Is that headline Clickbait?

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Abstract

To catch readers attention digital and print media are using "Clickbait" headlines. To their monetary benefits, they are misleading the population by publishing catchy headlines to get more user engagements and clicks per post. Nowadays, it has grown to become a nuisance to social media users and social media operators. Malicious content publishers misuse social media to manipulate users and exploit celebrities or well-known personalities many times. There are various ongoing research on better clickbait detectors [1, 2] that tries to classify if a given headline is clickbait or not. In this project, we will try to find an answer to a fundamental question that if only a new article's headline is sufficient to successfully classify if it is clickbait or would we also need more context from related body of the article. We intend to explore various sequence-to-sequence models and Bidirectional Encoder Representations from Transformers (BERT) for achieving this. Based on the achieved results with these approaches, we may extend the scope and try Summarization of given news post to generate another news headline and find the cosine similarity of it with the original headline to detect Clickbait-ness on Webis-17-dataset.

1 Introduction

News headlines, be it print media or digital media, have long been criticized for being "Clickbait". A headline is Clickbaiting when it is, arousing curiosity instead of providing informative summaries to its reader. In addition to news articles, with the increase on online marketing and CPC (Cost Per Click) like money-making models, various agencies are generating catchy titles for their posts so as to get more user clicks and engagements. Humans have a curious nature by default. The main reason that results in clicking on intriguing posts is due to the "Curiosity Gap" the headline creates. Loewenstein's information-gap theory of curiosity [5] is usually presented as the psychological reasoning behind this. Nowadays the problem of clickbait has increased to such an extent that people don't mind fake and un-related headlines to articles in order to generate ad revenues from the posts. Typically, it is spread on social media in the form of short teaser messages that may read like the following examples:

- Drink this formula every morning to loose 5kg of weight in 5 days
- Giant asteroid hurtling towards Earth!
- 9 Out Of 10 Americans Are Completely Wrong About This Mind-Blowing Fact
- Here's What Actually Reduces Gun Violence

When reading such messages, readers get the distinct impression that something is odd about them, some emotional reaction is promised, something unnamed is referred to, some lack of knowledge is ascribed.

From a users stand-point, clicking on these catchy titles and reading the following paragraphs which majorly has no connection with the headline is a waste of time and is misleading. Malicious content publishers misuse social media to manipulate users and exploit celebrities or well-known personalities many times. As a step towards stopping this social media nuisance, to promote responsible journalism and to stop the spread of misleading information in today's information world, we propose the project on identifying if a given headline is a clickbait or not by using Natural Language Processing (NLP) techniques. It can have a wider use-case as an add-on extension on web browsers showing if the headline is clickbait and the user should click on it or not.

Well-known media and ad platform, Facebook for example have found that people don't like stories that are misleading, sensational or

spammy. That includes clickbait headlines that are designed to get attention and lure visitors into clicking on a link. They even launched a war [3] against clickbaits in 2017 to utilize users feedback to identify and block domains from their platform forever that are notorious for producing clickbaits.

In this project, we will try to find an answer to a fundamental question that if only a new article's headline is sufficient to successfully classify if it is clickbait or would we also need more context from related body of the article. We will use the Webis Clickbait Corpus 2017 that has samples of headlines, passages, keywords, captions, etc. from major US news publishers. We intend to explore various sequence-to-sequence models such as RNN, LSTM, GRU and Bidirectional Encoder Representations from Transformers (BERT) Embeddings for achieving this. After getting the baselines from seq-seq models, we may extend the scope and try Summarization of given news post to generate another news headline and find the cosine similarity of it with the original headline to detect Clickbait-ness of a headline. More details are in the next section.

2 Related Work

In the past there have been multiple approaches to solve the problem of clickbait detection from classical ML to modern DL and Transformer techniques used for this task are as follows.

Classical ML Phase: Initially the researchers were utilizing classical machine Learning techniques and heavily utilized feature engineering techniques to address the problems. In Click Bait Detection by Potthast et al[6] the authors creates multiple types of features like word n-grams, char n-grams and then perform Chi-square tests to select the best features which are used in Random Forest models. In Chakraborty et al[7] authors utilize different ML models specifically SVMs to achieve high accuracy in clickbait classification.

Deep Learning Era: One of the early strides in the application of deep learning in the domain of click bait analysis was successfully applied by Agrawal [8] where CNN was utilized for the task. Two models , one from scratch and one using Word2Vec Embeddings trained by Mikolov et al [9] and were able to achieve great results. In 2017 the ClickBait Challenge[4] was launched in order to tackle the problem of Clickbait articles on twitter. This also saw some pretty amazing results from the deep learning area. Anand et al [2] used sequence based models along with distributed word embedding and character level word embedding and found BiLSTMs to work really well on the challenge (Bi-GRUs a bit worse with 1% less accuracy).

After the arrival of attention mechanism [10] the field of NLP advanced a lot. Attention paved the way for the Transformer architecture by Vaswani et al [11] which completely revolutionized the domain and more and more people switched to large pretrained model rather than using LSTM and GRU based sequence models. One such architecture which took things to the next level was BERT or Bidirectional Encoder Representations from Transformers by Devlin et al [12]. It is based on transformer architecture and trained bidirectionally using the encoder module. Trained by utilizing Masked Language modelling and Next sentence prediction tasks it was able to outperform all other models on most NLP tasks. Transformer models like BERT can be fine-tuned for a downstream tasks and be applied to a different problem set. Clickbait classification can be one such downstream task where the model can be fine-tuned to its specific data.

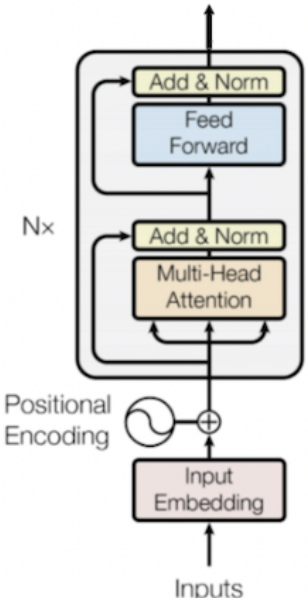

Figure 1: Encoder block of BERT

Apart from the above mentioned ones, one another approach of the clickbait challenge we could utilize is the article summaries. Transformers with sequence to sequence architecture have also made strides in this field of Document Summarization. Models like BART [13] and T5 [14] were able to achieve state of the art performance in summarization tasks. These pretrained models are readily available and can be utilized in summarizing the articles which we hope to use in this project. Once we have the summaries of articles, we can find the embedding of that text summary and the distance of it with the edmedding of the actual news headline. Various distance metrics or Cosine Similarity can be used to understand if the summary matches with the headline or not, if not that is Clickbait.

3 Appendix

We plan to use the Webis Clickbait Corpus 2017 (Webis-Clickbait-17) comprises a total of 38,517 Twitter posts from 27 major US news publishers. In addition to the posts, information about the articles linked in the posts are included. The posts had been published between November 2016 and June 2017. To avoid publisher and topical biases, a maximum of ten posts per day and publisher were sampled. All posts were annotated on a 4-point scale [not click baiting (0.0), slightly click baiting (0.33), considerably click baiting (0.66), heavily click baiting (1.0)] by five annotators from Amazon Mechanical Turk. A total of 9,276 posts are considered clickbait by the majority of annotators. The corpus is divided into two logical parts, a training and a test dataset.

The Figure - 2 is a single input sample (with truncated text for visualization purpose only). Its corresponding label in a JSON format is in Figure - 3. The input contains post text, target captions, target title, target description, target paragraphs, etc. If all of these, a combination of these or only one of these can detect a headline as Clickbait or not is what we would try finding. The label file has truth judgments on 5 aspects as well as truth class and its mean, median, mode. Thus, can be used as either a Classification Task or as a Regression Task.


```
{
  "id": "858426904239497216",
  "postMedia": [
    "media/photo_858425825229549568.jpg"
  ],
  "targetCaptions": [
    "Cleveland Browns logo",
    "Dec 6, 2015; Cleveland, OH..."
  ],
  "postText": [
    "Johnny Manziel on Browns' No. 1 pick 📽️..."
  ],
  "postTimestamp": "Sat Apr 29 21:04:57 +0000 2017",
  "targetTitle": "Johnny Manziel Says Top Pick in Draft...",
  "targetDescription": "Johnny  Manziel...",
  "targetKeywords": "NFL Draft, Football, NFL, AFC North,...",
  "targetParagraphs": [
    "Johnny Manziel approves of the Cleveland Brow...",
    "When TMZ asked the former first-round pick..."",
  ]
}
```


Figure 2: Input sample (with truncated text)


```
{
  "id": "858426904239497216",
  "truthJudgments": [
    0,
    0,
    0,
    0,
    0
  ],
  "truthClass": "no-clickbait",
  "truthMedian": 0,
  "truthMode": 0,
  "truthMean": 0
}
```


Figure 3: Corresponding Label

4 References

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