

# Assessing Racial Bias in Media: A New Approach with a Localized Database and Scoring Function

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## Abstract

Media biases are often seen as neutral facts and tend to go unnoticed by the public. These biases can subtly influence how people view various social issues, leading to hasty conclusions. The negative impacts of media bias are especially apparent today, as they can fuel racial hatred and contribute to hate crimes. Readers need to recognize racial bias in articles before engaging with them, as this awareness can lead to a more objective understanding of race-related topics. To address this need, I realized the importance of developing a program to evaluate the level of media bias in race-focused news articles. This paper aims to fill that gap by introducing a localized database created through a detailed review of hundreds of race-related articles. This unique database will enable more thorough assessments of racial bias in the media. Additionally, I have developed a specialized scoring function to evaluate media bias related to racism. This function combines scores from the local database with tf-idf values, allowing the program to accurately measure bias in articles that address sensitive racial issues.

## Keywords

Media Bias, Racial Hatred, Race-related Topics, Database. TF-IDF

## Introduction

Racial equality is essential for fostering social justice, ensuring that all individuals have the same rights

and opportunities regardless of their race. It forms the foundation of a fair society where discrimination and prejudice are actively challenged. When people are treated equally, they can fully participate in their communities, contributing to a more just and equitable world[1].

Moreover, promoting racial equality has significant economic benefits. A diverse workforce, enriched by various perspectives and experiences, drives innovation and creativity. When individuals from all racial backgrounds have access to education and employment opportunities, it leads to a more dynamic economy. This inclusivity not only enhances productivity but also helps in addressing skill gaps in the labor market.

In addition, racial equality contributes to social cohesion and stability. When people feel valued and respected, it fosters a sense of belonging and reduces tensions within communities. Representation matters; diverse voices in decision-making processes ensure that policies reflect the needs of all citizens. By embracing racial equality, society can cultivate a culture of understanding and respect, enriching the social fabric and promoting a more harmonious coexistence.

News bias refers to the tendency of journalists and media organizations to present information in a way that promotes a particular viewpoint or ideology. This bias can manifest through the selection of stories, the framing of issues, and the language used in reporting. For instance, a news outlet might emphasize certain events while ignoring others, thereby shaping the narrative to align with its biases [2]. This selective reporting can significantly influence public perception and understanding of important issues.

Framing is another critical aspect of news bias, where the presentation of a story impacts how audiences interpret it. The choice of images, headlines, and the overall tone can sway opinions, often favoring one perspective over another. For example, a report on a protest may describe it as a "rally for justice" in one outlet and a "violent demonstration" in another,

leading to differing perceptions of the same event. Such framing can reinforce existing beliefs and contribute to polarization among audiences.

Moreover, source bias plays a significant role in shaping news coverage. Journalists may rely on specific experts or activists that align with their outlet's stance, which can create a skewed representation of facts. This reliance on like-minded sources can further entrench biases, as audiences may receive a narrow view of complex issues. To combat news bias, it's essential for consumers to seek diverse perspectives and critically evaluate the sources of their information, fostering a more nuanced understanding of current events.

Racial bias in news reporting is a significant issue that can perpetuate stereotypes, reinforce systemic inequalities, and shape public perception of different racial and ethnic groups. One of the main ways this bias manifest is through the selective coverage of crime stories. For instance, studies have shown that media outlets often disproportionately emphasize the race of suspects when they are Black or Brown, while downplaying or omitting the race of White suspects. This selective reporting can contribute to harmful stereotypes and skew public perceptions about crime and race.

Another area where racial bias is evident is in the framing of news stories. The language used to describe individuals from different racial backgrounds can vary significantly, influencing how audiences perceive their actions. For example, Black individuals may be described as "aggressive" or "violent," while White individuals might be characterized as "troubled" or "misguided." Such framing not only shapes narratives but also perpetuates existing biases and prejudices in society.

Additionally, the lack of diversity within newsrooms can exacerbate racial bias in reporting. When the workforce lacks representation, the stories told may not reflect the complexities of different communities. This can lead to a narrow understanding of issues affecting marginalized groups and a failure to address their perspectives. To combat racial bias in news, media organizations must prioritize diverse hiring practices, actively challenge stereotypes, and strive for more inclusive and accurate representations in their reporting.

However, biases are hard to detect by the naive readers - who believe in the purity of intent in the authors of articles manually.

In this paper, the proposed system enables the readers to notice the bias in the news based on the reasonable score function. Another contributing point is that the database related to the bias is locally constructed based on the racial research. Also the system returns the keywords and recommends similar articles adopting TF-IDF and the recommendation system. for the readers in the aspect of efficient search.

In chapter II, the main method TF-IDF and recommendation system is described. Explanation of the proposed system is followed in chapter III. In chapter IV, evaluation and implementation description is introduced. Finally, the paper concludes with the future works in chapter V.

## Related work

### A. TF-IDF

TF-IDF, or Term Frequency-Inverse Document Frequency, is a numerical statistic used in information retrieval and text mining to evaluate the importance of a word in a

document relative to a collection of documents (corpus)[3]. It helps identify the significance of terms in a given context, balancing frequency and rarity. There are 2 components:

#### 1. Term Frequency (TF):

This measures how often a term appears in a document compared to the total number of terms in that document. The idea is that the more a term appears, the more important it may be within that document.

$$TF(t,d)=$$

Total number of terms in document  $d$  /  
Number of times term  $t$  appears in document  $d$

#### 2. Inverse Document Frequency (IDF):

This assesses the importance of a term across the entire corpus. A term that appears in many documents is less significant than one that appears in fewer documents.

$$IDF(t,D)=$$

$\log$  (Total number of documents in corpus  $D$  /  
Number of documents containing term  $t$  )

The TF-IDF score is calculated by multiplying TF and IDF:

$$TF-IDF(t,d,D)=TF(t,d)\times IDF(t,D)$$

TF-IDF is widely used in various applications, including: Search engines- To rank documents based on query relevance, Text classification- To identify key features in documents, and Recommender systems- To analyze user preferences in text data Overall, TF-IDF

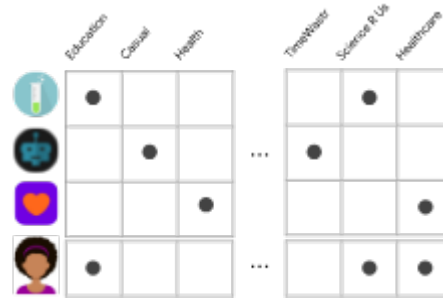
provides a way to quantify the relevance of terms, helping to improve information retrieval and text analysis.

## B. Recommendation system

A recommendation system is a tool designed to suggest products, services, or content to users based on various factors, including user preferences, behavior, and demographic information. These systems are widely used in online platforms, such as e-commerce sites, streaming services, and social media, to enhance user experience and engagement. By analyzing user data, recommendation systems can personalize the content delivered to each individual, helping them discover items they might not have found otherwise.

There are several approaches to building recommendation systems, with the most common being collaborative filtering, content-based filtering, and hybrid methods. Collaborative filtering relies on the preferences and behaviors of similar users to make recommendations. For example, if two users have rated several movies similarly, a movie that one user enjoyed could be recommended to the other. Content-based filtering, on the other hand, suggests items based on their attributes and the user's past preferences.

For instance, if a user likes action movies, the system might recommend other films in the same genre. Hybrid methods combine both approaches to leverage the strengths of each.



<from google developers website>

Since the proposed system is based on the keywords, the **content-based filtering** method is secreted among those recommendation methods.

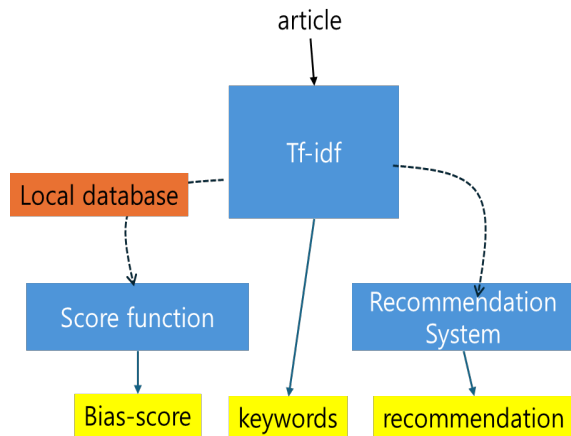
The effectiveness of a recommendation system hinges on the quality and quantity of data it uses. User interactions, such as clicks, ratings, and purchases, provide valuable insights that help the system learn and improve over time. Additionally, incorporating contextual information—such as time of day or location—can further refine recommendations, making them more relevant to users' current situations. Machine learning algorithms play a crucial role in processing this data, allowing the system to adapt and evolve as user preferences change[4].

Ultimately, a well-designed recommendation system can significantly enhance user satisfaction and loyalty. By offering personalized suggestions, these systems not only help users find what they're looking for but also encourage them to explore new options, increasing overall engagement. As technology advances, the potential for more sophisticated and accurate recommendation systems continues to grow,

promising an even more tailored experience for users in the future.

### Proposed system

In this chapter, the proposed system is introduced. Figure below is a flow description.



<proposed system>

The system uses the article for the only parameter. And then calculate the TF-IDF scores for each word. Starting with the TF-IDF score, the proposed system returns a total of 3 answers for readers.

#### A. Keywords

Users can input the number of keywords  $N_k$ . The words which are Top- $N_k$  TF-IDF scores are returned. To be a reasonable system, the system gives the first priority to the proper nouns like the name of building, city or sports players.

#### B. Bias-score

Using the local database, the bias-score is calculated. The example of loca database is below:

word	score
Mediocre	-3
average	0
evil	-1

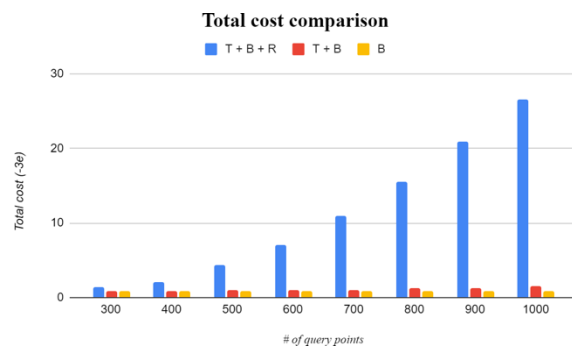
The system chooses top- $N_a$  keywords and sum the scores of each word.  $N_a$  increases until the total score meets the threshold.

#### C. Recommendation

Since the system has keywords, the content-based filtering is enabled. If the user likes an article, the system recommends similar keyworded articles.

### Evaluation

The implementation has been executed in Python with processor i7-10g.



The yellow label is for calculating the bias score, the red label is for the calculating TF-IDF and the bias score, and the Blue label is for the recommendation system in addition.

### Conclusion and Future works

The K value calculated from the graph above helped accurately determine the bias scores for Article 1 and Article 2, confirming my prediction that Article 1 would be more positively biased than Article 2. This research

makes important contributions to the field of media bias detection in a few key ways. First, it establishes a model for a local database that assign bias scores to significant words in news articles. By creating a dedicated database focused on evaluating racial bias in the media, we can enhance it using AI machine learning algorithms to improve the accuracy of bias assessments. Second, it introduces a scoring function that combines scores from the local database with TF-IDF values, aiding users in evaluating the bias in race-sensitive news articles.

There are several ways my method for quantifying bias in news articles could be improved. First, by implementing a preference measurement method during the evaluation stage, individuals could compare the numerical scores with their own perceptions of the articles' bias, which would help verify the program's accuracy. Second, rather than relying on a manually created local database with a limited set of terms, we could use a deep learning algorithm to analyze thousands of news articles and automatically build a more extensive database with bias scores for relevant words. This would help reduce potential errors from a scoring system based on a local database that may reflect the bias of its creator.

## References

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