Machine-Made Media: Monitoring the Mobilization of Machine-Generated Articles on Misinformation and Mainstream News Websites

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Abstract
As large language models (LLMs) like ChatGPT have gained traction, an increasing number of news websites have begun utilizing them to generate articles. However, not only can these language models produce factually inaccurate articles on reputable websites but disreputable news sites can utilize LLMs to mass produce misinformation. To begin to understand this phenomenon, we present one of the first large-scale studies of the prevalence of synthetic articles within online news media. To do this, we train a DeBERTa-based synthetic news detector and classify over 15.90 million articles from 3,074 misinformation and mainstream news websites. We find that between January 1, 2022, and May 1, 2023, the relative number of synthetic news articles increased by 55.9% on mainstream websites while increasing by 502% on misinformation sites. We find that this increase is largely driven by smaller less popular websites. Analyzing the impact of the release of ChatGPT using an interrupted-time-series, we show that while its release resulted in a marked increase in synthetic articles on small sites as well as misinformation news websites, there was not a corresponding increase on large mainstream news websites.

1 Introduction
Since the release of ChatGPT in November 2022, hundreds of millions of Internet users have used the large language model (LLM) to efficiently compose letters, write essays, and ask for advice (Hu 2023). However, LLMs have also been shown to produce erroneous text. In one example, CNET, a reputable website that publishes reviews and news on consumer electronics, published articles generated by OpenAI’s ChatGPT that were rife with factual errors (Leffer 2023). Beyond inaccurate text, recent research has shown LLMs can be used to effectively spread misinformation (Tang, Chuang, and Hu 2023). Yet, despite the widespread adoption of LLMs and their potential to accelerate the spread of misinformation, there has not been any study of whether LLMs like ChatGPT have been broadly used to produce news articles on mainstream or fringe/unreliable websites.

In this work, we present a large-scale study of the relative increase in machine-generated/synthetic articles from 3,074 news websites (1,112 misinformation/unreliable websites and 1,962 mainstream/reliable news websites) between January 1, 2022, and May 1, 2023. To do this, we utilize data from 19 models, as well as adversarial data from article perturbation/re-writes and paraphrases, to train a DeBERTa-based model (He et al. 2021) to detect English-language synthetic news articles. We subsequently benchmark this classifier on eight test sets of machine-generated news articles, including two from real-world companies (Pu et al. 2022) and one from an independent collection of human-written real-world articles. Across these test datasets, our model, at a false positive rate (FPR) of 1%, achieves an average precision score of 0.992. With this trained model, we classify over 15.90M articles published between January 1, 2022, and May 1, 2023, from our set of 3,074 news websites.1

We find that among reliable/mainstream news websites, synthetic articles increased in prevalence by 55.9% (0.93% of news articles in January 2022 to 1.45% in May 2023) while among unreliable/misinformation websites, the prevalence increased by 502% (0.34% of news articles in January 2022 to 2.05% in May 2023). Examining the content of synthetic articles, we find that while mainstream/reliable news websites have largely utilized synthetic articles to report on financial and business-related news, misinformation/unreliable news websites have reported on a wide range of topics ranging from world affairs (e.g., the Russo-Ukrainian War) to human health (e.g., COVID-19). Examining the impact of ChatGPT on the prevalence of synthetic content, we further find that its release coincided with significant increases in machine-generated articles on misinformation websites and unpopular mainstream news websites.

Our work presents one of the first in-depth analyses of the growth of synthetic articles across the news ecosystem. We show that throughout 2022 and 2023, particularly after the release of ChatGPT, many misinformation websites have rapidly increased the amount of synthetic content on their websites. As misinformation websites increasingly utilize synthetic articles, we hope that our work can serve as the basis for identifying the use of LLMs and for helping enable future studies on the spread of misinformation.

2 Background and Related Work
Recent advances in large language models (LLMs) have resulted in impressive performance on a variety of tasks, 

1We release the weights of our model and the URLs used in this study at https://github.com/hanshanley/machine-made-media.
most notably convincing text generation (Brown et al. 2020; Chowdhery et al. 2022; AI 2022; Zellers et al. 2019). Within the past year, models like Open AI’s ChatGPT, Meta’s LLaMa, and Google’s Bard have largely democratized their use. However, despite their popularity, the widespread availability of LLMs can be problematic. For example, Zeller et al. (2019) showed that even the older GPT-2 LLM can create convincing articles, often with factual errors, that evoke more trust than human-written articles.

**Definition: Synthetic Articles** Within this work, we consider new articles largely generated by LLMs and other automated software to be synthetic/machine-generated (Gagiano et al. 2021). For instance, the article produced by prompting the API for OpenAI’s GPT-3.5 davinci LLM would be considered synthetic. We note, however, as shown in prior work (Mitchell et al. 2023; Uchendu et al. 2021), heavily human-edited machine-generates news articles are difficult to detect, often being indistinguishable from human-written news articles. As such, within this work, we further define synthetic news articles as those that are largely if not completely generated by LLMs without significant human modification.

**Real-World Use of Synthetic News Media.** While the large-scale democratization of generative models is new, the use of machine-generated or synthetic articles by news websites is not. Since as early as 2019, Bloomberg has used the service Cyborg to automate the creation of nearly one-third of their articles (Peiser 2019). Similarly, since 2019, as reported by the New York Times, other reputable news sources including The Associated Press, The Washington Post, and The Los Angeles Times, have used machine-generation services to write articles on topics that range from minor league baseball to earthquakes (Peiser 2019). However, articles that contain machine-generated content from services such as Cyborg, BERTie, or ChatGPT, while reducing the workload of reporters, have also been shown to often contain factual errors (Alba 2023; Leffer 2023). As a result, much research has focused on detecting machine-generated news articles (Zellers et al. 2019; Uchendu et al. 2020; He et al. 2023; Ippolito et al. 2020).

**Detecting Machine-Generated Media.** Several approaches have been developed to detect machine-generated text. BERT-defense (Ippolito et al. 2020) for instance uses a BERT-based (Devlin et al. 2019) model to identify machine-generated texts. DetectGPT (Mitchell et al. 2023) approximates the probabilistic curvature of specific LLMs for zero-shot detection. Mitchell et al. show that if the specific model used to generate text is known and can be readily queried to obtain the log probabilities of pieces of text, then it is possible to easily differentiate synthetic articles from human-written news articles, achieving a 0.97 AUROC for the XSum dataset. Zhong et al. (2020) propose a graph-based approach that considers the factual structure of articles to detect machine-generated text.

Our work depends on accurately identifying machine-generated articles across news websites. As shown in previous works, however, many machine learning models trained to detect synthetic texts overfit to their training domain, the token distribution of the model used to generate the synthetic texts, and the topics that they were trained on (Mitchell et al. 2023; Uchendu et al. 2020; Lin, Hilton, and Evans 2022). For example, models trained to detect synthetic news articles, often fail to detect shorter machine-generated tweets. Despite these shortcomings, as illustrated by Pu et al. (2022), classifiers focused on only one domain can often perform exceedingly well on datasets seen “in-the-wild.” Adversarially training a RoBERTa (Liu et al. 2019) based classifier, Pu et al. achieve an $F_1$-classification score of 87.4–91.4 on a test dataset made up of synthetic news articles purchased from AI Forger and Article Forge. Unlike in other domains, such as tweets or comments, news articles tend to be longer, allowing for greater precision in their classification (Pu et al. 2022; Sadasivan et al. 2023).

**Reliable and Unreliable News Websites.** In this work, we analyze how both reliable/mainstream and unreliable/misinformation news websites have published machine-generated articles throughout 2022 and 2023. Unreliable information from these sites can take the form of misinformation, disinformation, and propaganda, among others (Jack 2017). Within this work, we refer to websites that have been labeled by other researchers as generally spreading false or unreliable information as misinformation/unreliable news websites (including both websites labeled as misinformation and disinformation within this label). As in prior work, we consider reliable/mainstream news websites as “outlets that generally adhere to journalistic norms including attributing authors and correcting errors; altogether publishing mostly true information” (Hounsel et al. 2020).

**3 Detecting Machine-Generated Articles**

As described in Section 2, several approaches have been developed for identifying synthetic articles, with some of the most successful being transformer-based methodologies (Pu et al. 2022; Gehrmann, Strobelt, and Rush 2019). However, given that past models were trained to (1) only detect text from particular models (Zellers et al. 2019), (2) are deeply vulnerable to adversarial attacks (Pu et al. 2022), (3) or have unreleased weights (Zhong et al. 2020), we design and benchmark our own transformer-based machine-learning classifiers to identify synthetic articles in the wild.

In addition to training three transformer architectures (BERT, RoBERTa, DeBERTa) on a baseline training dataset (detailed below), we further train these models on datasets generated from two common adversarial attacks (Krishna et al. 2023; Mitchell et al. 2023). To benchmark and understand the generalization of our approach, we test our new models against datasets of articles generated by two companies, AI Writer and AI Forger provided to us by Pu et al. (2022), the Turing Benchmark (Uchendu et al. 2021), four distinct GPT-3.5 generated datasets (OpenAI 2022), and finally a dataset of human-written articles from 2015 (Conrey et al. 2016). We now describe our training and test datasets, the architectures of our models, and finally our models’ performances on our benchmarks.

**Baseline Training Datasets.** To train a classifier to detect
machine-generated/synthetic news articles found in the wild, we require a diverse dataset of articles from a wide array of generative models. Thus, for our baseline training dataset, we take training data of machine-generated/synthetic articles from three primary sources: the Turing Benchmark, Grover, and articles generated from GPT-3.5.

**Machine-Generated Training Articles:** For much of our training data, we utilize the Turing Benchmark (Uchendu et al. 2021), which contains news articles generated by 10 different generative text architectures including GPT-1 (Radford et al. 2019a), GPT-2 (Radford et al. 2019b), GPT-3 (Brown et al. 2020), CTRL (Keskar et al. 2019), XLM (Lample and Conneau 2019), Grover (Zellers et al. 2019), XLNet (Yang et al. 2019), Transformer-XL (Dai et al. 2019), and FAIR/WMT (Ng et al. 2019; Chen et al. 2020). We note that given the different settings and trained weights provided by the authors of these respective works, the Turing Benchmark altogether includes articles generated from 19 different models. We randomly subselect 1000 articles from within the Turing benchmark generated by each of these different models as training data.

In addition to the Turing Benchmark training dataset, we use the training dataset of Zellers et al. (2019), which contains realistic, often long-form articles, that mimic the fashion of popular news websites such as cnn.com, nytimes.com, and the washingtonpost.com. Unlike the Grover-generated articles from the Turing Benchmark dataset, which are generated using a prompt of just the title of potential articles, these Grover articles are generated in an unconditional setting and from prompting the Grover model with metadata (i.e., title, author, date, website). As found by Zellers et al., many of the articles produced by their models were convincing to human readers, and we thus include 11,930 machine-generated articles from the base model of Grover (across different Grover decoding settings [e.g., p=1.00, p=0.96, p=0.92 (nucleus/top-p), k=40 (top-k), etc... settings]) in our training dataset.

Finally, given the popularity of the GPT-3.5 model (Hu 2023), with it being the basis of the released version of ChatGPT, and GPT-3.5 being one of the most powerful released models, we add 3,516 articles generated from the GPT-3.5 davinici model. To create these articles, we prompt the public API of GPT-3.5 davinici with the first 10 words of 3,516 real news articles from 2018 (see Section 4; while scraping our news dataset, we acquired several million articles from 2018). For GPT-3.5 davinici model, we use a nucleus decoding setting of p=1.00, p=0.96, and p=0.92 (some of the most common (Mitchell et al. 2023; Zellers et al. 2019)).

We finally note that, as found in prior work (Pu et al. 2022; Uchendu et al. 2021; Zellers et al. 2019), machine-generated news articles are often shorter in length than human-written articles. While training, to ensure that our models do not simply distinguish between longer human-written articles and those generated by generative transformers by their different lengths, we ensure that our machine-generated and human-written articles are of similar lengths (median training synthetic article length of 210 words and median training human article length of 224 words). Furthermore, as found by past work, predictions for texts, particularly short texts, tend to be unreliable (Kirchner et al. 2023; Kirchner et al. 2022); conversely, as shown by Sadasivan et al. (Sadasivan et al. 2023), as the lengths of texts increase the variance between human and machine-generated texts increases. As such, for our training and our generated test data (GPT-3.5 dataset), we exclude texts shorter than 1,000 characters (140 words) (OpenAI 2022). We note as a result, we do not use every trained model’s articles from the Turing Benchmark; given that WMT-20/FAIR articles within this dataset are all shorter than 1000 characters, we do not include them within our training dataset. Altogether our training dataset thus includes data from 19 different models (18 from Turing Benchmark and GPT-3.5 davinici).

**Human-Written Training Articles:** For our set of human-generated articles, as in Zellers et al. (2019), we utilize news articles published in 2018. Specifically, we use 28,446 articles from 2018 from our set of news websites that we later measure (see Section 4; while scraping our news dataset, we acquired several million articles from 2018), 2,500 articles from the human split of the Grover dataset, and 2,500 articles from the human-train-split within the Turing Benchmark dataset.

We present an overview of our complete baseline dataset in Table 1.

<table>
<thead>
<tr>
<th>Training Dataset</th>
<th>Human Written</th>
<th>Machine Generated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turing Benchmark</td>
<td>975</td>
<td>18,076</td>
</tr>
<tr>
<td>GPT-3.5</td>
<td>1,000</td>
<td>243</td>
</tr>
<tr>
<td>GPT-3.5 w/ Pert.</td>
<td>1,000</td>
<td>241</td>
</tr>
<tr>
<td>GPT-3.5 w/ Para.</td>
<td>1,000</td>
<td>118</td>
</tr>
<tr>
<td>Article Forger</td>
<td>1,000</td>
<td>1,000</td>
</tr>
<tr>
<td>AI Writer</td>
<td>1,000</td>
<td>1,000</td>
</tr>
</tbody>
</table>

Table 1: The number of machine-generated and human-written articles within the baseline, perturb, para, and perturb + para training datasets.

<table>
<thead>
<tr>
<th>Test Dataset</th>
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</tr>
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<tbody>
<tr>
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Table 2: The number of machine-generated and human-written articles within our test datasets.
dataset provided to us by Pu et al. (2022). This dataset consists of news articles created using generative large language models from two independent companies, Article Forger and AI Writer. By testing against these outside datasets, we validate our approach against articles generated by (1) models not within our dataset and (2) by generative news article services available to the public. We provide details in Table 2.

**Training and Test Dataset using Perturbations and Paraphrases.** Transformer-based classifiers are often particularly susceptible to adversarial attacks, particularly attacks that rewrite sections of the generated article (Mitchell et al. 2023; Pu et al. 2022) and paraphrase attacks (i.e., where a generic model is used to paraphrase the output of a different generative model (Krishna et al. 2023)). To guard against these weaknesses, we take two approaches (1) perturbing our set of synthetic articles by rewriting at least 25% of their content using the generic T5-1.1-XL model and (2) paraphrasing each article with the T5-based Dipper model.

**Constructing Perturbed Synthetic Articles.** To perturb/rewrite sections of our machine-generated articles, as in Mitchell et al. (2023), we randomly MASK 5-word spans of text until at least 25% of the words in the article are masked. Then, using the text-to-text generative model T5-3B (Raffel et al. 2020), we fill in these spans, perturbing our original generated articles. As shown by Mitchell et al. (2023), large generic generative models such as T5 can apply perturbations that roughly capture meaningful variations of the original passage rather than arbitrary edits. This enables us to model divergences from the distributions of texts created by our 19 different generative models (18 from Turing Benchmark and GPT-3.5). We thus utilize T5-3B to perturb a portion of the machine-generated articles of our Baseline train dataset. In addition, we create a separate test dataset by perturbing our GPT-3.5 test dataset (Table 2). We note that after perturbing our datasets, we filter to ensure all articles used for training contain at least 1000 characters. We annotate training and test datasets containing synthetic articles perturbed with T5-3B with the suffix Pert. After perturbation we still consider these articles to be synthetic.

**Constructing Paraphrased Synthetic Articles.** To paraphrase each of the machine-generated articles within our dataset, we use the approach outlined by Krishna et al. (Krishna et al. 2023). Specifically, as in their work, we utilize Dipper, a version of the T5 generative model fine-tuned on paragraph-level paraphrases, that outputs paraphrased versions of the inputted text. We use the default and recommended parameters as in Krishna et al. to paraphrase a portion of the text within our original training dataset as well as our GPT-3.5 test dataset (Krishna et al. 2023). We note that after paraphrasing our datasets, we again filter to ensure all articles utilized for training contain at least 1000 characters (Table 2). We annotate training and test datasets containing articles paraphrased with Dipper with the suffix Para. After paraphrasing we still consider these articles to be synthetic.

**Detection Models.** Having described our training test sets, we now detail our models and evaluate their performance on our 6 test datasets (Turing Benchmark, GPT-3.5, GPT-3.5 w/Pert, GPT-3.5 w/Para, Article Forger, AI Writer). Specifically, we fine-tune three pre-trained transformers, BERT-base (Devlin et al. 2019), RoBERTa-base (Liu et al. 2019), and DeBERTa-v3-base (He et al. 2021) for each architecture, we train 4 models to detect machine-generated articles utilizing for training contain at least 1000 characters. We annotate training and test datasets containing synthetic articles perturbed with T5-3B with the suffix Pert. After perturbation we still consider these articles to be synthetic.

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model took approximately 2 hours to train using an Nvidia RTX A6000 GPU. After training, as in Pu et al. (2022), we determine each model’s binary $F_1$-scores, precision, and recall for each test dataset and rank each model using its average $F_1$-score. We classify each text based on its outputted softmax probability (>0.5 being classified as synthetic). For a baseline comparison for our trained models, we further test the Roberta-based classifier released by Open AI in 2019 (Solaiman et al. 2019) on each of our test datasets.

Consistent with prior works (Veselovsky, Ribeiro, and West 2023; Mitchell et al. 2023; Gagiano et al. 2021), due to training our model on synthetic articles from a wide variety of sources, and due to our model’s focus on news articles, as seen in Table 3, we observe that all our trained models perform markedly better than Open AI’s 2019 released detection model. We further observe, as aggregated in the form of Table 4, that our DeBERTa+Pert+Para model achieved the highest accuracy on the Signal dataset and the second highest precision on the ChatGPT Rewrite dataset, with scores of 94.2% accuracy and 97.9% precision respectively.

### Selecting a classification threshold for synthetic articles.

Given its performance across all eight of our datasets, we use our DeBERTa+Pert+Para trained model as our detection model for the rest of this work. However, as noted in prior research (Krishna et al. 2023), a realistic low false positive rate (FPR) would be near 1%. Given our model only achieves an average FPR of 5.8% on our Signal article dataset and a softmax probability threshold of 0.50, when classifying articles within this work, we raise our softmax probability classification threshold to 0.98%, allowing us to achieve a 1% FPR/accuracy on the Signal article dataset. At this threshold, our model achieves a 0.993/0.972 precision/recall on our original six datasets with an FPR of 0.7%. Similarly, at this threshold, our model reaches a precision of 0.989 on our ChatGPT rewrite test set at the expense of only reaching a 0.639 recall. We thus find that by increasing our threshold to 0.98, we can achieve a realistic FPR at the expense of recall. For the rest of this work, we utilize a softmax probability threshold of 0.98. Our work thus likely represents a conservative estimate of the amount of synthetic articles online.

### News Dataset and Classification Pipeline

Having described the DeBERTa-based model that we use to identify machine-generated/synthetic articles, we now describe our datasets of scraped news articles.

#### Website List.

Between January 1, 2022, and May 1, 2023, we gather all articles published from 3,074 news websites.¹⁰ Our list of websites consists of domains labeled as “news” by Media Bias Fact Check¹¹ and by prior work (Hanley, Kumar, and Durumeric 2023). Within our list of news sites, we differentiate between “unreliable news websites” and “reliable news websites.” Our list of unreliable news websites includes 1,112 domains labeled as “conspiracy/pseudoscience” by mediabiasfactcheck.com as well as those labeled as “unreliable news”, misinformation, or disinformation by prior work (Hanley, Kumar, and Durumeric 2023; Barret Golding 2022; Szpakowski 2020). Our list of “unreliable” or misinformation news websites includes websites like realjewnews.com, davidduke.com, thegatewaypundit.com, and breitbart.com. We note that despite being labeled unreliable every article from each of these websites is not necessarily misinformation.

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¹⁰We had ChatGPT rewrite each article by supplying the prompt “Rewrite the following news article in your own words:” followed by the article.

¹¹https://mediabiasfactcheck.com/
Our set of “reliable” news websites consists of the news websites that were labeled as belonging to the “center”, “center-left”, or “center-right” by Media Bias Fact Check as well as websites labeled as “reliable” or “mainstream” by other works (Hanley, Kumar, and Durumeric 2023; Barret Golding 2022; Szpakowski 2020). This set of “reliable news websites” includes websites like washingtonpost.com, reuters.com, apnews.com, cnn.com, and foxnews.com. Altogether after removing duplicates and unavailable websites, we scraped 1,962 “reliable news” or mainstream websites.

We note that to later understand how websites of varying popularity/size have used machine-generated articles on their websites, we strate our list of websites by their popularity using ranking data provided by the Google Chrome User Report (CrUX) (Ruth et al. 2022). We note that the CrUX dataset, rather than providing individual popularity ranks for each website, instead provides rank order magnitude buckets (e.g., top 10K, 100K, 1M, 10M websites). As such, we analyze our set of websites in the following buckets: Rank < 10K (125 websites), 10K < Rank < 100K (511 websites), 100K < Rank < 1M (1,164 websites), 1M < Rank < 10M (802 websites), and finally Rank > 10M (472 websites).

**Article Collection.** To collect the articles published by our set of news websites, we queried each website’s RSS feeds (if available) and crawled the homepages of each website daily from January 1, 2022, to May 1, 2023. Upon identifying newly published articles, we subsequently scraped websites using Colly\(^{12}\) and Headless Chrome, orchestrated with Python Selenium. To extract the article text and publication date from each HTML page, we parsed the scraped HTML using the Python libraries newspaper3k and html.parser.

Given that many of our websites (e.g., cnn.com) have multilingual options, we use the Python langdetect library to filter out all non-English articles. To prepare data for classification, we remove boilerplate language using the Python justext library and then remove URLs, emojis, and HTML tags. Further, to ensure the reliability of our classifications, we only classify news articles that are at least 1000 characters (approximately 140 words) long. Altogether, from our selection of 3,074 websites, we gathered 15.90M articles that were published between January 1, 2022, and May 1, 2023. Finally, we utilize our DeBERTa+Pert+Para model at a softmax classification threshold of 0.98 to classify each article as either human-written or machine-generated. Classifying all 15.90M articles took approximately 65.8 hours using an Nvidia RTX A6000 GPU.

**Ethical Considerations.** With the rise of LLMs, many companies have widely scraped and gathered data from websites to fuel their models (Schappert 2023). As a result, websites ranging from Twitter to Reddit have begun to set up restrictions to ensure the privacy of their users and to protect their content from being used in other private companies’ generative models. While we do not train a generative model that could artificially produce convincing and seem-

\(^{12}\)https://github.com/gocolly/colly

Figure 1: The average percentage of synthetic articles for all, misinformation, and mainstream websites. We provide 95% Normal confidence intervals.

... uniquely unique reproductions of the texts that we utilize, we note the concern that our work raises. Our work, however, only studies the texts of our set of 15.90 million articles and classifies them as machine-generated or human-written. We do not seek to generate summaries or artificial rewrites of the content. In terms of web crawling for this data, as noted elsewhere (Singrodia, Mitra, and Paul 2019; Hanley, Kumar, and Durumeric 2023; Smith et al. 2013), website crawling and scraping remain pivotal for understanding and documenting what occurs on the Internet. Without scraping, understanding trends and how the Internet could potentially affect real life becomes impossible. As decided in Van Burn v. United States, publicly accessible information can be legally scraped as long as it is done ethically and does no harm to the site (Emily R. Lowe and Katrina Slack 2022). As such, we collect only publicly available data from our set of websites and follow the best practices for web crawling as in Acar et al. (2014). We limit the load that each news site experiences by checking for new articles daily at a maximum rate of one request every 10 seconds. The hosts that we scan from are identifiable through WHOIS, reverse DNS, and an HTTP landing page explaining how to reach us if they would like to be removed from the study. During our crawling period, we received no requests from websites to opt out.

5 The Rise of Machine-Generated Media

Having described our detection model and datasets, in this section, we analyze the relative change in the levels of synthetic content across our set of websites between January 1, 2022, and May 1, 2023. Specifically, we determine (1) whether there has been an increase in the use of synthetic articles, (2) if there has been an increase in their use, which sets of websites are driving this increase, (3) what synthetic articles are topically about, and (4) whether the introduction of ChatGPT has had an effect on the prevalence of synthetic articles.

**Large-Scale Trends in Machine-Generated Media.** To begin, we plot the average percentage of synthetic news articles per website across our dataset between January 1, 2022, and May 1, 2023, in Figure 1. In aggregate, across all 3,074 sites, we see that 1.07% of all articles published in January 2022 (13,447 of 1,254,959) were synthetically gen-
erated. However, by May 2023, the fraction of synthetic articles nearly went up to 1.76% (26,006 of 1,469,612 articles), a 65.1% relative increase (nearly doubling in raw amount).

We observe that our set of reliable/mainstream websites typically had a greater percentage of synthetic articles at the beginning of 2022 compared with misinformation/unreliable news websites. While only 0.34% of articles on average per domain from our set of misinformation websites were classified as machine-generated in January 2022, 0.93% of articles on average from our set of mainstream/reliable websites were classified as machine-generated. This result is consistent with prior observations that many news websites have begun to use automated services to write quick, often financial-related articles (Section 2). For example, the beginning of one of the articles from Reuters (Figure 2) classified by our system as being machine-generated simply contained simple information about the direction of particular markets and funds.

Figure 2: Example first paragraph of an article classified by our system as machine-generated/synthetic.

We finally note that we observe a small but noticeable dip in the percentage and amount of synthetic content during 2022 and 2023 (Figure 5). While between January 1, 2022, and May 1, 2023, reliable/mainstream news websites had a 55.9% relative increase (0.52% absolute percentage increase) in their levels of synthetic content, misinformation websites had a 502% relative increase (1.71% absolute percentage increase). Starting from a lower base, we thus see a substantial increase in the number of synthetic articles from unreliable/misinformation websites.

Furthermore, as seen in Figure 3, we further observe that an increasing number of news outlets published at least one synthetic article within any given 30-day time frame. Across our period of study, the number of mainstream websites that published at least one synthetic article increased from 696 (35.5% of mainstream websites) in January 2022 to 936 (47.7%) in April 2023. Similarly, the number of misinformation websites that published at least one synthetic article increased from 117 (10.6% of misinformation websites) to 188 (16.9%).

To confirm these initial findings, we further examine the increase in common idiosyncratic error messages often returned by ChatGPT. Specifically using a list of error messages including “my cutoff date in September 2021”, “as an AI language model”, and “I cannot complete this prompt” that the company News Guard (Sadeghi and Arvanitis 2023) has used to detect AI-generated websites, we gather every article among our 15.90 million articles that utilized such message: altogether 570 articles from 280 domains. Amongst these websites, the top domains of these articles included forbes.com (32 articles), dailymail.co.uk (29), fairobserver.com (19), theregister.com (13), and patheos.com (13).

As seen in Figure 4, we find that while at the beginning of 2022, there were seemingly no such error messages within our set of articles, by the end of April 2023, there were nearly six of these articles each day. We note that this graph also mirrors the behavior of the percentage of machine-generated articles that our DeBERTa detector found amongst all of our websites. Together, these results confirm that there has been a noted increase in the use of synthetic content generation by our set of news websites in 2022 and 2023.

We finally note that we observe a small but noticeable dip in the percentage and amount of synthetic content in Figures 5 (particularly among misinformation websites) and 4 between February and March 2023. We find that for Figure 5, unreliable websites such as pluralist.com, helsinkitimes.fi, and thelist.com, in particular, drove the ini-
Figure 5: The average percentage of machine-generated/synthetic articles for misinformation/unreliable and mainstream/reliable news websites at different striations of popularity according to Google Chrome User Report (CrUX) from October 2022. All striations of misinformation websites experienced a small uptick of machine-generated content around November 30, 2022, the release date of OpenAI’s ChatGPT. **We note that the scale of synthetic content is much larger for websites with popularity rank >10M.**

<table>
<thead>
<tr>
<th>Jan. 2022</th>
<th>CrUX Rank</th>
<th>April 2023</th>
<th>% Syn.</th>
<th>CrUX Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>opensource.org</td>
<td>&lt;100K</td>
<td>thelist.com</td>
<td>26.0%</td>
<td>&lt;100K</td>
</tr>
<tr>
<td>theodysseyonline.com</td>
<td>&lt;100K</td>
<td>thefrisky.com</td>
<td>26.0%</td>
<td>&lt;100K</td>
</tr>
<tr>
<td>logically.ai</td>
<td>&lt;10M</td>
<td>northkoreatimes.com</td>
<td>23.6%</td>
<td>&lt;1M</td>
</tr>
<tr>
<td>egypttoday.com</td>
<td>&lt;1M</td>
<td>egypttoday.com</td>
<td>23.1%</td>
<td>&gt;10M+</td>
</tr>
<tr>
<td>sourcewatch.org</td>
<td>&lt;1M</td>
<td>waynedudee.com</td>
<td>20.1%</td>
<td>&lt;1M</td>
</tr>
<tr>
<td>theqant.com</td>
<td>&lt;100K</td>
<td>ancient-origins.net</td>
<td>15.3%</td>
<td>&lt;100K</td>
</tr>
<tr>
<td>bleacherreport.com</td>
<td>&lt;10K</td>
<td>entrepreneur.com</td>
<td>14.9%</td>
<td>&lt;100K</td>
</tr>
<tr>
<td>africanews.com</td>
<td>&lt;1M</td>
<td>bignwsnetwork.com</td>
<td>14.4%</td>
<td>&lt;1M</td>
</tr>
<tr>
<td>worldpopulationreview.com</td>
<td>&lt;100K</td>
<td>logically.ai</td>
<td>14.6%</td>
<td>&lt;10M</td>
</tr>
<tr>
<td>lawweekly.com</td>
<td>&lt;1M</td>
<td>bignwsnetwork.com</td>
<td>14.5%</td>
<td>&lt;1M</td>
</tr>
</tbody>
</table>

Table 6: Websites with the largest percentage of synthetic content in January 2022 and in April 2023.

Most popular misinformation/unreliable websites (e.g., breitbart.com, zeroncheg.com) and mainstream/reliable websites (e.g., cnn.com, foxnews.com), synthetic articles enjoyed only a smaller 0.74% (191% relatively) and a 0.35% (26.6%) increase overall. Indeed, calculating the websites with the most machine-generated content, we again observe in Table 6 that the websites that had the largest amounts of synthetic content were all fairly small or unpopular small.

**Topics Addressed by Synthetic Articles.** While misinformation websites and less popular websites have seen the largest increase in the use of synthetic articles, many reliable and large news websites also heavily use synthetic articles. However, as noted in Section 2, many reliable news sites have acknowledged their use of these machine-generated articles and utilize them in a benign manner. To understand different websites’ use of synthetic articles, in this section, we analyze the topics addressed by synthetic articles among different types of websites and how this has changed between January 2022 and May 2023.

To identify the topics within our identified set of machine-generated articles, we train a DeBERTa-based classifier to identify the topic of an article based on its text. As training data, we utilize the News Catcher Topic Labeled dataset, which contains topic labels for 106,395 different articles belonging to 8 different categories {Business, Entertainment, Health, US/Nation, Science, Sports, Technology, and World}. We note while the original dataset only contained the title of each article, the dataset also included the original URL. As such, using the method outlined in section 4, we gather the set of articles listed in the dataset and subsequently train a DeBERTa-based classifier to correctly label articles based on their content. We note that a significant portion of these URLs were not available; as a result, we trained our model on a subset of 79,000 articles from the original dataset, further removing articles that were less than 1000 characters. Keeping out a 10% of this dataset as a test dataset, upon training, we achieve a 0.819 $F_1$ score an average of 0.819 precision across the eight categories. Once

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13 https://www.kaggle.com/datasets/kotartemiy/topic-labeled-news-dataset
and human-written articles from misinformation websites for each topic category.

Table 7: Odds Ratio for the amounts of synthetic and human-written articles from misinformation websites for each topic category.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Odds Ratio</th>
<th>Topic</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entertainment</td>
<td>0.57</td>
<td>Science</td>
<td>1.56</td>
</tr>
<tr>
<td>Business</td>
<td>1.45</td>
<td>Sports</td>
<td>0.78</td>
</tr>
<tr>
<td>Health</td>
<td>0.96</td>
<td>Technology</td>
<td>0.65</td>
</tr>
<tr>
<td>Nation</td>
<td>1.11</td>
<td>World</td>
<td>0.88</td>
</tr>
</tbody>
</table>

Table 8: Odds Ratio for the amounts of synthetic and human-written articles from mainstream websites for each topic category.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Odds Ratio</th>
<th>Topic</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entertainment</td>
<td>0.78</td>
<td>Science</td>
<td>1.50</td>
</tr>
<tr>
<td>Business</td>
<td>0.68</td>
<td>Sports</td>
<td>0.43</td>
</tr>
<tr>
<td>Health</td>
<td>2.31</td>
<td>Technology</td>
<td>0.26</td>
</tr>
<tr>
<td>Nation</td>
<td>0.84</td>
<td>World</td>
<td>1.30</td>
</tr>
</tbody>
</table>

Table 9: Odds Ratio for the amounts of synthetic articles between misinformation and mainstream websites for each topic category. As seen above, misinformation websites are more likely to have synthetic articles about Entertainment, Health, Science, US/Nation, and World-related topics compared to mainstream websites.

![Figure 6: The plurality of synthetic articles from mainstream/reliable websites is related to the Business topic. In contrast, the majority of synthetic articles from misinformation/unreliable websites are related to Entertainment, World affairs, and US/Nation current events.](image)

Reuters have utilized synthetic articles to give updates on financial markets (Figure 2). Furthermore, again calculating the odds ratio between the number of synthetic and human-written articles for each of our topic categories, as seen in Table 8, among our set of mainstream websites, relative to their own topic proportions, mainstream websites are most likely to utilize synthetic articles for Science and Business topics. This again reinforces prior reporting about the use of synthetic articles among mainstream websites.

Finally, calculating the odds ratio (Table 9) between the rates of usage of synthetic articles per category, we further observe that misinformation websites, throughout our period of study were more likely to utilize synthetic articles on topics related to Entertainment, Entertainment, US/Nation-current events, and Science, and World affairs. In contrast, mainstream websites were more likely to utilize synthetic articles for Business, Technology (very small proportion), and Sports.

**Estimating the Impact of ChatGPT.** As seen in the previous sections, misinformation websites and less popular websites saw the largest increases in the use of synthetic articles. In order to estimate how the introduction of ChatGPT specifically may have affected the levels of synthetic content on news websites, we now utilize an interrupted-time-series analysis. Namely, we examine whether there was a direct jump in the number of synthetic articles above expectation following the release of ChatGPT on November 30, 2022 (OpenAI 2022).

As seen in Table 10, after the release of ChatGPT on
We note that while we sampled our dataset from a large set of 3,074 news websites and gathered over 15,903 articles, we did not gather articles from every news website and focused on English-language media. As such, our results largely do not apply to non-English media. Similarly, because we used pre-defined lists of misinformation websites, our work largely misses the probable existence of new misinformation websites that appeared since the launch of ChatGPT.

Because we take a conservative approach to our estimation of machine-generated/synthetic texts and due to our removal of articles with characters lengths less than 1000 characters, the absolute numbers presented in this paper are only rough estimates of the percentage of articles on a given website that are machine-generated. As illustrated by Sadasivan et al. (Sadasivan et al. 2023), reliable detection of these short texts is near impossible/largely impractical as large language models become more complex. As shown by Sadasivan et al. (Sadasivan et al. 2023), as LLMs come to more closely match the distribution of written human language, the distinction between human-written and machine-generate texts disappears. As such, we note that while we manage to create a somewhat reliable detector in this work for longer articles for several released and public models, as more advanced and powerful models are developed, effective detection will be more difficult. Similarly, it has been shown that heavily human-edited machine-generated similarly are very difficult to detect as machine-generated (Mitchell et al. 2023) and in this work, we do not seek to detect these instances. As such, due to our conservative approach, our absolute percentage estimates are likely underestimates.

Furthermore, due to the limitations of our approach in building a model to estimate the relative increase in machine-generated texts on news websites, our models are not universal classifiers for synthetic texts. Most newspapers and outlets (as of early 2023), are not trying to purposefully evade AI detectors. Our models, which were trained on newspaper data from a given set of websites, are built for a particular context and cannot serve to universally detect synthetic texts.

Detection of Machine-Generated Media. We find that by training on data from a wide variety of generative models, we were able to outperform Open AI’s released RoBERTa detector as well as several other released detectors (Pu et al. 2022). Furthermore, we find, as in prior works (Gagiano et al. 2021; Pu et al. 2022), that including data from common attacks can increase overall detection accuracy. We argue that future detectors applied to real-world data should account for these techniques.

Small Websites and Synthetic Articles. As seen throughout this work, while larger more popular websites have been slower to adopt the use of AI-generated and synthetic content, smaller less popular websites in particular have shown the greatest relative increase in the use of synthetic (727% increase among the least popular misinformation websites and 369% increase among the least popular mainstream websites). We thus find that to fully understand the influence of synthetic media, as similarly argued by News Guard (Sadeghi and Arvanitis 2023), researchers must doc-

Table 10: Estimated absolute percentage increase immediately following the release of ChatGPT on November 30, 2022, in machine-generated articles (determined using an ARIMA-based interrupted time series analysis).

<table>
<thead>
<tr>
<th>Rank</th>
<th>Misin. Abs. Trend</th>
<th>Main. Abs. Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% Inc.</td>
<td>Trend % Inc.</td>
</tr>
<tr>
<td>All</td>
<td>+0.46%***</td>
<td>+0.006%**</td>
</tr>
<tr>
<td>Rank &lt; 10K</td>
<td>+0.16%***</td>
<td>+0.003%</td>
</tr>
<tr>
<td>10K &lt; Rank &lt; 100K</td>
<td>+0.11%</td>
<td>+0.01%</td>
</tr>
<tr>
<td>100K &lt; Rank &lt; 1M</td>
<td>+0.36%***</td>
<td>+0.000%</td>
</tr>
<tr>
<td>1M &lt; Rank &lt; 10M</td>
<td>+0.14%***</td>
<td>+0.005%</td>
</tr>
<tr>
<td>Rank &gt; 10M</td>
<td>+1.52%***</td>
<td>+0.005%</td>
</tr>
</tbody>
</table>

*p < 0.05, ** p < 0.01, *** p < 0.001

In this work, we implement a DeBERTa-based model to classify 15.90 million articles from 3,074 news websites as human-written or synthetic. We find that between January 1, 2022, and May 1, 2023, the percentage of synthetic articles produced by mainstream/reliable news increased by 55.9% while the percentage produced by misinformation/unreliable news websites increased by 502%. Estimating the effect of ChatGPT, we observe a noticeable jump in the percentage of synthetic articles from misinformation websites and unpopular mainstream news around its release. We now discuss several limitations and implications of this work.

Limitations. We note that while we sampled our dataset from a large set of 3,074 news websites and gathered over 15,903 articles, we did not gather articles from every news website and focused on English-language media. As such, our results largely do not apply to non-English media. Similarly, because we used pre-defined lists of misinformation websites, our work largely misses the probable existence of new misinformation websites that appeared since the launch of ChatGPT.
ument and study these less popular websites rather than just concentrating on the top and most frequently visited do-

The Rise of Synthetic Misinformation. We found that throughout 2022 and 2023, as large language models be-
came more widely accessible, the percentage of machine-
generated content on misinformation sites has had a 502% relative increase. While at the beginning of 2022, a lower percentage of misinformation/unreliable news websites’ content was synthetic (0.34% vs. 0.93%), we find that by May 2023, across all popularity brackets examined, misinformation websites had closed this gap (2.05% vs. 1.45%). Unlike popular mainstream websites, misinformation websites and unpopular mainstream websites experienced a noticeable jump in synthetic content after the release of Chat-
GPT (as determined by our interrupted-time-series analy-
sis). Furthermore, as shown by our topic analysis, misinformation websites have utilized these synthetic articles to address world affairs and health-related news more often than mainstream websites. While not every article posted on an unreliable/misinformation news website is necessar-
ily misinformation, the rapid adoption of synthetic methods by misinformation websites for articles addressing world af-
fairs and health news by these websites could have down-
stream negative effects. As such given the rapid adoption of the use of synthetic articles by misinformation and unpop-
ular websites, in particular, we argue for future studies of how misinformation websites have utilized these technolo-
gies and how the content of these types of articles spread to social media and the broader Internet.

References

Acar, G.; Eubank, C.; Englehardt, S.; Juarez, M.; Narayanan, A.; and Diaz, C. 2014. The Web Never For-
https://openai.com/blog/chatgpt/.


Paper Checklist to be included in your paper

1. For most authors...

(a) Would answering this research question advance science without violating social contracts, such as violating privacy norms, perpetuating unfair profiling, exacerbating the socio-economic divide, or implying disrespect to societies or cultures? Yes, our work largely
2. Additionally, if your study involves hypotheses testing...

(a) Did you clearly state the assumptions underlying all theoretical results? Yes, and where appropriate we have interpreted what these results mean

(b) Have you provided justifications for all theoretical results? NA

(c) Did you discuss competing hypotheses or theories that might challenge or complement your theoretical results? NA

(d) Have you considered alternative mechanisms or explanations that might account for the same outcomes observed in your study? Yes, in our limitations section, we discuss several alternative explanations for our data.

(e) Did you address potential biases or limitations in your theoretical framework? Yes, we addressed the potential biases and limitations of our classifier in Section 4

(f) Have you related your theoretical results to the existing literature in social science? Yes, see Section 2

(g) Did you discuss the implications of your theoretical results for policy, practice, or further research in the social science domain? Yes, we discussed how research should inform future AI detection systems and discussed the need to understand the growth of websites that primarily publish synthetic data.

3. Additionally, if you are including theoretical proofs...

(a) Did you state the full set of assumptions of all theoretical results? NA

(b) Did you include complete proofs of all theoretical results? NA

4. Additionally, if you ran machine learning experiments...

(a) Did you include the code, data, and instructions needed to reproduce the main experimental results (either in the supplemental material or as a URL)? Yes, we have included a redacted GitHub link

(b) Did you specify all the training details (e.g., data splits, hyperparameters, how they were chosen)? Yes, we have outlined these details in Section 3

(c) Did you report error bars (e.g., with respect to the random seed after running experiments multiple times)? Yes, we benchmark and test our models across multiple datasets to better give an indication of the robustness of our results. We further include error bars for our results

(d) Did you include the total amount of compute and the type of resources used (e.g., type of GPUs, internal cluster, or cloud provider)? Yes, we have outlined these details in Section 3

(e) Do you justify how the proposed evaluation is sufficient and appropriate to the claims made? Yes, we have outlined these details in Section 3

(f) Do you discuss what is “the cost” of misclassification and fault (in)tolerance? Yes, we have outlined these details in Section 3

5. Additionally, if you are using existing assets (e.g., code, data, models) or curating/releasing new assets...

(a) If your work uses existing assets, did you cite the creators? Yes, we have cited Pu et. al’s work (Pu et al. 2022)

(b) Did you mention the license of the assets? NA

(c) Did you include any new assets in the supplemental material or as a URL? Yes, we have included a redacted GitHub link to the URLs used in this project

(d) Did you discuss whether and how consent was obtained from people whose data you’re using/curating? Yes, we have outlined how we have obtained data from them

(e) Did you discuss whether the data you are using/curating contains personally identifiable information or offensive content? NA

(f) If you are curating or releasing new datasets, did you discuss how you intend to make your datasets FAIR?
Yes, our dataset is findable, accessible, interoperable, and reusable as we post in on GitHub and it consists of a list of urls.

(g) If you are curating or releasing new datasets, did you create a Datasheet for the Dataset? Yes, we outline in our GitHub page which domains are included within our dataset, (the methodology for collection is listed in the paper), and we document how it is supposed to be used. We note that our dataset just consists of a list of URLs as we do not release the news article contents.

6. Additionally, if you used crowdsourcing or conducted research with human subjects...

(a) Did you include the full text of instructions given to participants and screenshots? NA

(b) Did you describe any potential participant risks, with mentions of Institutional Review Board (IRB) approvals? NA

(c) Did you include the estimated hourly wage paid to participants and the total amount spent on participant compensation? NA

(d) Did you discuss how data is stored, shared, and deidentified? NA

A Reddit Users and Synthetic Articles

Having examined the increase in synthetic articles across the news ecosystem, we estimate whether Internet users are actually interacting with this machine-generated content more. To do so, we analyze social media users from Reddit’s overall interaction with synthetic articles.

Reddit Dataset. To understand Reddit users’ interaction with synthetic content, we first gather all Reddit submissions/posts and their associated metadata (e.g., date posted, the subreddit of the post, number of comments, etc...) that referenced an article published between January 1, 2022, and April 1, 2023, from one of the news websites in our dataset. To collect this Reddit data, we rely upon Pushshift (Baumgartner et al. 2020), which keeps a queryable replica of Reddit data, getting all available submissions posted between January 1, 2022, and March 31, 2023. Altogether, we identify 408,292 Reddit submissions that make use of 486,993 news articles (31,689 from misinformation/unreliable websites; 455,304 from mainstream/reliable news websites) from our list of URLs from 2022 and 2023. Among these articles, we identified 3,470 synthetic articles from mainstream websites and 247 synthetic articles from misinformation websites. We report the subreddits and news websites with the most synthetic articles that appear in our Reddit dataset in Table 11. We note that despite these low numbers, we perform this analysis to get an understanding of the broad trends in interaction with synthetic media on Reddit.

Ethical Considerations. We collect only publicly available data from Reddit. In addition, we did not attempt to deanonymize any Reddit user. We note that we utilize public Pushshift data that was collected before Reddit ultimately blocked Pushshift on May 1, 2023, for breaking their terms of service.

Figure 7: Percentage of Reddit submissions featuring news articles from between January 1, 2022, and March 31, 2023, that went to synthetic/machine-generated articles.

User Interaction with Synthetic Articles. In order to examine how Reddit users have interacted with synthetic articles, we plot the percentage of synthetic articles among Reddit submissions that featured an article from our 3,074 news websites (Figure 7). In addition, among the submissions that hyperlinked to an article from our news article dataset, we determined the percentage of Reddit comments that were on Reddit submissions that featured a synthetic article rather than a human-written one (Figure 8).

Mainstream Synthetic Articles. As seen in Figure 7, despite the overall relative percentage increase (56.5%) in the use of synthetic new articles by mainstream/reliable news websites, we do not see a correspondingly large percentage increase in the percentage of mainstream/reliable news submissions on Reddit that are synthetic. Between January 1, 2022, and March 31, 2023, we only observed a slight increase from 1.80% to 2.27% (a 25.7% relative increase). However, while synthetic articles in terms of proportions did not increase significantly among posted mainstream articles, in terms of raw numbers, we find that the daily average of mainstream synthetic article submissions went from 4.1 in January 2022 to 7.2 in March 2023 (up 75.6%). Similarly, we observe a raw increase in the average daily number of comments on these submissions from 329.9 comments to 3,134.0 comments, an 850% increase. However, as seen in Figure 8, in terms of the percentage of comments that went to submissions that featured synthetic articles, this corresponded to an absolute percentage decrease of 1.57%.

We further determine whether these machine-generated articles tend to receive more or less interaction from Reddit users. Performing a pairwise comparison on a domain basis of the number of comments on human-written articles against synthetic articles, we determine, we find, after controlling for the particular website, that on average synthetic articles from mainstream websites tend to receive approximately 5.83 fewer comments from Reddit users than human-written articles. Thus, while there has been a slight increase in the percentage of synthetic articles on Reddit from our set of mainstream websites, machine-generated articles

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14We apply a Mann–Whitney U-test and find this difference to be statistically significant (i.e., $p \approx 0$).
Table 11: Subreddits, misinformation websites, and mainstream websites with the most synthetic Reddit submissions. As seen above, the subreddits and news sites with the most posted articles largely concern money/business, sports, and daily updated news reports.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>nofilternews</td>
<td>872</td>
<td>dailymail.co.uk</td>
<td>124</td>
<td>investopedia.com</td>
<td>500</td>
</tr>
<tr>
<td>autotldr</td>
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<td>15</td>
<td>reuters.com</td>
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<td>cnbc.com</td>
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<td>10</td>
<td>newsweek.com</td>
<td>161</td>
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<tr>
<td>backfieldvacio</td>
<td>142</td>
<td>townhall.com</td>
<td>10</td>
<td>bleacherreport.com</td>
<td>153</td>
</tr>
</tbody>
</table>

Figure 8: Percentage of Reddit comments on news submissions between January 1, 2022, and March 31, 2023, that went to synthetic/machine-generated articles submissions.

from these mainstream/reliable websites were on average less popular on Reddit than human-written articles.

Misinformation Synthetic Articles. As seen in Figure 7, the percentage of Reddit submissions that feature synthetic news articles from misinformation/unreliable news websites remained relatively stable. We observe only an increase from 2.50% in January 2022, to 2.60% in March 2023, a 3.55% relative increase. However, in terms of raw numbers, we observe that while on average 0.3 synthetic articles were featured in Reddit submissions each day in January 2022, this increased to an average of 0.6 in March 2023, a 100% increase. This corresponds to a similar increase in the number of comments on these submissions. Specifically, we observe a raw increase in the average total number of comments on these submissions each day from 7.2 comments to 13.83 comments, a 92.1% decrease. This corresponded with a 2.92% absolute percentage increase in the percentage of Reddit comments on synthetic articles (Figure 8).

We again determine the difference in the amount of users’ comments on synthetic and human-written articles. After controlling for the particular website, human-written content from our set of misinformation/unreliable news websites tends to receive approximately 5.61 more comments than synthetic content.\(^{15}\) This shows, again, on the whole, that human-written articles tend to see more engagement.

From this analysis, examining both mainstream and misinformation websites, we thus see that while there has been an uptick in the percentage of Reddit submissions that feature synthetic articles, there has not been a corresponding proportional increase in the percentage of Reddit comments interacting with these submissions.

\(^{15}\)We again apply a Mann–Whitney U-test and find this difference to be statistically significant (i.e., \(p \approx 0\)).