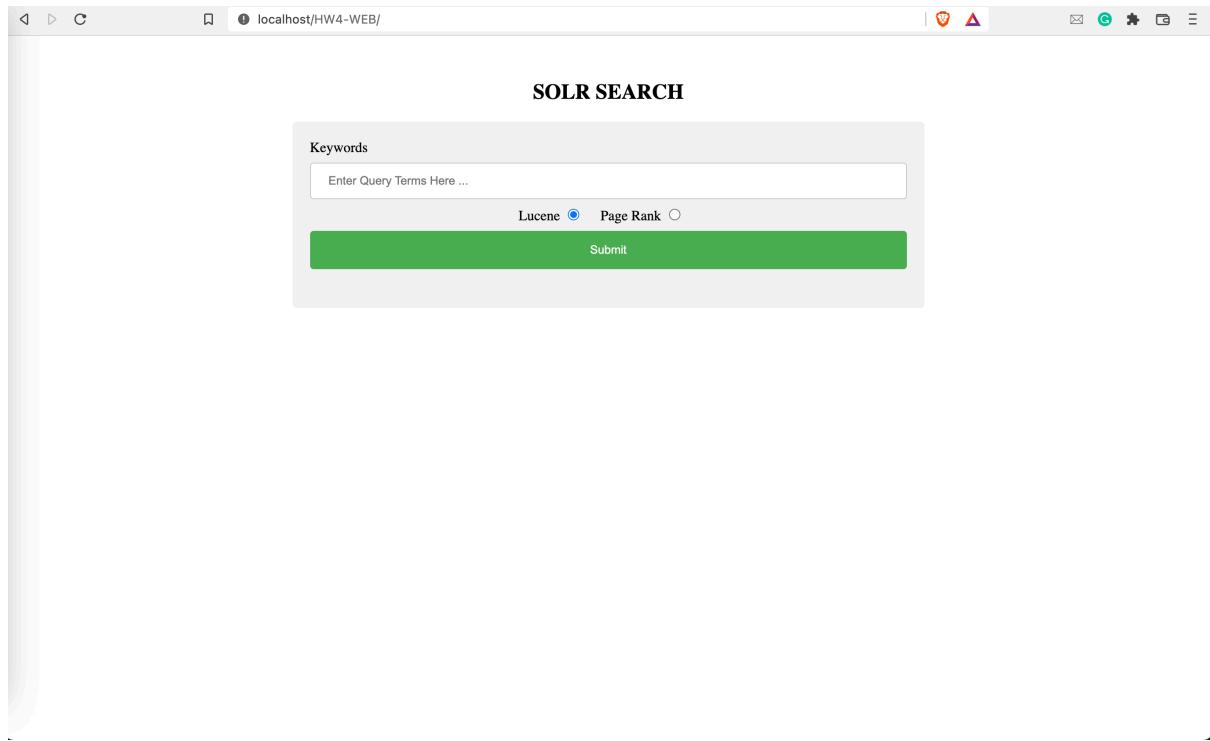
**B. Explanation regarding why some pages have higher PageRank values than others.**

Answer:

Page Rank is an algorithm that **counts the number and quality of links to a page** to get a general idea of the **page's importance**. The underlying assumption is that more important websites are likely to receive more links from other websites. There are multiple reasons why some pages have a higher PageRank values than others. Firstly, the number of links is important. The more links you have coming into a page (**inbound links**) the higher the PageRank will be. However, by just looking at the number of links to the page, one can anticipate incorrect/irrelevant results. It is evident that the parent and category pages will have a higher number of inbound links since a lot of child pages points to them. Therefore, Google/PageRank algorithm uses multiple parameters such as **high-quality information** (link authority and domain authority), and **logical structure** of the site, etc to compute the overall ranking of multiple pages. Link authority can be determined by the authority of the domain linking to a page. **Domain authority** is evaluated by looking at the number of links pointing to a page and the quality of those links. Links from pages with a high domain authority will have more weight than those from pages with a low domain authority. For instance, spam pages usually have a low domain authority thus ranked lower.

## C. FLOW DOCUMENT

### a. Screenshot of initial page where you enter the query in input box.



- User is required to enter something before clicking on the submit button, otherwise, an alert is shown which asks the user to type something before clicking on the submit button.
- Also, it can be seen in the screenshot, that by default **Lucene** is selected for the user.

## b. Screenshot of page which shows the results for Lucene(Default).

**SOLR SEARCH**

Keywords: Cannes

Lucene  Page Rank

Submit

Results: 1 - 10 of 144

**TITLE:** Cannes Film Festival - Los Angeles Times  
**URL:** <https://www.latimes.com/topic/cannes-film-festival>  
**ID:** /Users/shreyagupta/Documents/USC Classes/Spring 2022/CSCI-572/HW4/solr-7.7.3/..../LATIMES/latimes/570906ea-4a63-47eb-8982-b1d1c84c96dd.html  
**DESCRIPTION:** N/A

**TITLE:** Cannes: Times critics on everything you need to know about this year's festival - Los Angeles Times  
**URL:** <https://www.latimes.com/entertainment/movies/la-et-mn-cannes-wrap-critics-conversation-20190526-story.html>  
**ID:** /Users/shreyagupta/Documents/USC Classes/Spring 2022/CSCI-572/HW4/solr-7.7.3/..../LATIMES/latimes/26ca60fd-075d-428a-a569-648aa22f54a2.html  
**DESCRIPTION:** The 72nd Festival de Cannes featured new films by Quentin Tarantino and Terrence Malick, opened with Jim Jarmusch's "The Dead Don't Die" and ended with the Palme d'Or going to "Parasite," a thriller directed by South Korean filmmaker Bong Joon-ho.

**TITLE:** Cannes 2015: The full list of winners - Los Angeles Times  
**URL:** <https://www.latimes.com/entertainment/movies/movienews/la-et-mn-cannes-2015-winners-20150524-story.html>  
**ID:** /Users/shreyagupta/Documents/USC Classes/Spring 2022/CSCI-572/HW4/solr-7.7.3/..../LATIMES/latimes/d0b46307-f1ca-41b0-b801-dabbd9c99814.html  
**DESCRIPTION:** Director Jacques Audiard's film "Dheepan," a drama about three Tamil exiles trying to reconstruct their lives in France, has won the top prize at the Cannes Film Festival.

**TITLE:** Bong Joon-ho's 'Parasite' and Mati Diop's 'Atlantics' make history at Cannes Film Festival - Los Angeles Times  
**URL:** <https://www.latimes.com/entertainment/movies/la-et-mn-cannes-film-festival-award-winners-20190525-story.html>  
**ID:** /Users/shreyagupta/Documents/USC Classes/Spring 2022/CSCI-572/HW4/solr-7.7.3/..../LATIMES/latimes/b418851c-6897-4f78-bfcf-9c38b7154d7b.html  
**DESCRIPTION:** History was made and history repeated itself, albeit with a wicked twist, when Bong Joon-ho's "Parasite" won the Festival de Cannes' Palme d'Or on Saturday night.

**TITLE:** One thing the Cannes Film Festival jury got right: Bong Joon-ho's 'Parasite' victory - Los Angeles Times  
**URL:** <https://www.latimes.com/entertainment/movies/la-et-mn-cannes-parasite-atlantics-awards-20190526-story.html>  
**ID:** /Users/shreyagupta/Documents/USC Classes/Spring 2022/CSCI-572/HW4/solr-7.7.3/..../LATIMES/latimes/64e0e56-5191-4bc7-946a-2a71ad7cae42.html  
**DESCRIPTION:** Times critic Justin Chang is filing regular dispatches from the 72nd Cannes Film Festival, which runs May 14-25 in France.

**TITLE:** Quentin Tarantino gets testy at Cannes over question about women's roles in his films - Los Angeles Times  
**URL:** <https://www.latimes.com/entertainment/movies/la-et-mn-cannes-once-upon-a-time-in-hollywood-20190522-story.html>  
**ID:** /Users/shreyagupta/Documents/USC Classes/Spring 2022/CSCI-572/HW4/solr-7.7.3/..../LATIMES/latimes/643a9a12-ce31-41b6-98ff-f9359d9a75e6.html  
**DESCRIPTION:** There were plenty of hard questions Quentin Tarantino could have faced as he greeted reporters for the first time following the Cannes premiere of "Once Upon a Time ... in Hollywood."

**TITLE:** At Cannes, genre filmmaking from 'Parasite' to 'The Wild Goose Lake' turns heads - Los Angeles Times  
**URL:** <https://www.latimes.com/entertainment/movies/la-ca-mn-cannes-genre-parasite-wild-goose-lake-tarantino-20190522-story.html>  
**ID:** /Users/shreyagupta/Documents/USC Classes/Spring 2022/CSCI-572/HW4/solr-7.7.3/..../LATIMES/latimes/ae7753de-c381-4fe6-8ad7-9b75ea307d1.html  
**DESCRIPTION:** Times critic Justin Chang is filing regular dispatches from the 72nd annual Cannes Film Festival, which runs through Saturday in France.

**TITLE:** Review: Abdellatif Kechiche's 'Mektoub, My Love: Intermezzo' is the disaster of the Cannes Film Festival - Los Angeles Times  
**URL:** <https://www.latimes.com/entertainment/movies/la-et-mn-cannes-mektoub-my-love-intermezzo-abdellatif-kechiche-20190523-story.html>  
**ID:** /Users/shreyagupta/Documents/USC Classes/Spring 2022/CSCI-572/HW4/solr-7.7.3/..../LATIMES/latimes/6c8bb962d-9a2e-4eb1-9e39-0702f4c0a2bb.html  
**DESCRIPTION:** Times critic Justin Chang is filing regular dispatches from the 72nd Cannes Film Festival, which runs May 14-25 in France.

**TITLE:** Quentin Tarantino shocks Cannes again with epic 'Once Upon a Time ... in Hollywood' - Los Angeles Times  
**URL:** <https://www.latimes.com/entertainment/movies/la-et-mn-cannes-quentin-tarantino-once-upon-a-time-in-hollywood-20190521-story.html>  
**ID:** /Users/shreyagupta/Documents/USC Classes/Spring 2022/CSCI-572/HW4/solr-7.7.3/..../LATIMES/latimes/24290574-b025-4ef1-bdbf-76214af0d7fa6.html  
**DESCRIPTION:** Times critic Justin Chang is filing regular dispatches from the 72nd annual Cannes Film Festival, which runs May 14-25 in France.

**TITLE:** Robert Eggers, director of the smart and scary 'The Lighthouse,' sees comfort in horror - Los Angeles Times  
**URL:** <https://www.latimes.com/entertainment/movies/la-et-mn-cannes-robert-eggers-the-lighthouse-robert-pattinson-20190524-story.html>  
**ID:** /Users/shreyagupta/Documents/USC Classes/Spring 2022/CSCI-572/HW4/solr-7.7.3/..../LATIMES/latimes/92b6b8e6-e668-45ef-ace6-093cf812282d.html  
**DESCRIPTION:** "The Witch" director Robert Eggers' eerie new movie "The Lighthouse," with Robert Pattinson and Willem Dafoe, caused a sensation at the Cannes Film Festival.

- The above screenshots shows the top 10 ranked result for the keyword – *Cannes* by **Lucene**, our default ranking algorithm.

### c. Screenshot of page which shows the results for PageRank.

The screenshot shows a web browser window with the URL [localhost/HW4-WEB/?q=Cannes&rankingAlgorithm=pageRank](http://localhost/HW4-WEB/?q=Cannes&rankingAlgorithm=pageRank). The title bar says "SOLR SEARCH". The search interface includes a "Keywords" input field containing "Cannes", a radio button for "Lucene" (unchecked) and "Page Rank" (checked), and a green "Submit" button. Below the search form, it says "Results: 1 - 10 of 144". The main area displays ten search results, each in a separate box:

- TITLE:** Carrie Fisher: Over the edge and back in her first novel - Los Angeles Times  
**URL:** <https://www.latimes.com/entertainment/la-et-carrie-fisher-over-the-edge-and-back-19870731-story.html>  
**ID:** /Users/shreyagupta/Documents/USC Classes/Spring 2022/CSCI-572/HW4/solr-7.7.3/./LATIMES/latimes/87655b28-6c4c-4427-a129-2ba9bd41b51d.html  
**DESCRIPTION:** Actress and author Carrie Fisher, the child of two Hollywood icons who rose to fame as Princess Leia in the blockbuster "Star Wars" series, has died at age 60.
- TITLE:** Complete coverage: ASAP Rocky's arrest - Los Angeles Times  
**URL:** <https://www.latimes.com/entertainment-arts/story/2019-08-05/asap-rocky-arrest-in-sweden-coverage>  
**ID:** /Users/shreyagupta/Documents/USC Classes/Spring 2022/CSCI-572/HW4/solr-7.7.3/./LATIMES/latimes/65171416-6196-4b5d-bcb9-e541cdb94d85.html  
**DESCRIPTION:** U.S. rapper ASAP Rocky's arrest in Sweden has prompted endless coverage as celebrities and even President Trump got involved.
- TITLE:** Quentin Tarantino shocks Cannes again with epic 'Once Upon a Time ... in Hollywood' - Los Angeles Times  
**URL:** <https://www.latimes.com/entertainment/movies/la-et-mn-cannes-quentin-tarantino-once-upon-a-time-in-hollywood-20190521-story.html>  
**ID:** /Users/shreyagupta/Documents/USC Classes/Spring 2022/CSCI-572/HW4/solr-7.7.3/./LATIMES/latimes/24290574-b025-4e8f-bdfb-762f4a0d7fa6.html  
**DESCRIPTION:** Times critic Justin Chang is filing regular dispatches from the 72nd annual Cannes Film Festival, which runs May 14-25 in France.
- TITLE:** Best of Toronto Film Festival: 'Parasite' and more movies you need to know - Los Angeles Times  
**URL:** <https://www.latimes.com/entertainment-arts/movies/story/2019-09-13/toronto-film-festival-best-of-wrap-parasite>  
**ID:** /Users/shreyagupta/Documents/USC Classes/Spring 2022/CSCI-572/HW4/solr-7.7.3/./LATIMES/latimes/f265cf49-862e-42b5-aaa1-3a9bb6dd040d.html  
**DESCRIPTION:** L.A. Times writers Glenn Whipp and Justin Chang discuss their Toronto festival highlights including "Marriage Story," "Knives Out," "Uncut Gems" and "The Lighthouse."
- TITLE:** As Elton John tour continues, he talks 'Rocketman,' family and farewell - Los Angeles Times  
**URL:** <https://www.latimes.com/entertainment-arts/music/story/2019-10-14/elton-john-me-auto-biography-farewell-tour>  
**ID:** /Users/shreyagupta/Documents/USC Classes/Spring 2022/CSCI-572/HW4/solr-7.7.3/./LATIMES/latimes/9b1f4252-c941-4d6c-a202-deda5968dc38.html  
**DESCRIPTION:** Elton John's autobiography "Me" arrives on the heels of his smash farewell tour, "Rocketman" biopic and what can only be described as personal contentment.
- TITLE:** Robert Pattinson loves talking masturbation in 'The Lighthouse' - Los Angeles Times  
**URL:** <https://www.latimes.com/entertainment-arts/movies/story/2019-10-24/lighthouse-explained-robert-pattinson-willem-dafoe>  
**ID:** /Users/shreyagupta/Documents/USC Classes/Spring 2022/CSCI-572/HW4/solr-7.7.3/./LATIMES/latimes/af5446a3-252e-409-9010-0be506a67879.html  
**DESCRIPTION:** Sex dreams about mermaids, ill-tempered seagulls who seem possessed, flatulence employed as "deliberate displays of power." Robert Eggers' black-and-white thriller "The Lighthouse" has much to discuss.
- TITLE:** Blake Edwards dies at 88; 'Pink Panther' director was master of slapstick comedy - Los Angeles Times  
**URL:** <https://www.latimes.com/local/obituaries/la-me-blake-edwards-20101217-story.html>  
**ID:** /Users/shreyagupta/Documents/USC Classes/Spring 2022/CSCI-572/HW4/solr-7.7.3/./LATIMES/latimes/7fc0257f-60eb-4de5-bb9b-9f257037c545.html  
**DESCRIPTION:** Writer-director Blake Edwards was also known for his legendary disputes with studio chiefs. He collaborated in film with his wife, Julie Andrews, and his movie '10' was a cinematic sensation in 1979.
- TITLE:** Playboy founder Hugh Hefner, who shook up American morality with an ideal of swinging singlehood, dies at 91 - Los Angeles Times  
**URL:** <https://www.latimes.com/local/california/la-me-hugh-hefner-snap-story.html>  
**ID:** /Users/shreyagupta/Documents/USC Classes/Spring 2022/CSCI-572/HW4/solr-7.7.3/./LATIMES/latimes/2d2ad906-c744-4fdb-a790-c6450cdb8924.html  
**DESCRIPTION:** Hugh Hefner, the incurable playboy who built a publishing and entertainment empire on the idea that Americans should shed their puritanical hang-ups and enjoy sex, has died.
- TITLE:** 'The Studio' Author John Gregory Dunne Dies - Los Angeles Times  
**URL:** <https://www.latimes.com/archives/la-xpm-2003-dec-31-me-dunne31-story.html>  
**ID:** /Users/shreyagupta/Documents/USC Classes/Spring 2022/CSCI-572/HW4/solr-7.7.3/./LATIMES/latimes/0be8bd9f-26b0-40af-97e0-9a8c92ecd907.html  
**DESCRIPTION:** John Gregory Dunne, the journalist, screenwriter and novelist who chronicled the Hollywood movie industry in his book "The Studio," then went on to write for film, died unexpectedly Tuesday evening as he sat down to dinner with his wife, author Joan Didion.
- TITLE:** Celebrity developer pleads no contest to Bel-Air mega-mansion charges. But what happens to the 30,000-square-foot estate? - Los Angeles Times  
**URL:** <https://www.latimes.com/local/lanow/la-me-in-bel-air-building-20170530-htmlstory.html>  
**ID:** /Users/shreyagupta/Documents/USC Classes/Spring 2022/CSCI-572/HW4/solr-7.7.3/./LATIMES/latimes/3ec480e0-e26f-4419-91fd-f691a8f09011.html  
**DESCRIPTION:** N/A

- The above screenshots shows the top 10 ranked result for the keyword – *Cannes* by **PageRank**, which uses `external_pageRankFile` for ranking the html pages.

- d. Screenshot of the actual webpage that opens when clicking on one of the result's link.

The screenshot shows a web browser displaying the Los Angeles Times website at [latimes.com/entertainment/la-et-carrie-fisher-over-the-edge-and-back-19870731-story.html](https://latimes.com/entertainment/la-et-carrie-fisher-over-the-edge-and-back-19870731-story.html). The page title is "From the Archives: Carrie Fisher: Over the edge and back in her first novel". The main image is a portrait of actress Carrie Fisher. Below the image is a caption: "Actress Carrie Fisher. (Iris Schneider / Los Angeles Times)". To the left of the image are social sharing icons for Facebook, Twitter, and Email. The article is by Nikki Finke, published on July 31, 1987, at 1 AM PT. On the right side of the page, there are several sidebar links under "SUBSCRIBERS ARE READING" and "LATEST ENTERTAINMENT & ARTS".

- On clicking the top ranked result by PageRank, we got the above HTML page.

The screenshot shows a search interface titled "SOLR SEARCH". A search bar contains the keyword "Cannes". Below the search bar are two radio buttons: "Lucene" and "Page Rank", with "Page Rank" being selected. A green "Submit" button is below the search bar. At the bottom of the interface, it says "Results: 1 - 10 of 144". Below the interface, there is a box containing search results with the following details:

**TITLE:** Carrie Fisher: Over the edge and back in her first novel - Los Angeles Times  
**URL:** <https://www.latimes.com/entertainment/la-et-carrie-fisher-over-the-edge-and-back-19870731-story.html>  
**ID:** /Users/shreyagupta/Documents/USC Classes/Spring 2022/CSCI-572/HW4/solr-7.7.3/.LATIMES/latimes/87655b28-6c4c-4427-a129-2ba9bd41b51d.html  
**DESCRIPTION:** Actress and author Carrie Fisher, the child of two Hollywood icons who rose to fame as Princess Leia in the blockbuster "Star Wars" series, has died at age 60.

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

**1. Cannes**

Lucene	Page Rank
<a href="https://www.latimes.com/topic/cannes-film-festival">https://www.latimes.com/topic/cannes-film-festival</a>	<a href="https://www.latimes.com/entertainment/la-et-carrie-fisher-over-the-edge-and-back-19870731-story.html">https://www.latimes.com/entertainment/la-et-carrie-fisher-over-the-edge-and-back-19870731-story.html</a>
<a href="https://www.latimes.com/entertainment/movies/la-et-mn-cannes-wrap-critics-conversation-20190526-story.html">https://www.latimes.com/entertainment/movies/la-et-mn-cannes-wrap-critics-conversation-20190526-story.html</a>	<a href="https://www.latimes.com/entertainment-arts/story/2019-08-05/asap-rocky-arrest-in-sweden-coverage">https://www.latimes.com/entertainment-arts/story/2019-08-05/asap-rocky-arrest-in-sweden-coverage</a>
<a href="https://www.latimes.com/entertainment/movies/moviesnow/la-et-mn-cannes-2015-winners-20150524-story.html">https://www.latimes.com/entertainment/movies/moviesnow/la-et-mn-cannes-2015-winners-20150524-story.html</a>	<a href="https://www.latimes.com/entertainment/movies/la-et-mn-cannes-quentin-tarantino-once-upon-a-time-in-hollywood-20190521-story.html">https://www.latimes.com/entertainment/movies/la-et-mn-cannes-quentin-tarantino-once-upon-a-time-in-hollywood-20190521-story.html</a>
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<a href="https://www.latimes.com/opinion/story/2019-11-06/trump-republicans-democrats-predictions-polling-2020">https://www.latimes.com/opinion/story/2019-11-06/trump-republicans-democrats-predictions-polling-2020</a>	<a href="https://www.latimes.com/opinion/opinion-la/la-ol-opinion-newsletter-brexit-20160625-snap-htmlstory.html">https://www.latimes.com/opinion/opinion-la/la-ol-opinion-newsletter-brexit-20160625-snap-htmlstory.html</a>
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## 6. Senate

Lucene	Page Rank
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<a href="https://www.latimes.com/politics/story/2019-10-30/california-donors-spend-millions-on-2020-senate-races-across-the-country">https://www.latimes.com/politics/story/2019-10-30/california-donors-spend-millions-on-2020-senate-races-across-the-country</a>	<a href="https://www.latimes.com/politics/la-na-pol-congress-obamacare-repeal-20170113-story.html">https://www.latimes.com/politics/la-na-pol-congress-obamacare-repeal-20170113-story.html</a>
<a href="https://www.latimes.com/politics/story/2019-10-04/vulnerable-senate-republicans-impeachment">https://www.latimes.com/politics/story/2019-10-04/vulnerable-senate-republicans-impeachment</a>	<a href="https://www.latimes.com/opinion/op-ed/la-ol-patt-morrison-daniel-dale-trump-toronto-star-20190529-htmlstory.html">https://www.latimes.com/opinion/op-ed/la-ol-patt-morrison-daniel-dale-trump-toronto-star-20190529-htmlstory.html</a>
<a href="https://www.latimes.com/politics/la-na-pol-kavanaugh-hearing-20180927-story.html">https://www.latimes.com/politics/la-na-pol-kavanaugh-hearing-20180927-story.html</a>	<a href="https://www.latimes.com/opinion/livable-city/la-ol-public-transit-freeway-traffic-20151117-story.html">https://www.latimes.com/opinion/livable-city/la-ol-public-transit-freeway-traffic-20151117-story.html</a>
<a href="https://www.latimes.com/nation/la-pol-scotus-confirmation-votes-over-the-years-20181005-htmlstory.html">https://www.latimes.com/nation/la-pol-scotus-confirmation-votes-over-the-years-20181005-htmlstory.html</a>	<a href="https://www.latimes.com/local/lanow/la-me-ln-ed-buck-west-hollywood-death-20190107-story.html">https://www.latimes.com/local/lanow/la-me-ln-ed-buck-west-hollywood-death-20190107-story.html</a>
<a href="https://www.latimes.com/politics/story/2019-08-14/2020-senate-control-presidential-race">https://www.latimes.com/politics/story/2019-08-14/2020-senate-control-presidential-race</a>	<a href="https://www.latimes.com/opinion/story/2019-11-01/should-uc-stop-considering-sat-and-act-scores-in-admissions">https://www.latimes.com/opinion/story/2019-11-01/should-uc-stop-considering-sat-and-act-scores-in-admissions</a>
<a href="https://www.latimes.com/politics/story/2019-08-14/john-hickenlooper-quits-presidential-race-for-senate-run">https://www.latimes.com/politics/story/2019-08-14/john-hickenlooper-quits-presidential-race-for-senate-run</a>	<a href="https://www.latimes.com/opinion/livable-city/la-ol-shoup-dtla-parking-cash-out-20170328-story.html">https://www.latimes.com/opinion/livable-city/la-ol-shoup-dtla-parking-cash-out-20170328-story.html</a>
<a href="https://www.latimes.com/politics/story/2019-10-30/california-donors-spend-millions-on-2020-senate-races-across-the-country">https://www.latimes.com/politics/story/2019-10-30/california-donors-spend-millions-on-2020-senate-races-across-the-country</a>	<a href="https://www.latimes.com/entertainment-arts/story/2019-10-03/trumps-impeachment-inquiry-watergate-tv-spectacle-whistleblower">https://www.latimes.com/entertainment-arts/story/2019-10-03/trumps-impeachment-inquiry-watergate-tv-spectacle-whistleblower</a>
<a href="https://www.latimes.com/politics/la-na-pol-william-barr-senate-confirm-attorney-general-20190214-story.html">https://www.latimes.com/politics/la-na-pol-william-barr-senate-confirm-attorney-general-20190214-story.html</a>	<a href="https://www.latimes.com/opinion/livable-city/la-oe-babin-bicycle-laws-20161003-snap-story.html">https://www.latimes.com/opinion/livable-city/la-oe-babin-bicycle-laws-20161003-snap-story.html</a>
<a href="https://www.latimes.com/opinion/story/2019-10-15/wmcaleen-homeland-security-trump-nielsen-senate-acting-secretary">https://www.latimes.com/opinion/story/2019-10-15/wmcaleen-homeland-security-trump-nielsen-senate-acting-secretary</a>	<a href="https://www.latimes.com/opinion/story/2019-10-18/sondland-mulvaney-trump-ukraine-quid-pro-quo">https://www.latimes.com/opinion/story/2019-10-18/sondland-mulvaney-trump-ukraine-quid-pro-quo</a>

## 7. *Olympics 2020*

Lucene	Page Rank
<a href="https://www.latimes.com/sports/olympics/story/2019-08-15/2020-tokyo-olympics-searching-for-answers-amid-heat-wave">https://www.latimes.com/sports/olympics/story/2019-08-15/2020-tokyo-olympics-searching-for-answers-amid-heat-wave</a>	<a href="https://www.latimes.com/fashion/la-ig-louis-vuitton-mens-collection-michael-jackson-leaving-neverland-20190315-story.html">https://www.latimes.com/fashion/la-ig-louis-vuitton-mens-collection-michael-jackson-leaving-neverland-20190315-story.html</a>
<a href="https://www.latimes.com/sports/olympics">https://www.latimes.com/sports/olympics</a>	<a href="https://www.latimes.com/entertainment-arts/story/2019-11-02/5-games-afterparty-luigis-mansion-3-the-outer-worlds-must-play-games">https://www.latimes.com/entertainment-arts/story/2019-11-02/5-games-afterparty-luigis-mansion-3-the-outer-worlds-must-play-games</a>
<a href="https://www.latimes.com/people/david-wharton">https://www.latimes.com/people/david-wharton</a>	<a href="https://www.latimes.com/topic/la-affairs">https://www.latimes.com/topic/la-affairs</a>
<a href="https://www.latimes.com/people/david-wharton">https://www.latimes.com/people/david-wharton</a>	<a href="https://www.latimes.com/politics/la-na-pol-congress-obamacare-repeal-20170113-story.html">https://www.latimes.com/politics/la-na-pol-congress-obamacare-repeal-20170113-story.html</a>
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<a href="https://www.latimes.com/sports/olympics/story/2019-07-31/deadly-heat-wave-2020-summer-olympics-tokyo">https://www.latimes.com/sports/olympics/story/2019-07-31/deadly-heat-wave-2020-summer-olympics-tokyo</a>	<a href="https://www.latimes.com/people/andrea-castillo">https://www.latimes.com/people/andrea-castillo</a>
<a href="https://www.latimes.com/sports/story/2019-11-05/ioc-anti-doping-2020-tokyo-olympics">https://www.latimes.com/sports/story/2019-11-05/ioc-anti-doping-2020-tokyo-olympics</a>	<a href="https://www.latimes.com/entertainment-arts/music/story/2019-08-21/dueto-dos-rosas-viva-pomona">https://www.latimes.com/entertainment-arts/music/story/2019-08-21/dueto-dos-rosas-viva-pomona</a>
<a href="https://www.latimes.com/sports/olympics/story/2019-10-10/naomi-osaka-chooses-japan-over-u-s-2020-tokyo-olympics">https://www.latimes.com/sports/olympics/story/2019-10-10/naomi-osaka-chooses-japan-over-u-s-2020-tokyo-olympics</a>	<a href="https://www.latimes.com/politics/story/2019-09-10/what-time-democratic-debate-who-is-on-stage">https://www.latimes.com/politics/story/2019-09-10/what-time-democratic-debate-who-is-on-stage</a>
<a href="https://www.latimes.com/sports/story/2019-07-23/tokyos-rough-road-to-2020-summer-olympics">https://www.latimes.com/sports/story/2019-07-23/tokyos-rough-road-to-2020-summer-olympics</a>	<a href="https://www.latimes.com/opinion/op-ed/la-ol-patt-morrison-daniel-dale-trump-toronto-star-20190529-htmlstory.html">https://www.latimes.com/opinion/op-ed/la-ol-patt-morrison-daniel-dale-trump-toronto-star-20190529-htmlstory.html</a>
<a href="https://www.latimes.com/people/david-wharton">https://www.latimes.com/people/david-wharton</a>	<a href="https://www.latimes.com/sports/ucla">https://www.latimes.com/sports/ucla</a>

## 8. Stock

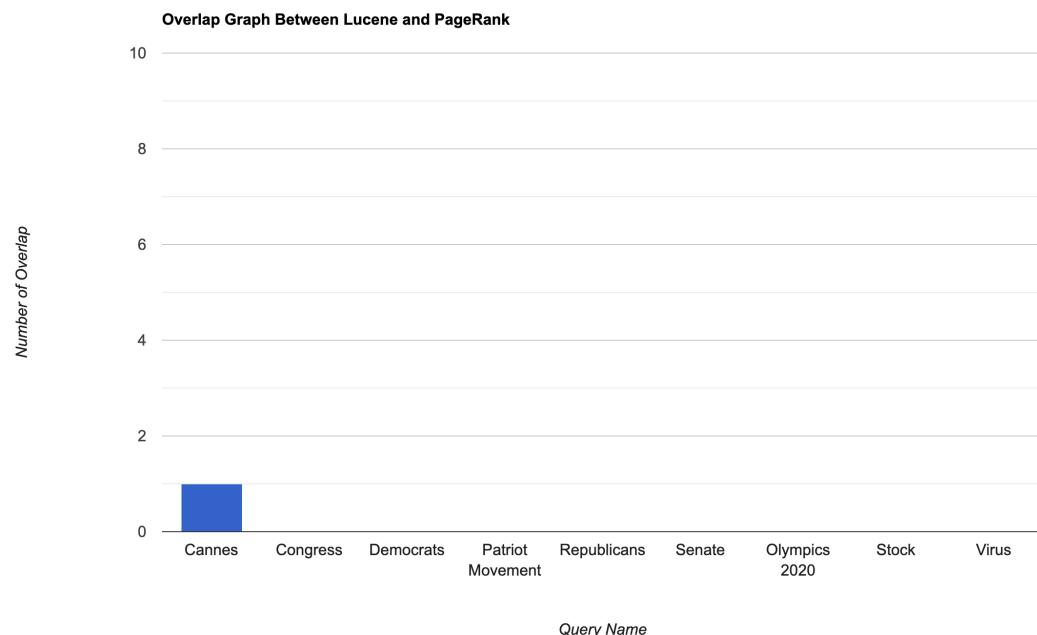
Lucene	Page Rank
<a href="https://www.latimes.com/business/story/2019-11-06/uber-lock-up-period-ends-with-falling-stock-protests">https://www.latimes.com/business/story/2019-11-06/uber-lock-up-period-ends-with-falling-stock-protests</a>	<a href="https://www.latimes.com/business/story/2019-11-01/google-to-buy-fitness-wearables-giant-fitbit-for-about-2-1-billion">https://www.latimes.com/business/story/2019-11-01/google-to-buy-fitness-wearables-giant-fitbit-for-about-2-1-billion</a>
<a href="https://www.latimes.com/business/la-fi-lyft-stock-20190401-story.html">https://www.latimes.com/business/la-fi-lyft-stock-20190401-story.html</a>	<a href="https://www.latimes.com/business/la-fi-affordable-housing-transit-zoning-20190526-story.html">https://www.latimes.com/business/la-fi-affordable-housing-transit-zoning-20190526-story.html</a>
<a href="https://www.latimes.com/business/la-fi-hy-tesla-stock-20160518-snap-story.html">https://www.latimes.com/business/la-fi-hy-tesla-stock-20160518-snap-story.html</a>	<a href="https://www.latimes.com/business/story/2019-08-23/trump-employer-health-insurance">https://www.latimes.com/business/story/2019-08-23/trump-employer-health-insurance</a>
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<a href="https://www.latimes.com/business/la-fi-stock-market-correction-20180212-story.html">https://www.latimes.com/business/la-fi-stock-market-correction-20180212-story.html</a>	<a href="https://www.latimes.com/business/story/2019-08-30/the-definitive-story-on-kacey-musgraves-and-toms-one-hour-photo">https://www.latimes.com/business/story/2019-08-30/the-definitive-story-on-kacey-musgraves-and-toms-one-hour-photo</a>
<a href="https://www.latimes.com/business/story/2019-11-09/stock-managers-who-played-defense-in-2019-are-left-scrambling-to-make-up-ground">https://www.latimes.com/business/story/2019-11-09/stock-managers-who-played-defense-in-2019-are-left-scrambling-to-make-up-ground</a>	<a href="https://www.latimes.com/sitemap/1995/1">https://www.latimes.com/sitemap/1995/1</a>

## 9. Virus

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<a href="https://www.latimes.com/espanol/internacional/articulo/2019-11-09/monos-se-volvieron-inmunes-tras-inocularles-virus-del-ebola-con-mutacion">https://www.latimes.com/espanol/internacional/articulo/2019-11-09/monos-se-volvieron-inmunes-tras-inocularles-virus-del-ebola-con-mutacion</a>	<a href="https://www.latimes.com/topic/health">https://www.latimes.com/topic/health</a>
<a href="https://www.latimes.com/science/sciencenow/la-science-of-zika-five-ways-20160223-htmlstory.html">https://www.latimes.com/science/sciencenow/la-science-of-zika-five-ways-20160223-htmlstory.html</a>	<a href="https://www.latimes.com/sitemap/1995/1">https://www.latimes.com/sitemap/1995/1</a>
<a href="https://www.latimes.com/espanol/internacional/articulo/2019-11-09/monos-se-volvieron-inmunes-tras-inocularles-virus-del-ebola-con-mutacion">https://www.latimes.com/espanol/internacional/articulo/2019-11-09/monos-se-volvieron-inmunes-tras-inocularles-virus-del-ebola-con-mutacion</a>	<a href="https://www.latimes.com/food/story/2019-10-25/plenty-vertical-farm-compton">https://www.latimes.com/food/story/2019-10-25/plenty-vertical-farm-compton</a>
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<a href="https://www.latimes.com/science/sciencenow/la-sci-sn-acute-flaccid-myelitis-polio-20181017-story.html">https://www.latimes.com/science/sciencenow/la-sci-sn-acute-flaccid-myelitis-polio-20181017-story.html</a>	<a href="https://www.latimes.com/espanol/internacional/articulo/2019-11-07/ozuna-te-seguira-hasta-que-salga-el-sol">https://www.latimes.com/espanol/internacional/articulo/2019-11-07/ozuna-te-seguira-hasta-que-salga-el-sol</a>
<a href="https://www.latimes.com/local/lanow/la-me-ln-virulent-newcastle-disease-outbreak-in-southern-california-20190607-story.html">https://www.latimes.com/local/lanow/la-me-ln-virulent-newcastle-disease-outbreak-in-southern-california-20190607-story.html</a>	<a href="https://www.latimes.com/topic/medicine">https://www.latimes.com/topic/medicine</a>
<a href="https://www.latimes.com/world-nation/story/2019-09-04/anti-vaxxers-helping-polio-comeback-pakistan">https://www.latimes.com/world-nation/story/2019-09-04/anti-vaxxers-helping-polio-comeback-pakistan</a>	<a href="https://www.latimes.com/people/soumya-karlamangla">https://www.latimes.com/people/soumya-karlamangla</a>
<a href="https://www.latimes.com/local/obituaries/la-me-deborah-asnis-20150921-story.html">https://www.latimes.com/local/obituaries/la-me-deborah-asnis-20150921-story.html</a>	<a href="https://www.latimes.com/espanol/internacional/articulo/2019-11-02/mazda-muestra-en-el-auto-show-de-tokio-su-primer-vehiculo-electrico">https://www.latimes.com/espanol/internacional/articulo/2019-11-02/mazda-muestra-en-el-auto-show-de-tokio-su-primer-vehiculo-electrico</a>

**E. An overlap graph showing the amount of overlap between the two ranking strategies for all queries.**

Answer:



Query Name/Keywords	Number of Overlaps
Cannes	1
Congress	0
Democrats	0
Patriot Movement	0
Republicans	0
Senate	0
Olympics 2020	0
Stock	0
Virus	0