Initial Plan: "Utilising Natural Language Processing Models and Visualisations to Identify Bias Within News"

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1 Project Description

In the US today there are over 3000 official news outlets (ignoring bloggers, radio, podcasts, etc.) as is stated in (Legg, n.d.). This page continues citing stats from (Jeffery Gottfried, 2020)"Less than half of Americans trust the news, and 72% of U.S. adults say news organizations do an insufficient job revealing their funding sources". This project seeks to investigate and develop tools that can be used for the consumer to understand both the bias that the information they are reading holds and how the bias is being presented to them.

Due to the huge growth of electronic news outlets, it has become ever increasingly difficult to discern objective and accurate reporting over information being heavily impacted by the authors and stakeholders involved within news. Bias in the news is often demonstrated in subtle forms such as through specific word choice, framing of people and ideas within the articles, and through outlets covering/omitting specific aspects of events. Being able to detect and understand the effect that these strategies have can typically prove to be very challenging, especially without devoting large quantities of time and resources. Understanding the nuances and contexts that contribute to bias is vital for the ongoing development of bias detection methods.

Within the modern landscape of technology and connectivity, news is readily accessible through a range of mediums to an ever-growing audience. The growth of news accounts on social media such as TikTok has led to an increase in young people using social media as a news outlet. (Sky News, 2023)"Last year's report found 40% of 18-24-year-olds used TikTok, with 15% using the platform for news." (Sky News, 2023). This has become a large issue with many younger people being exposed to potentially heavily biased information. Uncovering bias ensures a better informed and more united public. Furthermore, existing methods for detecting bias, such as manual analysis, are very labour-intensive and thus problematic to scale with the growth in news availability. An automated approach to this problem utilising natural language processing (NLP) and visualisations could provide a more efficient and objective way to identify and present bias.

I plan to tackle this project in a series of steps. I will begin with creating a large dataset of news articles both from pre-existing datasets found online and through creating custom datasets using APIs such as "NEWSAPI" if/when it is needed. Once this dataset is completed, I plan to develop an initial model that will analyse the articles stored in my dataset and score them for various types of bias (e.g. political, racial, gender). This model will leverage sentiment analysis (the process of analysing digital text to determine if the emotional tone of the message is positive, negative, or neutral - (Amazon, n.d.)), entity recognition ('the task of identifying and categorizing key information (entities) in text' (Marshall, 2020))and word frequency analysis. In conjunction with this, I am going to implement a series of visualisations both as an aid to quickly understand the findings from my models, but also as a tool for identifying flaws to remove in further iterations of my models.

Upon completion of the project, I anticipate delivering a robust NLP model trained to identify bias in news reporting. This model will be tested for accuracy and reliability against a benchmark dataset containing a range of news articles with a range of different biases. Additionally, I will produce a detailed report showing my findings at different stages, utilising visualisations to take the abstract idea of bias into a readable and more accessible set of results.

2 Aims and Objectives

This project aims to develop an efficient and effective system that can detect and illustrate bias within news articles. Leveraging the capabilities of Natural Language Processing and data visualisation, the system will provide an objective measure of bias, enabling readers to gain a further understanding into the information they are being presented with. The goal is to promote media literacy and contribute to the public knowledge on bias and misleading information within the news outlets.

One of the alternatives aims and hopeful outcomes of this project is to provide a stepping on point for others looking to further their understanding of the field. One issue that is often found with the specialised areas of computer science is that they can be very inaccessible to those without a prior knowledge in the field. So, I hope that through this project I can provide insightful findings but also provide my findings and methods used in a way that is both engaging to someone with a prior understanding alongside someone whose just curious about the topic and my work.

2.1 Objectives

1. Create a collection of datasets for the purposes of training and testing my algorithms. Completed by week 3 these datasets will article from a range of news outlets and contain articles on varying topics.
2. Build an initial model of which attempts to identify bias within articles. This model will be trained/tested using the datasets previously made. The goal of this objective is to have a baseline model that can be used for improvements in later iterations. To be completed by week 5.
3. Analyse and report on the initial model. The aim here is to discover flaws, areas working efficiently and identify changes to be made going forward. To be done in week 6.
4. Using the initial model and analysis plan and produce and improved model, trained and tested on the same datasets, but also tested on a secondary dataset to evaluate its uses on a larger scope than the possibilities of the initial model.
5. Analysis on the improved project is to be made of the improved model. With a goal of creating a detailed report on the differences in techniques, performance, and design. Potentially there will be a comparison with how the model performs at judging.
6. Results and findings will be made through a series of comparisons between my models and other models available online. This report will explain how the changes have altered results as well as looking at external research into the topic for how further changes could be made in the future as well as a reflection as to changed I would have made in this case. To be completed and final report submitted in week 12.

3 Feasibility

Due to the nature project of this project, there are some potential ethical and legal issues I have taken several steps to mitigate/remove any issues.

Data collection can cause many issues with projects, especially when dealing data from certain sources. For example, for this project I could potentially utilise web scraping to collect my articles and their surrounding data. While there are several websites in which web scraping is allowed for research purposes or in general it can be very difficult to differentiate cases where it is and isn't okay. In order to avoid this, I have decided to utilise premade data sets from websites such as "Kaggle" or alternatives such as "hugging face". Within these websites the licencing is outlined by the creators for each dataset. The other option is to use an API such as "NEWSAPI", these APIs are set up for a wide range of uses and within the documentation all the licences are available.

Secondly as previously mentioned I have a plan to use a survey or similar method as part of my evaluation of my final model. As is standard with many projects, any data/feedback coming straight from participants typically requires ethical approval. In the case of my project the interaction with human participants will be minimal and as it is a potential plan at this time there will be no steps taken to deal with any ethical issues however should a survey be implemented; the appropriate approval will be sought from the university before perusing any further on the matter.

A more technical limitation on progress would occur if the models begin to require large computation power and storage that isn't readily available to myself as a student. While in the case of my project I feel that the issues here are somewhat minimal there are several options to dealing with this such as google colab, utilising the universities super computers or looking externally and reaching out to businesses.

4 Work Plan

Table 1 defines the rough structure of how I plan to allocate the time for this project. While I am using a relatively simple structure for this plan, I will also be utilising Microsoft to-do and clockify. Microsoft to-do is going to be used to track the progress of weekly tasks in a satisfactory manner. Alongside this, I will be using clockify as a time tracker, as is mentioned in the previous section one of the more sizable risks to this project is the delegation of how much time is spent on each of my tasks. Clockify solves this by giving a dashboard of details showing time how much time has been spent on individual sections to ensure certain aspects are not being prioritised and thus other key sections are falling behind.

At this time, I am inadequately experienced in dev ops for it to be implemented into the initial plan. However, throughout the project I aim to learn and begin to utilise its features to plan work and ensure tasks/milestones are completed as expected.

In conjunction with the work plan and tools described previously I will be having weekly catch ups with my supervisor to track progress and ensure that milestones are being hit on time.

Easter break has been omitted form the work plan (falling between week 8 and 9). I plan to utilise this time as a buffer to ensure that all models are completed, and I can begin the final in-depth analysis of my algorithms as stated in Table 1.

Table 1. Work plan

Week	Tasks	deliverables
Week 1	- Plan and write the initial report.	- First draft of the initial plan
Week 2	- Meeting to discuss the plan draft. - Plan and begin writing the initial chapters of final report (introduction, background, and methodology)	
Week 3	- First draft of the first 3 chapters - Flesh out and finalise the dataset structure and content	
Week 4	- Research and plan initial model. - Begin development of model	- First draft of opening chapters
Week 5	- Finalise initial model. - Evaluate and create visualisations of model's performance and stats	
Week 6	- Write up report regarding the initial model	- Give in first draft of introductory chapters and initial model report
Week 7	- Being work on the improved model.	

	- Make any necessary changes to the report in line with the suggestions	
Week 8	- Continue working on the improved model. - Begin evaluation and analysis of new model. - (potentially test against humans for a new metric)	
Week 9	- Complete evaluation and analysis sections of the report	- Draft containing both models and beginning sections handed in
Week 10	- Conclusions and future work to be completed. - Reflection on the project planned and started	
Week 11	- All sections completed and submitted for a final review	- Final draft for last notes and suggestions
Week 12	- Final tweaks and changes in accordance with draft feedback	- Final report submission

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