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A Robotic Reporter Still Lacks Creativity, but It Can Already Replace Human Journalists in Several Areas

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Abstract

Automated journalism is experiencing rapid advancements, prompting concerns among certain journalists who fear potential job displacement by robotic reporters. Conversely, there is a cohort of journalists embracing this progress, viewing the involvement of robotic reporters as a time-efficient measure and an avenue to engage in more creative forms of journalism. This article aims to explore topics in Czech Republic news that lend themselves to automation based on perplexity. Currently, the robotic reporter can generate articles in few domains (e.g., stock market news, fuel prices news, and traffic accident reports), while further exploration is underway for other areas. However, generating e.g. cultural news through automation remains challenging due to its less recurrent nature, as evidenced by perplexity measurements reflecting text complexity. Perplexity method can be used to determine which journalistic area is suitable for automated text. In this article, we focus on the Czech environment and the possibilities of automation and the reaction of selected Czech journalists who encounter automated texts in newsrooms. While automated journalism demonstrates superiority over human journalists in certain aspects, it still falls short in terms of creativity, an aspect where artificial intelligence remains unable to replace humans. Nevertheless, the robotic reporter can serve as an invaluable assistant to editors and reporters in their work. Consequently, the newsroom landscape is evolving, accommodating the integration of automated content editors.

Keywords

AI journalism, automated journalism, newsroom, journalists, perplexity, machine learning

Introduction

Artificial intelligence (AI) tools are increasingly being utilized in journalism to streamline various tasks, enhance the quality of reporting, and improve audience engagement. These tools leverage machine learning, natural language processing, and other AI techniques to assist journalists in

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various aspects of their work. This industry represents a rapidly evolving domain (Smith, Eckroth 2017), and this progress has notably permeated the news media industry, ushering in the era of automated journalism within newsrooms. Notably, two American companies, Narrative Science and Automated Insights, have emerged as pioneers in AI journalism by spearheading the development of algorithms for robotic reporters (Graefe 2016). As a consequence, robotic journalism has swiftly extended its reach across various journalistic domains, encompassing sectors such as stock market news, other business areas and sports. These fields of journalism, in particular, often rely on data that can be easily measured and quantified, making it the primary domain for the implementation of automated journalism (Galily 2018; Schapals 2020).

Prominent news agencies like the Associated Press, Reuters, and The New York Times have already integrated artificial intelligence elements into their daily editorial practices, and many other media outlets are following suit. Even in the Czech Republic, where the language complexity poses a challenge, there has been an embracing of this trend. For instance, the Czech News Agency (Česká tisková kancelář) harnessed templates and robotic journalism to produce coverage of the 2018 elections (Moravec 2020). Furthermore, researchers in the Czech Republic successfully developed software in 2019 that can autonomously report news from the Prague Stock Exchange. The automatically generated reports find application in the Czech News Agency and the Czech economic website, E15, both in its online and print versions (e15.cz 2020). This system enables the publication of routine reports at a considerably faster pace than human editors, who would otherwise have to monitor the Prague Stock Exchange's website (Moravec et al. 2020). As a result, the print version of the daily E15 now incorporates news reports pertaining to the Prague Stock Exchange, a feat previously unfeasible due to the tight 25-minute time window before the newspaper's deadline. Michal Šenk, the former deputy editor-in-chief of the daily E15, attested to the indispensability of the software's assistance in meeting deadlines, noting that a human reporter would be unable to craft such text within such a constrained timeframe (The former journalist from the daily E15, personal interview, July 24 2020).

Exploring automatable elements in journalistic texts through perplexity

Within automation, a specific technology is used so that the process or procedure performed needs minimal human assistance. In order to facilitate the work of journalists, or to prepare a basic version of the text associated with the collection and selection of facts and events, a generation of news texts has recently been automated in several domains. In the last three years, there has been a critical breakthrough in which systems based on artificial intelligence principles can build a sufficiently complex language model based on the learning process to generate results linguistically close to human-produced text (Brown et al. 2020). The latest versions of these systems, such as Generative Pretrained Transformer (GPT) (Radford et al., 2018), GPT-2 (Radford et al. 2019), GPT-3 (Brown et al. 2020), BERT (Devlin et al. 2018), RoBERTa (Liu et al. 2019), XL-Net (Yang et al. 2019), and ALBERT (Lan et al. 2019), can develop and maintain consistent links between text entities. However, the integration of provided facts, events, and their attributes is still very limited. The creation of a language model causes this problem during the learning phase. This phase is a kind of statistically weighted average of the volume of text submitted as training data. When generating text, the language model starts from a certain random point, either realistically randomly selected or purposefully entered by several sentences or facts (Lu et al. 2018; Jagfeld, Jenne, Vu 2018; Welleck et al. 2020). The most widely used metric for evaluating the quality of the language model is the quantity called perplexity (Shannon 1951; Brown et al. 1992; Jurafsky, Martin 2009).

Perplexity, as an evaluation metric, facilitates the identification of automation-suitable topics within the realm of journalism. In the context of natural language processing, perplexity serves as a viable option for assessing the performance of language models. Particularly, in the Czech language, certain topics emerge as viable candidates for automation, notably those grounded in extensive datasets, such as stock market news, traffic accidents, and petrol prices.

Conversely, the automation of specific domains, such as culture and investigative journalism, presents notable challenges. These domains demand sophisticated storytelling, nuanced interpretation, and contextually rich narratives that are inherently complex to replicate through automated processes while avoiding hallucianation issues. Human intuition, creativity, and critical thinking remain indispensable for crafting compelling and insightful journalistic content in these areas. Creativity is an indispensable aspect throughout the entire journalistic process, as emphasized by Deuze (2019). Ali and Hassoun (2019) highlight the limitation of algorithms in generating outputs beyond the constraints of their original programming framework, ultimately preventing them from reaching the highest echelons of creativity. Nevertheless, this form of creativity is currently not deemed essential for the news produced through automated journalism. In contrast, computer scientist Murray Shanahan presents an opposing stance, contending that artificial intelligence holds the capacity to match human capabilities, given that both human brains and computers adhere to the laws of physics (Miller 2019).

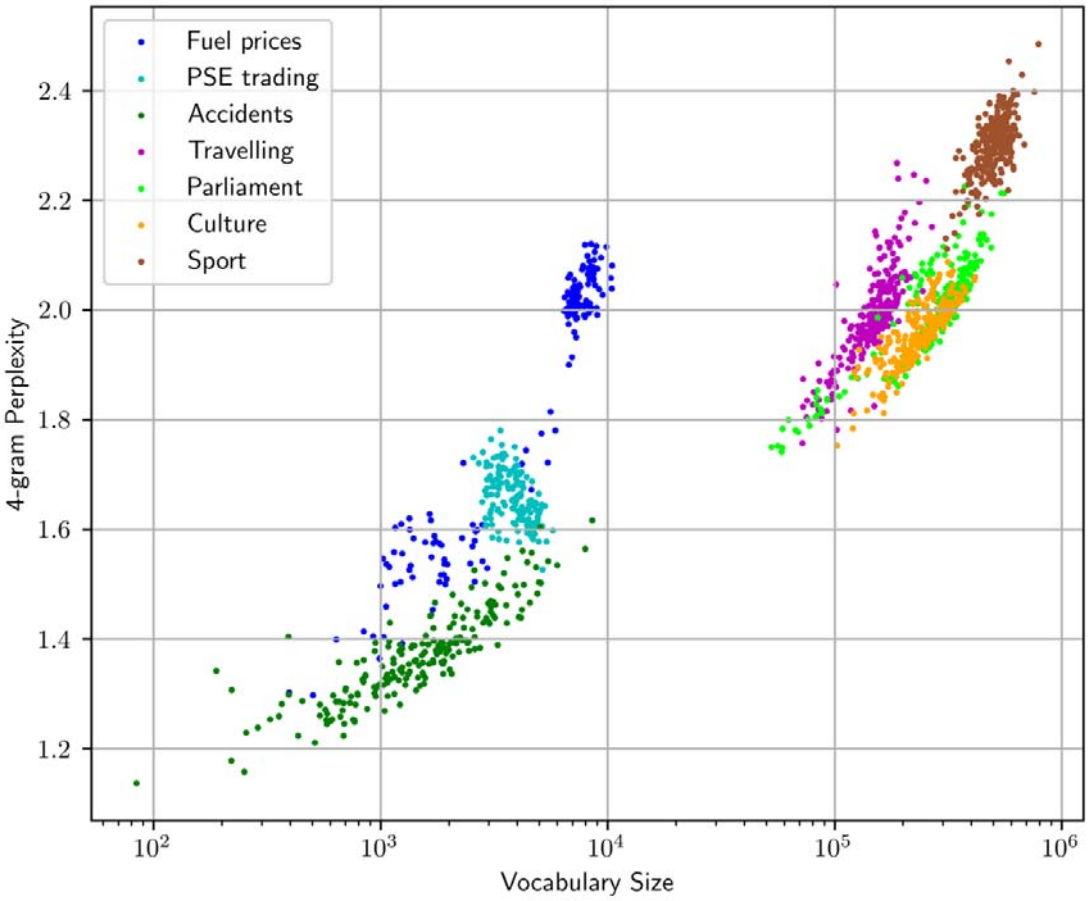
The growing trend of newsrooms in the Czech Republic increasingly adopting automatically generated texts raises pertinent questions about the potential impact on journalist employment. While automation offers undeniable advantages in terms of efficiency, speed, and scalability, concerns arise regarding potential redundancies among journalists.

The newsroom is gradually changing, and more robotic reporters are coming

Artificial intelligence extension the previous innovations that have been implemented in journalism, such as the telephone, the internet, etc. Currently, automated journalism helps journalists in several aspects, including, for example, content production (Lemelshtrich Latar 2018). Journalism is developing very fast and different areas are entering newsrooms, such as computer science and other technical fields. That is why it is important for newsrooms to have people who can do programming or analyze big data (Mayer-Schönberger, Cukier 2013). Many newsrooms are already changing. Natural language generation software could have two consequences. It could replace some newsroom positions because software can produce texts faster and more accurately than human reporters (Cleary, Cochie 2011). This software could also improve the skills of some employees (Rottwilm 2014). Boden (2009) argued that artificial intelligence can mimic human creativity. This also leads to the idea that robotic reporters will replace human journalists. This can already be seen in some newsrooms where a robotic reporter appears in various positions such as an editor (Lemelshtrich Latar 2018). This technical progress in journalism thus changes the established journalistic practice and staffing of newsrooms (Gynnild 2014). Furthermore, there are apprehensions regarding the potential displacement of journalists from their professions, which could result in job loss. Carlson (2015) concluded that apart from news writing, automated technologies are progressively assuming responsibilities that were conventionally undertaken by human journalists. He expressed concerns regarding the future of journalistic labor, the composition of news, and the underlying basis of editorial authority, viewing the automation of journalism as significantly "disruptive".

Many expert studies focus on machine-produced content (Graefe et al. 2018; Waddell 2018; Wölker, Powell 2018; Marconi, Siegman, Machine Journalist 2016). Some research shows that texts from robotic reporters may compete with classical articles created by humans (Graefe et al.

Figure 1: Relationship between vocabulary size and text perplexity for seven thematic domains in the Czech News Agency's corpus (categories: fuel prices, PSE trading, accidents, travelling, parliament, culture, and sport)



Source: own processing 2021.

2018). For example, the Associated Press began utilizing automated content in 2013, focusing on content that human journalists would not have enough time to produce. A year later, they used automated content to evaluate the quarterly production of U.S. publicly traded companies (Tata Consultancy Services 2016). Clerwall (2014) claims that readers did not distinguish texts written by a human journalist from those created by a robotic reporter, which demonstrates the quality of these texts. This is one of the reasons journalists are afraid of these technological changes, as they may deprive them of their jobs, but on the other hand they make some work procedures easier (Powers 2012). According to Miroshnichenko (2018), it is not possible to replace human creativity, but it can replace human power in terms of fact that artificial intelligence can be used in journalism in other ways (for example, when processing the big data). The disadvantage of automated journalism is the high cost of creating programs and templates (Višnovský et al. 2019).

Method

We have combined several methods in our research. Semi-structured in-depth interviews (Bryman 2016) were conducted with 22 journalists from the economically oriented daily E15 and the Czech

News Agency. The newsrooms had the opportunity to work with an automatic text generating software. Interviews with journalists were conducted online via Google Meet. The interviews were an average of 45 minutes long and were held by two researchers who also have experience in journalism. The shortest interview lasted 22 minutes and the longest took 63 minutes. We have focused on journalists who have actively encountered automated journalism in their newsrooms and were thus able to respond to inquiries related to this topic.

As already mentioned, several topics are useful for automated news writing (Podolny 2015). Therefore, we used perplexity to calculate which areas are suitable for automation and which are not. One of the goals of this research is to show that there are news domains ideal for automating the generation of reports according to simple objective, measurable characteristics. Each such field can be characterized by vocabulary size, the richness of linguistic structures, and styles. In Figure 1, news from the same field creates clusters with similar vocabulary size and 4-gram perplexity reflecting the complexity of the field's linguistic style. We assume that a text generating system can describe simpler domains with fewer rules (i.e., fewer templates) from which messages are automatically composed based on input structured data sets. We define structured data sets as a set of data in which items are identified by keys that assign a semantic context to each data.

In our research, we aimed to answer three main research questions:

RQ1: What news domains can be automated in the Czech environment?

RQ2: Can a text from a robot reporter match a human journalist's output?

RQ3: Can the human journalist be replaced by a robot reporter?

The primary tool for assessing the complexity of language structures is perplexity, which measures how difficult it is to predict an unknown part of a text based on a known part of a text. In practice, the complexity of predicting the next word is typically measured based on the knowledge of several previous words. Perplexity of text can be computed relatively easily under feasible processing hardware requirements compared to the high demands required by tools built on GPT-3 or GPT-4 technologies. Although the term perplexity is commonly used in the field of natural language processing, it is not so widespread in the field of journalism. The concept of perplexity is based on evaluating the probabilities of word sequence (e.g., sentences) occurrences. Starting from the frequency theory, we measure the likelihood of a phenomenon as the occurrence ratio of a given phenomenon in many experiments (Cover, Thomas 1991). For example, if a word occurs 200 times in a text with 1600 words, then its probability of occurrence is 1/8. The associated probability determines the probability of a sequence of words in a given corpus of text or the possibility of generating such a sequence of words using a specific model. The distribution of sentence probability is called the language model (Jurafsky, Martin 2009).

This distribution describes both the linguistic rules of a given language and the transmitted semantic content. According to the concatenation rule, this probability can be expressed as the product of conditional probabilities. This describes the probability of occurrence of the next word, given the sequence of words preceding it. Conditional probability values are again estimated using the number of occurrences of individual subsequences of the arrangement. However, in practice, such a method of estimation is not possible. This is because of the huge number of possible longer sequences of words from a given dictionary. A dictionary can typically have up to a million different words, and this is computationally unmanageable. Therefore, the approximation of conditional probabilities is approached (with the help of conditional probabilities of appropriately selected shorter limited subsequences). The classical method of approximation is based on the property of Markov chains (Ching, Ng, Fung 2008; Gagniuc 2017), for which the next state is assumed to depend on only one current state. Since the following words in an ordinary text rely not only on

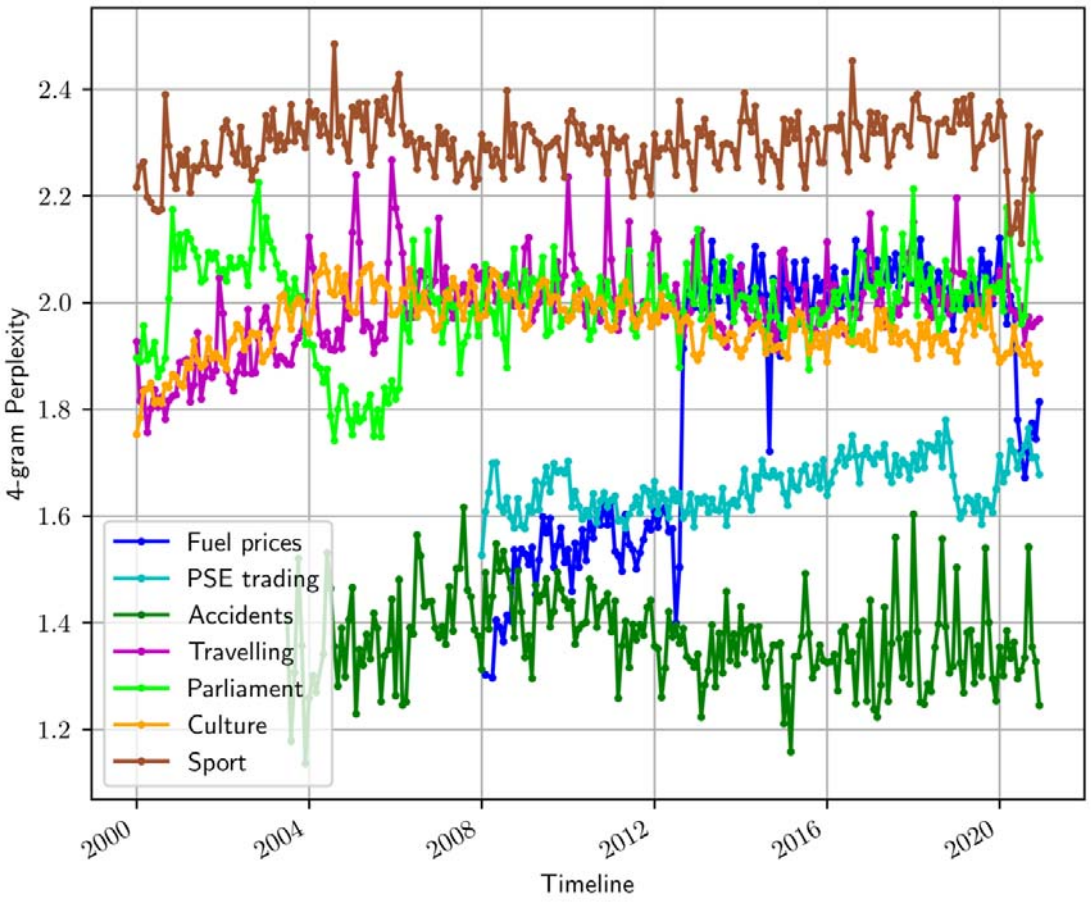
the present word but also on several other words that are not near the word, higher-order Markov chains are used in natural language processing (e.g., up to 6-8 previous terms). The conditional probabilities' values are then estimated again using the number of subsequences (Pinsky, Karlin 2011). Although the possibility is an expression of the uncertainty of a phenomenon, the concept of entropy has been defined in information theory, with which the uncertainty is better assessed (Shannon 1949). Shannon derived a uniquely determined entropy measurement function based on appropriately chosen assumptions. Perplexity is directly related to entropy.

To make the perplexity concept more comprehendible, we will demonstrate a very simplified, formal, not fully precise, but comprehensive, version of the basic idea in this paragraph. The reciprocal value of the probability of the event occurring in a sequence can be treated as the average return period. If we have an occurring probability of 1/8 for the word, then this word will appear on average once in eight consecutive words in many attempts. Hypothetically, we could generate such a sequence from precisely eight words, each having a probability of occurrence of 1/8. To determine which of these eight words was generated at a given position in the sequence, we need three dichotomous decisions. Each decision optimally divides the number of options in half. In three decisions, we can recognize precisely eight classes. In general, we need several decisions equal to the (binary) logarithm of the number of possible words to identify a given word in the sequence if the words at a given position in the line occur with the same probability. The average number of decisions that will need to be made at each position in a sequence corresponds to a quantity called entropy. Its value is determined in bits for the binary logarithm. By its value, entropy determines the complexity of the decision-making process (i.e., how many binary decisions need to be made on average to identify each word of the sequence). Perplexity can then be simply defined as the average number of words from which the predicted word needs to be determined. In this respect, it is only another expression of the same uncertainty. However, it is much easier to understand the statement that perplexity is eight (i.e., on average, we select from eight possible words at each position of the sequence) than if we had to understand that the entropy of a sequence is three bits, which means that we need, on average, three decisions to identify a word in each step (our own research 2021).

In our case, we approach the problem as determining the perplexity of a given sample of text, i.e., the perplexity of an empirical probability distribution. We determine the probability estimate of the approximation conditional probabilities using the frequencies of k-grams selected from the whole corpus of a specific message domain. With this approach, we evaluate the perplexity of a particular sample of text from the Czech News Agency's corpus. Thus, we are able to avoid inaccuracies injected by estimates of sequences that do not exist in the training set, but we are not able to comment on the conditions of generalization of such a language model. To address news text style changes introduced by the newsroom, the monthly evolution of message perplexity in the domain is then calculated using the cross-entropy between the empirical distribution of a given month and the empirical distribution of the domain throughout the whole evaluation period, which is considered as a standard reference.

Perplexity is usually defined by a formula as the n-th root of the reciprocal of the probability value of a given sequence of n words (Jurafsky, Martin 2009). The probability value estimates the number of possibilities, and the root calculates these possibilities on average for the individual terms of the respective sequence. In actual calculations, the entropy is usually calculated first and then converted to perplexity. The reason for this is to avoid the loss of computational accuracy by multiplying tiny values of probabilities and by adding the logarithm of the information values. Due to the limitations of the practical calculations above, entropy is approximated using conditional probabilities with a limited length of subsequences (Jurafsky, Martin 2009).

Figure 2: Perplexity of individual thematic domains of Czech News Agency news production (i.e., fuel prices, PSE trading, accidents, travelling, parliament, culture, and sport)



Source: own processing 2021.

Thus, starting from the definition formula of perplexity of sequence of words in the form (Jurafsky, Martin 2009).

$$PP(S) = P(w_1...w_n)^{-1/n}$$

we can derive its practical approximation using probabilities of -grams based on cross-entropy expressed as the Kullback-Leibler divergence over the corpus , that we used directly in our calculations

$$\widehat{PP(C)} = 2^{-D_{KL}(p(w_{j-K}...w_{j-1}w_j)||p(w_{j-K}...w_{j-1}))}$$

Results

In our study, we conducted experiments comparing the perplexity of Czech News Agency reports across various topics, including fuel prices, trading results on the Prague Stock Exchange, traffic accidents, parliament, culture, and sports. As depicted in Figure 2, the perplexity progression

for these thematic reports revealed that standard reports on fuel prices, stock exchanges, and accidents exhibited notably lower perplexity compared to reports from other thematic domains.

This decrease in perplexity has proven to be beneficial for many journalists at the Czech News Agency, simplifying their work and validating the efficacy of perplexity as a metric. A journalist from the Czech News Agency affirmed the agency's use of text automation for certain reports, particularly in regional newsrooms, where assignments often involve repeating information across 14 regions. This automation process involves inputting region-specific data, such as accident statistics or fuel prices (Journalist from the Czech News Agency, personal interview, March 10 2021).

Furthermore, a journalist with 20 years of experience at the Czech News Agency corroborated previous research on creativity and automated journalism (Miroshnichenko 2018; Galily 2018; Višnovský et al. 2019) and also suggested additional aspects that could be automated.

'I can imagine that it could go even further in the future. For example, it could be the navigability of roads in winter. Furthermore, it would be possible to automate, for example, snow reports from ski resorts. These are messages where you do not change much of the form and doesn't involve much creativity.' (Journalist from the Czech News Agency, personal interview, March 12 2021).

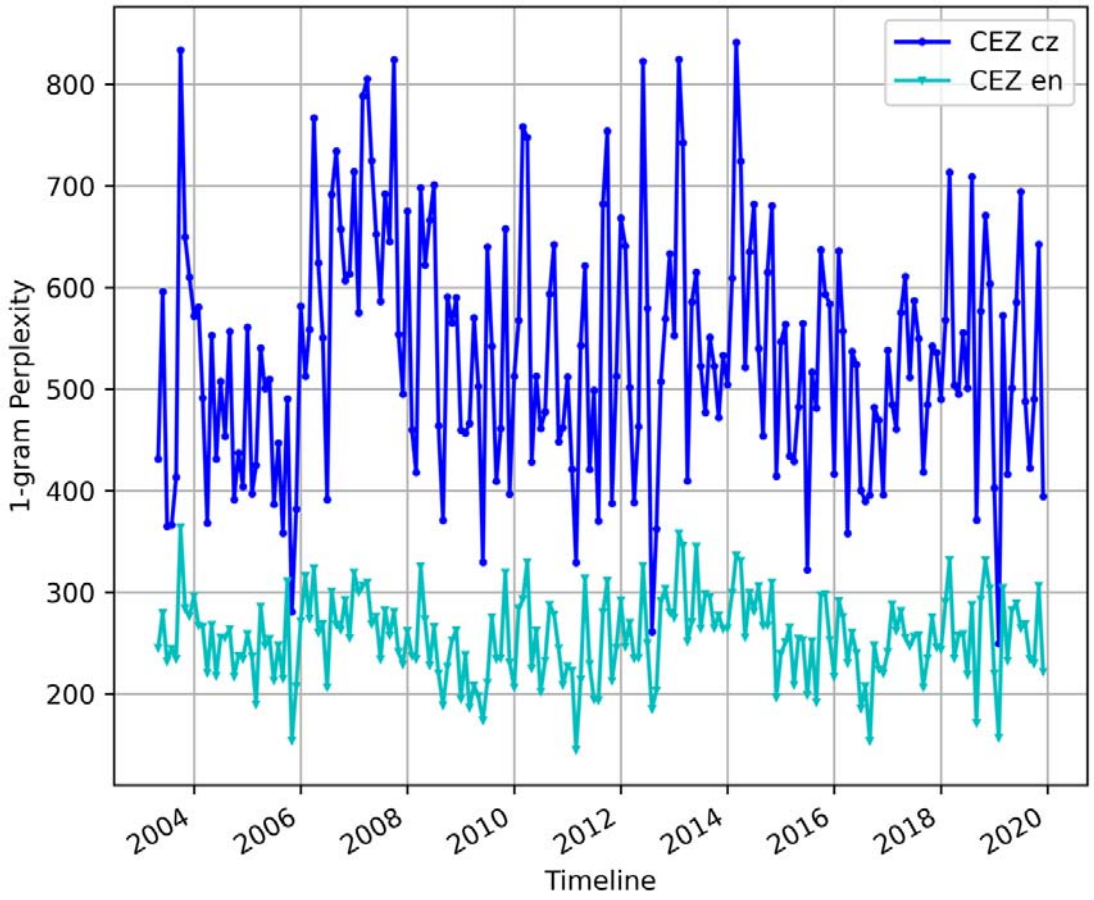
One thing was accented more than other in the interviews. Many respondents from the Czech News Agency and from the daily E15 would welcome the automation of texts where statistics and figures appear, because it is the most prone to error and, according to them, not a creative job. "*It would be good for a journalist not to have to rewrite numbers in tables, but to be able to do journalistic work. This means investigative journalism, interviews, and analysis*" (Journalist from the Czech News Agency, personal interview, March 2 2021). If a robot reporter will help human journalists in this way, the error rate in articles with a large amount of data would be reduced, as evidenced by the reactions of the editors.

From Figure 2, it is possible to observe seasonal fluctuations. For example, general reports on the winter traffic situation are simpler between December and February. It is also possible to observe the influence of economic pressures on the publication of reports. The years 2000 to 2006 can be characterized as a period when the variability of the message text was simplified. Similarly, at the beginning of the publication of reports on movements in petrol prices, much richer reports were generated, the structure of which gradually changed to a stable template.

We obtained an interesting result when evaluating the perplexity of messages providing the same content but in different languages (see Figures 3 and 4). Specifically, we compared the English and Czech versions of reports concerning the Czech National Bank, ČEZ Group, the Czech Statistical Office, industry, and trade. Messages were paired based on message lengths and publishing timestamps. We calculated perplexity as an approximation for phrases (k-grams) up to a length of five words. Predicting words without knowledge of the previous terms (1-gram) turned out to be more difficult for inflected Czech than English. However, it should be noted that we expected a difficulty factor much higher than only twice, which was what the results showed. In other words, the Czech language behaves in the prediction using isolated words and their endings as if it had twice as many words.

However, there was a surprise when perplexity was calculated for longer phrases. For example, the prediction of the next word when knowing the two previous words (3-grams) is easier in the perplexity sense for Czech than for English. This result can be explained by the fact that Czech has a much more flexible word order than English. However, this flexibility, which is used to emphasize parts of the transmitted information, is balanced by the rules of agreement for sentence fragment endings, such as agreement between stimulus and predicate, verb conjugation, gender/number agreement, adjective agreement, etc. The lower values of the perplexity of the

Figure 3: Perplexity assessment of messages providing the same content (in different languages), (1-gram)



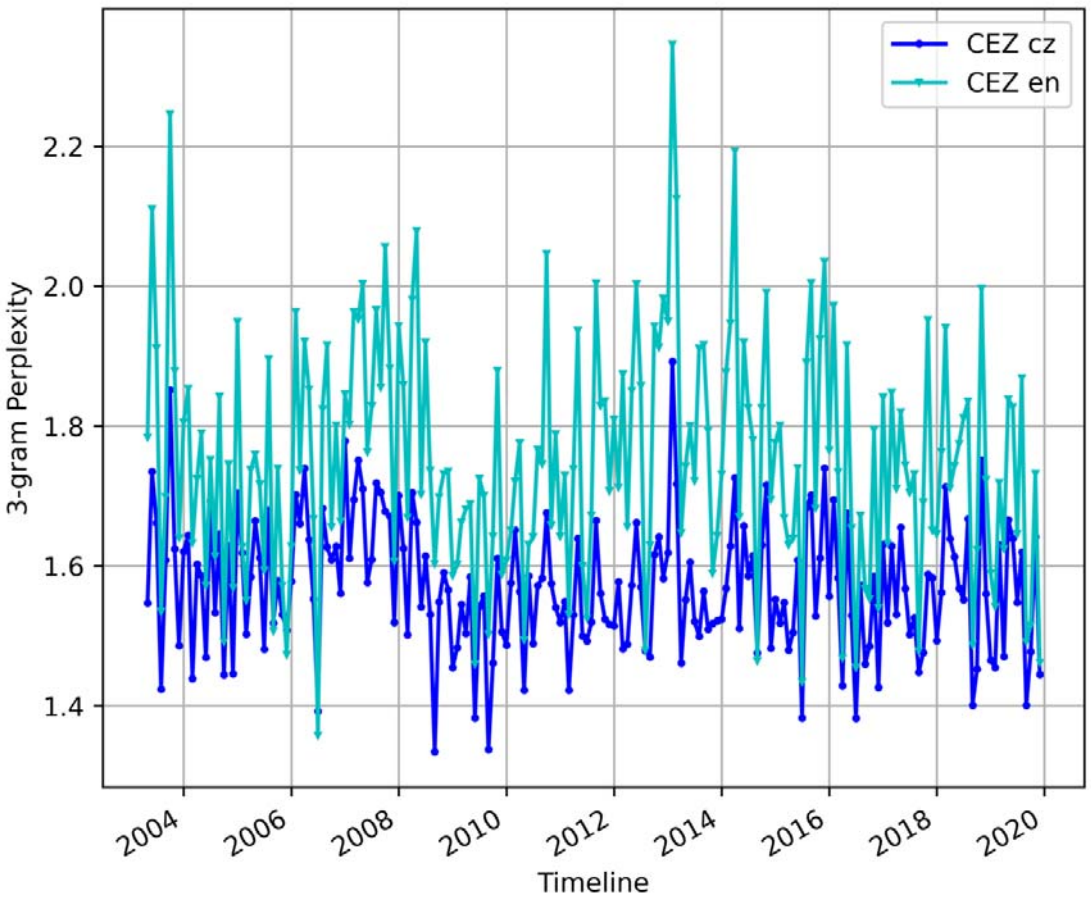
Source: own processing 2021.

Czech text suggest that with a suitable, albeit at present unknown, architecture of language models, it should be possible to achieve better results in the automatic processing of Czech texts than of English texts.

A robotic reporter should improve creativity

As the previous studies suggests (Miroshnichenko 2018; Višnovský et al. 2019), our qualitative research shows also that journalists want to improve the robotic journalist mainly in the fields of creativity and vocabulary. "*The robotic reporter for stock market news is repetitive. Some of the sentences that he produces are repeated. Information is repeated, for example, the stock market has fallen, risen, these shares have improved, these shares have deteriorated, and so on.*" This is how a journalist from the daily E15 described the work of a robotic reporter who produces Prague Stock Exchange news reports. This view was supported by another journalist from E15: "*The algorithm is not built to add a broader context to the text or to supplement, for example, a quote from the analyst.*" All employees of the Czech News Agency and the economic daily E15 agreed on the shortcomings that programmers should eliminate. They also positively evaluated the robotic reporter. Texts about stock market news and other sources that journalists have come across

Figure 4: Perplexity assessment of messages providing the same content (in different languages), (3-grams), source: own processing 2021.



Source: own processing 2021.

in their newsrooms tend to exhibit a lower degree of creativity but maintain factual accuracy. Conversely, contemporary systems like ChatbotGPT appear to demonstrate a heightened level of creativity but struggle to produce text that is consistently factually accurate. For instance, they may generate fabricate information, thereby displaying a creativity level beyond our expectations. The core challenge lies in determining how to effectively manage this creativity while ensuring that the integrity of the conveyed facts remains intact.

'If we have more automatically generated texts in the newsrooms, then we will have our hands free for another job. And the biggest advantage of a robotic reporter is definitely speed. It took about a half an hour to write reports about fuel prices in each region and now it is just a matter of checking what the computer has written, which only takes three minutes,' added a journalist with many years of experience in the Czech News Agency.

Journalists perceive automated journalism differently. Some experienced journalists fear for their jobs and others welcome relief from routine work. It depended on the experience level and the age of the journalist. Older colleagues are reluctant to learn new things, and some of them are a little worried about the future of their jobs. "*Now media owners can say that they have the robotic reporter who can write articles from the Prague Stock Exchange, so there is no need for the person who worked on it before,*" added a journalist who has many years of experience

working in the media. Some younger respondents were confident that they wrote better texts than the robotic reporter, even though they didn't have much journalistic experience. "*It may probably happen someday. But I'm not afraid of losing my job yet. The robotic reporter has not written better text than us yet,*" said a young journalist who has been working in this field for 3 years.

Most journalists saw the involvement of robotic reporters in newsrooms as a positive thing. "*I think human journalists will always be needed. It's just the way they work that is changing. People will be needed to process the information. And that's what the whole trade is based on,*" mentioned a journalist who has been working in the media for 19 years. The high cost of creating templates or texts by robotic reporters limit the development of automated journalism (Višnovský et al. 2019) and everything therefore depend on how much funds are media houses willing to provide for the further development of e.g., robotic reporters. Automated journalism is currently used in the area where articles are templated. It is primarily the field of sports and business journalism, where it is possible to obtain big data (Galily 2018). In the Czech Republic, it is the area of e.g., Parliamentary and Senate elections or fuel prices reports (Moravec et al. 2020), but some journalists have high expectations about automation in newsrooms. "*I'm very curious. The reality before us is that all content will be more automated. And it will be more widespread than it is now. On the other hand, I think there will still be a space for human journalists. They can do, for example, more analytical work or more extensive things. I'm not at all afraid that robotic reporters will take a job from someone in our newsroom now,*" mentioned a journalist who has 14 years of experience working in the media.

Conclusion and Discussion

In our analysis, we used the perplexity method, which can be implemented easily, to conclude which topics can be automated in journalism. There are several fields in the Czech environment in which a human journalist can be replaced by a robotic reporter. These include, for example, the stock exchange, news about traffic accidents or articles about fuel prices. These types of news do not require the intervention of a human journalist. According to executives, newsrooms are now looking for people who can combine the skills of a journalistic profession and also handle programming. This is especially needed in case an automated content tool needs to be fixed. Automated news covering these topics is already appearing in Czech newsrooms, primarily at the Czech News Agency and the economic daily E15. Other newsrooms either take this news from the Czech News Agency or human journalists still write these types of articles. Other areas of journalism that could be automated in the future are currently being explored. But human journalists dedicated to cultural news and journalism will certainly not lose their jobs. This area requires a lot of creativity and additional interactions (e.g. receiving quotes), which is why our research shows that it is not yet possible to automate these articles.

Experienced journalists see the creativity of robotic reporters as the biggest problem. This is what was most often said during the interviews. This could be the topic for the following research. Interdisciplinary research could investigate creativity level in automated texts. On the contrary, everyone praised the speed of article creation, which a human reporter cannot meet. For some, the robotic reporter was a benefit and for others a threat. Automated texts are established in newsrooms and texts from the Prague Stock Exchange are published without human intervention. The position of editor in the Czech News Agency is being strengthened. The editor checks texts from a robotic reporter, for example in the area of fuel prices. It is very likely that a robotic reporter will do even more work and produce more news content in the future, which is why some journalists are worried about their jobs. But this view wasn't taken by many of our respondents.

Most journalists positively receive a robotic reporter's help because they will have less work to do with template texts that they find boring and, conversely, more time to work more creatively.

It is important to recognize that while automation can streamline certain aspects of content production, it cannot fully supplant the unique contributions and skills of human journalists in domains where creativity and investigative acumen are paramount. Instead, the integration of automation should be approached as a complement to journalistic practice, allowing journalists to focus on more complex and value-added tasks while leveraging automated processes for data-driven or routine reporting.

As the media landscape continues to evolve, striking a balance between automation and human involvement in journalism becomes imperative. Responsible implementation of automation should prioritize the preservation of journalistic integrity, accuracy, and the promotion of informative and engaging storytelling. Future research endeavors should concentrate on exploring the potential for symbiotic relationships between human journalists and automated systems, seeking ways to enhance journalistic practices while addressing potential workforce implications. This approach can foster a harmonious coexistence between technological advancements and human expertise, ultimately elevating the standards of journalism in the modern era. Further research should also focus on the audience and how readers perceive articles written by a robotic reporter. We would recommend the Focus Group audience research combined with the Turing test (French 2000). This test aims to examine whether an AI system behaves intelligently compared to a human.

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