Project: Wiki Article Relevance Ranking **LINK TO GITHUB REPOSITORY**

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Overview

This project aims to rank wiki articles based on their relevance to a given query of user-visited sites. The algorithm follows several steps to achieve this, including scoring articles and presenting recommendations.

Algorithm Explanation

Step 1: Data Collection

We collected data on user-visited sites and a random set of wiki articles. The dataset includes user interactions with wiki articles.

```
import requests
response = requests.get(link if link else
"https://en.wikipedia.org/wiki/Special:Random")
```

We store retrieved wiki articles in `{link: article_text}` python dictionary and later save it to csv.

```
dict_of_pages[retrieved_link] = article_text
```

Step 2: Preprocessing

- **Text Cleaning:** Removed stop words, punctuation, and performed lemmatization.

```
def preprocess_text(self, text):
    words = word_tokenize(text)
    words = [word.lower() for word in words if word.isalpha()]

    stop_words = set(stopwords.words("english"))
    words = [word for word in words if word not in stop_words]

    words = [PorterStemmer().stem(WordNetLemmatizer().lemmatize(word))
                for word in words]
    return " ".join(words)
```

- **TF-IDF Vectorization:** Converted text data into numerical vectors using TF-IDF representation.

```
def tf_idf(self):
    """
    Implements the TF-IDF algorithm.
    """
    vectorizer = TfidfVectorizer()

    scrapped_articles_keys, scrapped_articles_values = zip(
        *self.scrapped_articles.items())
    scrapped_articles_vectorized = vectorizer.fit_transform(
        scrapped_articles_values)

    visited_articles_keys, visited_articles_values = zip(
        *self.visited_articles.items())
    visited_articles_vectorized = vectorizer.transform(
        visited_articles_values)

    return vectorizer, (visited_articles_keys, visited_articles_vectorized),
(scrapped_articles_keys, scrapped_articles_vectorized)
```

Step 3: Scoring Articles

- **Cosine Similarity:** Computed the cosine similarity between the TF-IDF vectors of articles and user queries.

```
vectorizer, (query_keys, query_vals), (scrap_keys, scrap_vals) = self.tf_idf()
similarities = cosine_similarity(scrap_vals, query_vals)
similarities = np.mean(similarities, axis=1)
```

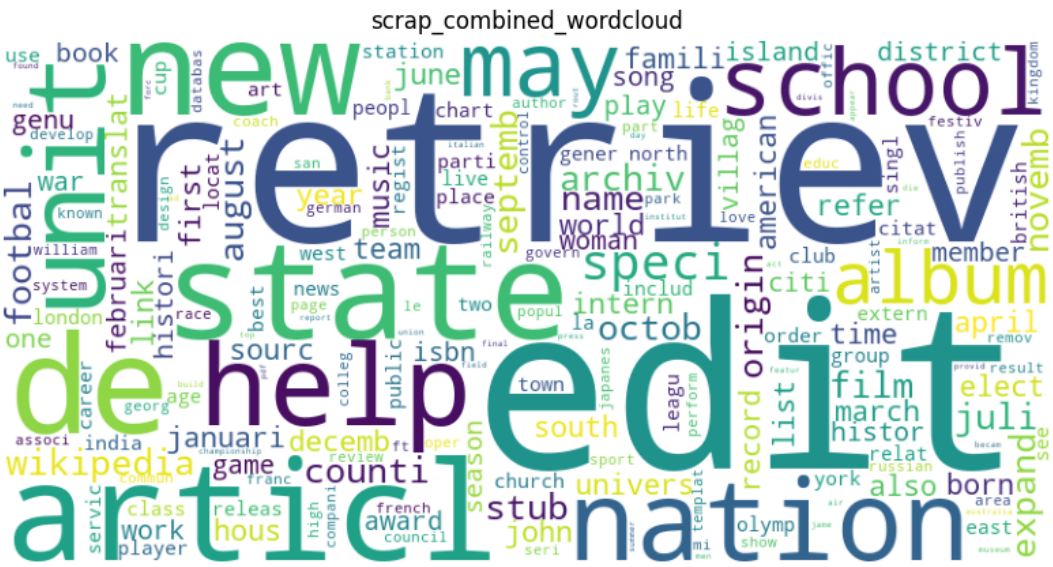
Step 4: Ranking

- **Weighted Sum:** Combined the cosine similarity score and user site weight to rank articles.

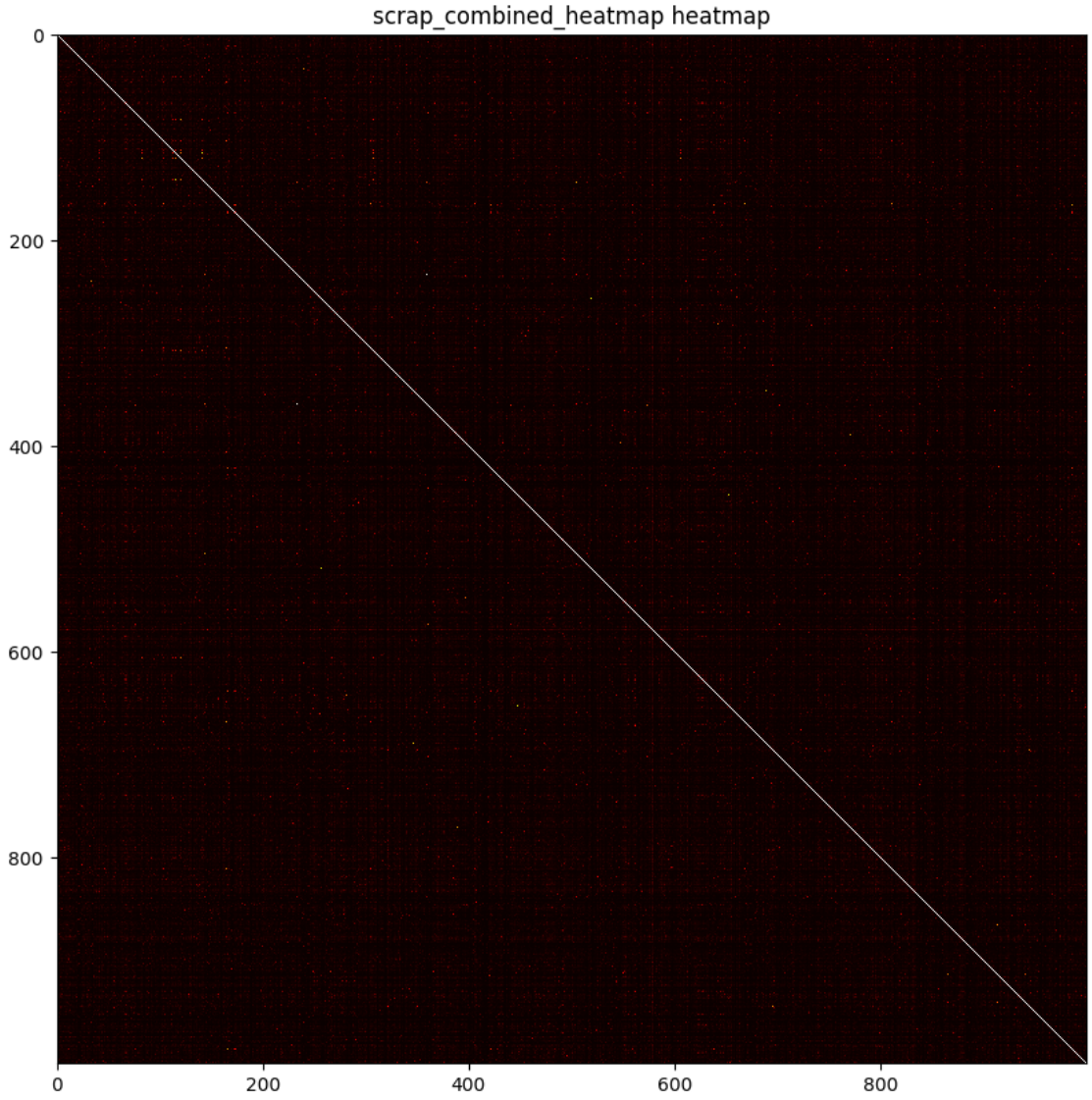
```
scrapped_files_ranking = {url: similarities[idx] for idx, url in
enumerate(scrap_keys)}
sorted_ranking = sorted(scrapped_files_ranking.items(), key=lambda x: x[1],
reverse=True)
```

Database Statistics

Most Frequent Words



Document Similarities

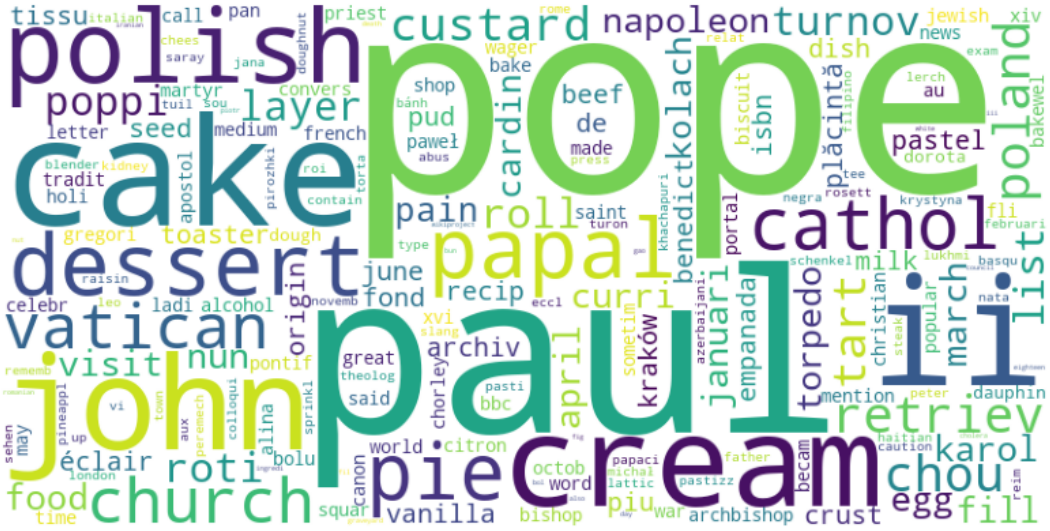


Examples of Recommendations

Recommendation 1

Query: [https://en.wikipedia.org/wiki/Pope_John_Paul_II, https://en.wikipedia.org/wiki/Napoleonka]

query_combined_wordcloud

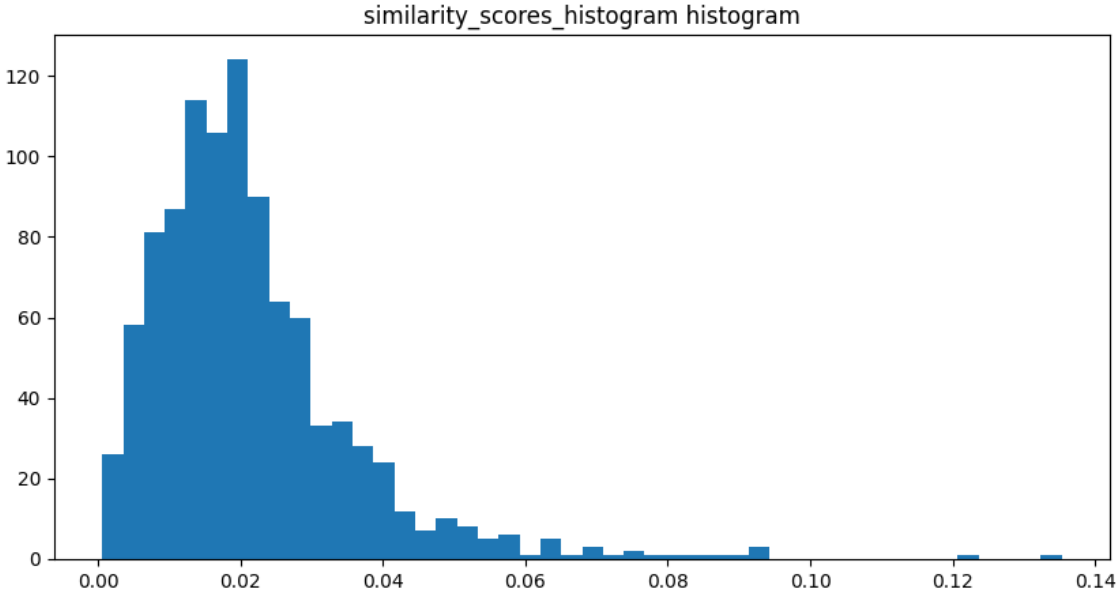


Top 5 Articles:

rank	scores	articles
1	Marie Gaudin	0.13535992551329262
2	Counter-Reformation in Poland	0.1222157785328554
3	Denis James	0.09376063456685456
4	Reformed Christian Church in Slovakia	0.09254415614548352
5	Kati roll	0.0920150110730178

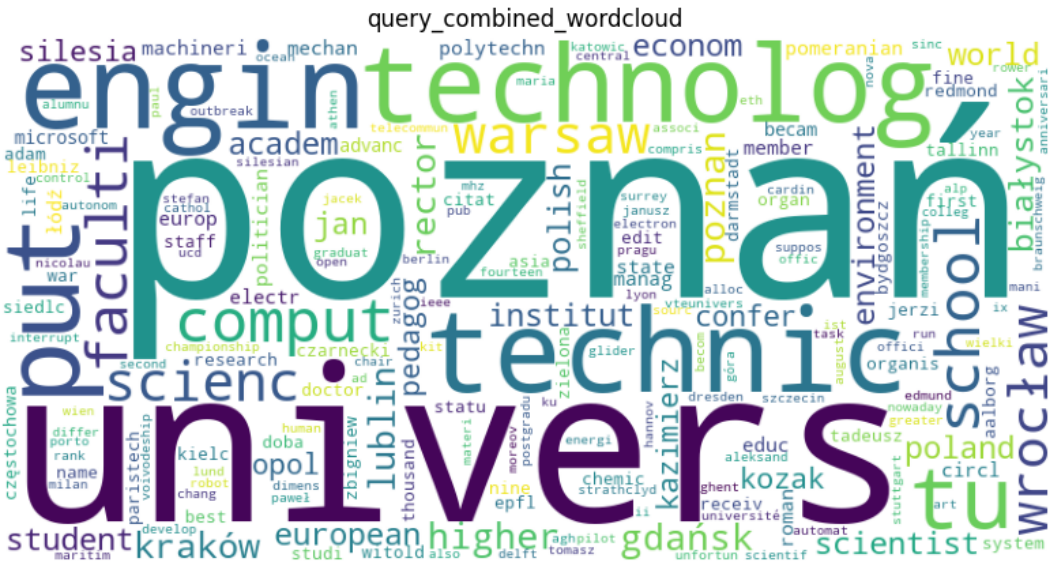
1	2	3	4	5
				

Article Relevance Score Histogram:



Recommendation 2

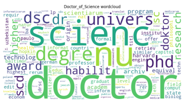
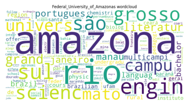
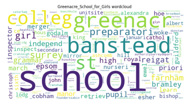
Query: [https://en.wikipedia.org/wiki/Pozna%C5%84_University_of_Technology]



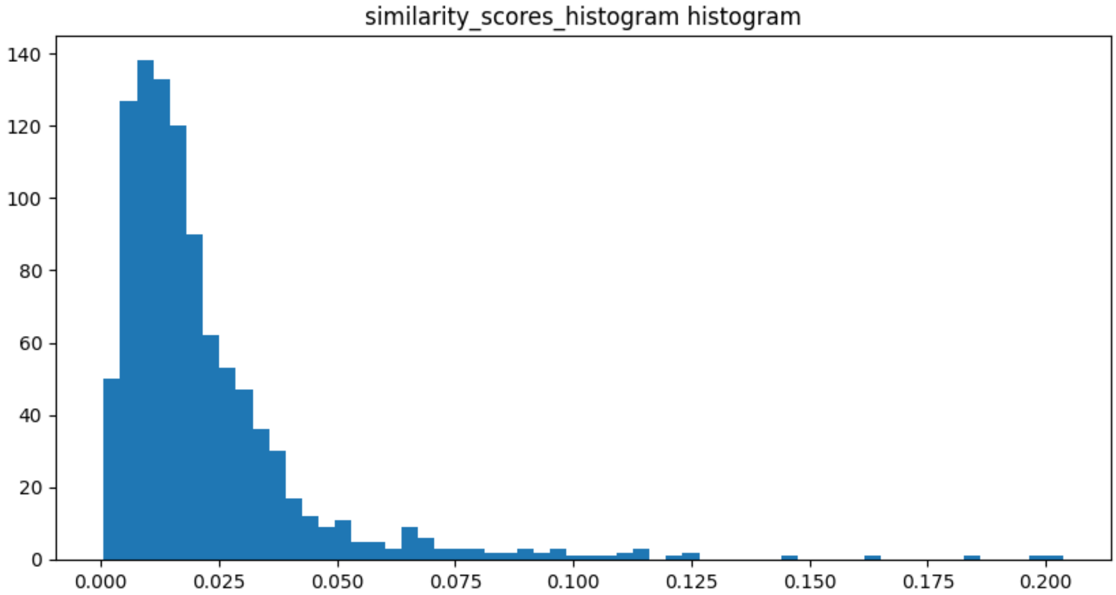
Top 5 Articles:

rank	scores	articles
1	Doctor of Science	0.2036485745710449
2	Transitional Justice Institute	0.1976957705688441
3	Federal University of Amazonas	0.18533330819579824
4	Education in Kazakhstan	0.16196265726197498

rank	scores	articles
5	Greenacre School for Girls	0.1452812849746801

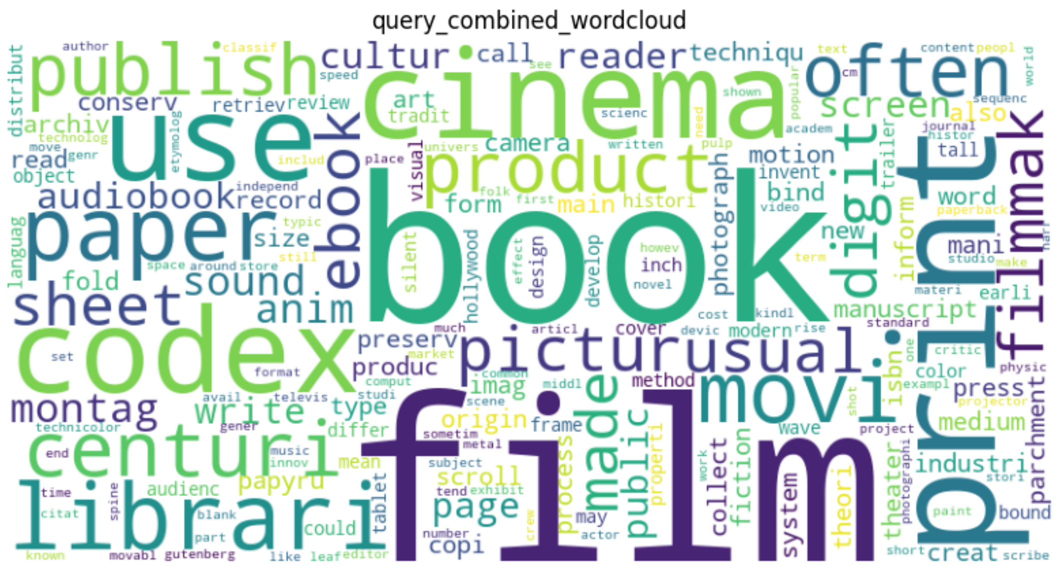
1	2	3	4	5
				

Article Relevance Score Histogram:



Recommendation 3

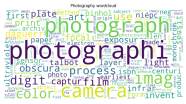
Query: [https://en.wikipedia.org/wiki/Film, https://en.wikipedia.org/wiki/Book]



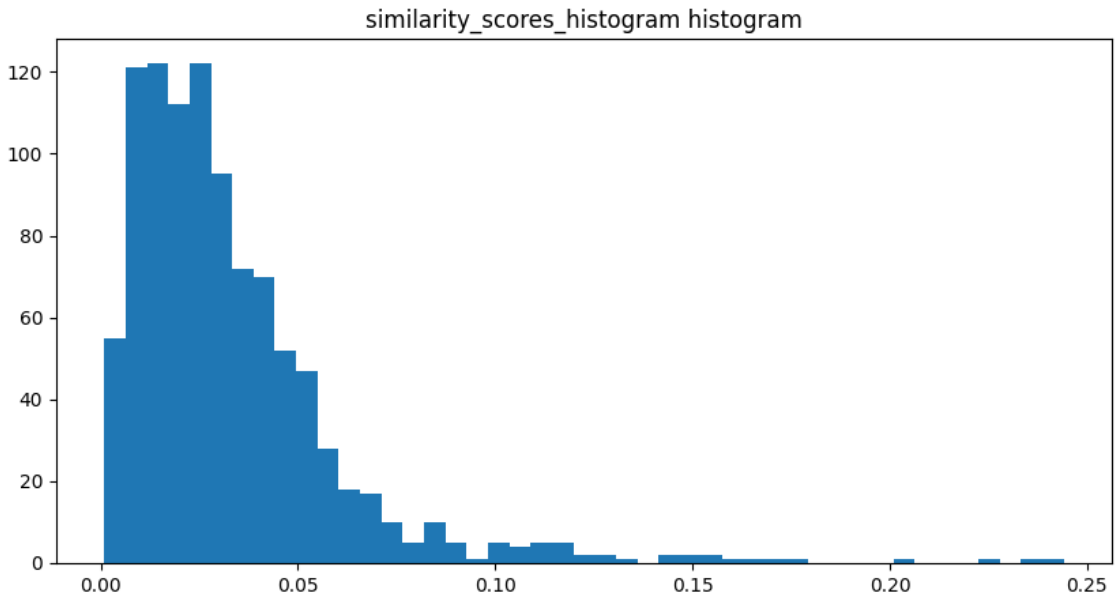
Top 5 Articles:

rank	scores	articles
1	Mahmoud Kalari	0.2441152496813287
2	BoPET	0.23662166286408362
3	Photography	0.2262585429467926
4	Summer Vacation 1999	0.20454218564508336
5	Last Day of Freedom	0.17759446401175358

1	2	3	4	5



Article Relevance Score Histogram:



Conclusion

This project successfully ranks wiki articles based on relevance to user queries and visited sites. The algorithm's effectiveness is demonstrated through statistical analysis and examples of recommendations.