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**Introduction**

Artificial Intelligence (AI) is all around us, and it is only getting bigger. An article by UBS shows that AI produced an annual growth rate of 20% from 2015 to become a 12.5 billion industry in 2020. As rapid advancements in AI continue to arise, its impacts on business and society will become more prevalent.

Consequently, humans are excited for the future of AI but also anxious as AI continues to outperform humans even in disciplines we thought were uniquely human. Understanding public opinion regarding AI can be a tricky task; AI is one of the most discussed topics on both social media and news articles. Fortunately, sentiment analysis tools can be used to automatically evaluate text data.

In this report, two different tools from a python package will be demonstrated to describe how they can evaluate the overall positivity or negativity of a given text. Each tool has different scoring and word analyses methods, and they will be described at length as well as their overall effectiveness and results.

**Analysis**

Two different sentiment analysis tools from the Natural Language Toolkit (NLTK) were used to analyse texts on the topic of AI. The first tool is called VADER which creates a score based on a dictionary which have a sentiment associated with each word. If the sentence has more positive words, the sentence is more positive; if it has more negative words, then it is more negative. The second tool is called TextBlob which is based on a separate library called pattern. This tool focuses more on adjectives that occur in customer reviews and provides a polarity score based on the overall positivity or negativity of a given text.

**About the Data**

The text used in this analysis were taken from two articles. The first is an article titled [“Advantages and Disadvantages of Artificial Intelligence”](https://towardsdatascience.com/advantages-and-disadvantages-of-artificial-intelligence-182a5ef6588c) and the second is a more opinionated piece on Medium titled [“Your AI Sucks.”](https://medium.com/maslo/your-ai-sucks-40fa00ec42a1)

Text used in this analysis

|  |  |
| --- | --- |
| **Article: “Advantages and Disadvantages of Artificial Intelligence”** | **Article: “Your AI Sucks”** |
| Reduction in Human Error: The phrase “human error” was born because humans make mistakes from time to time. Computers, however, do not make these mistakes if they are programmed properly. With Artificial intelligence, the decisions are taken from the previously gathered information applying a certain set of algorithms. So errors are reduced and the chance of reaching accuracy with a greater degree of precision is a possibility. | BROKEN TECH HIRING MAKES BAD AI. The people making a lot of these products aren’t thinking or testing beyond the dominant high-income/able-bodied/cis/straight/White or Asian/Male techworker majority. Despite lip service to the contrary tech hiring is not diverse. I’ve been through diversity hiring hell. The name brand companies put me through unnecessarily aggressive, exploitatively time-intensive, and inappropriately rude technical screens. The more a company claims commitment to diversity, the less their nonsensically stressful and Sisyphean hiring practices bias diversity in technical hiring. |
| Helping in Repetitive Jobs: In our day-to-day work, we will be performing many repetitive works like sending a thanking mail, verifying certain documents for errors and many more things. Using artificial intelligence we can productively automate these mundane tasks and can even remove “boring” tasks for humans and free them up to be increasingly creative. | KIDS + AI = DYSTOPIA. We have no understanding of the long-term impact of AI on child development. We’re letting children interact with AIs and the parental controls only screen for adult content. Child interaction with the product is an afterthought. Have you watched children barking orders at Alexa or Siri? Clearly it is not productive to compassionate child development. How are these tools going to impact child development years later? AI can be made to teach children cooperation and empathy. Ross Ingram, Maslo’s founder and CEO, came from Sphero, a robotic sphere that encourages learning through play. It has gained a lot of traction in grade and middle schools as a tool to teach STEM. The Sphero experience is collaborative and cooperative — decidedly absent of children frustratedly barking orders and yelling when the AI doesn’t understand them. We can make more cooperative and empathic AI like this. |
| Unemployment: As AI is replacing the majority of the repetitive tasks and other works with robots,human interference is becoming less which will cause a major problem in the employment standards. Every organization is looking to replace the minimum qualified individuals with AI robots which can do similar work with more efficiency. | HE TECH IS WEAK AND DOESN’T WORK THAT WELL. For conversation bot AIs, the bots break when you get off-script. When the bots break you often get routed to a human, but often without them informing you that you’re talking to a human. Chaos ensues. AI text and photo classifiers are frequently wrong. How many times has “ducking” been forced in your predictive text? For a while the Google predictive text for “sit on” was “my face.” AIs are sadly prone to sexist, racist and bigoted mistakes like Google Photos mistaking Black people for gorillas. Microsoft made a chatbot trained on Twitter user data that began with phrases like “Humans are cool” and within 24 hours, generated tweets like “I fucking hate feminists and they should all die and burn in hell.” The consequences can even be fatal; self-driving cars have killed five people to date. |

The text data was copied directly into Python and loaded as a list. The NLTK sentiment analysis tools read each set of sentences and produced a score based on the overall positivity and negativity.

VADER code loop snippet

1. sid = SentimentIntensityAnalyzer()
2. **for** sentence in sentences:
3. print(sentence)
4. ss = sid.polarity\_scores(sentence)
5. **for** k in sorted(ss):
6. print('{0}: {1}, '.format(k, ss[k]), end='')
7. print()

TextBlob code loop snippet

1. **for** sentence **in** sentences:
2. **print**(TextBlob(sentence).sentiment)

**Results**

VADER provides a compound score which is the aggregated sentiment of positive and negative words in the given text. TextBlob provides a polarity score. Both scores range from -1 to 1 where -1 is negative, 1 is positive, and 0 is neutral. The scores for each text are shown below:

Article: “Advantages and Disadvantages of Artificial Intelligence”

|  |  |  |
| --- | --- | --- |
| **Text** | **Vader** | **TextBlob** |
| Reduction in Human Error | 0.028 | -0.007 |
| Helping in Repetitive Jobs | 0.866 | 0.031 |
| Unemployment | -0.587 | 0.067 |

The text in this article is largely unopinionated and gave straightforward descriptions of the benefits and disadvantages of AI. The first two texts discussed the benefits (reduction in human error and helping in repetitive jobs) while the third text discussed the disadvantage of unemployment. Unsurprisingly, VADER produced positive scores for the first two texts and a negative for the third. TextBlob produced largely neutral scores for all three texts. Because this tool is focused on adjectives used in customer reviews, these scores are not surprising as the texts did not contain many of these adjectives.

Article: “Your AI Sucks”

|  |  |  |
| --- | --- | --- |
| **Text** | **Vader** | **TextBlob** |
| BROKEN TECH HIRING MAKES BAD AI | -0.957 | -0.196 |
| KIDS + AI = DYSTOPIA | 0.824 | -0.0313 |
| THE TECH IS WEAK AND DOESN’T WORK THAT WELL. | -0.993 | -0.181 |

Unlike the previous article, this text was much more opinionated and focused entirely on the disadvantages of AI. VADER produced almost perfectly negative scores for the first and third texts. Surprisingly, it produced a strongly positive score the second text. This may be because this text mostly asked questions and provided descriptions rather than discussing the specific pitfalls of AI.

TextBlob produced slightly negative scores for the first and third texts and an almost neutral score for the second text. When comparing the two articles, the second article contained more adjectives associated with negative customer reviews such as “bad”, “hate”, and “wrong.” This may explain why it produced larger score magnitudes for the second article when compared to the first article.

Overall, both tools were largely inconsistent when comparing their scores. Text is often equivocal and sentiment analysis can produce different results even when conducted by humans. It is no surprise that two tools that use different scoring methods and word analyses would provide different sentiment analysis results.

Based on the results, TextBlob does not appear to be effective overall for this type of text. Again, this may be because it relies on adjectives used from customer reviews which is likely not applicable for the text used in this analysis. VADER appears to be more effective overall and produced results that make more sense when taking a closer look at the text.

**Conclusion**

It is clear that AI has a profound impact on business and societies today, and this impact will only continue to grow in future years. Understanding how opinions regarding AI is important, but it is a daunting and nearly impossible task to do through a manual process. Luckily, there are plenty of tools that can conduct this analysis automatically.

Two tools from the NLTK package of python, VADER and TextBlob, were used to demonstrate how an automated process can evaluate the overall positivity or negativity of a given text. This was done on two different articles which discussed AI. Overall, both tools provided largely inconsistent results due to their differences in scoring and word analysis methods. Between these two tools, VADER appears to be more effective for sentiment analysis on text regarding AI.