

UNIVERSITY OF TARTU  
Faculty of Science and Technology  
Institute of Computer Science  
Computer Science Curriculum

Olga Chemodanova

# Public Perception of Artificial Intelligence in Ukraine and Russia: News Media and Social Media

Master's Thesis (30 ECTS)

Supervisor(s) Rajesh Sharma, PhD

Tartu 2024

## **Public Perception of Artificial Intelligence in Ukraine and Russia: News Media and Social Media**

### **Abstract:**

Artificial intelligence is essential in various fields in today's society. Certain AI advancements have gained popularity and are being actively utilized by the public. In order to study how AI affects society and to establish appropriate regulations to guide its development, one can examine people's opinions about AI. The public's views incorporate expectations and emotions regarding the technology, especially its potential negative impacts. This analysis can assist in implementing ways to adjust society to the advances of AI. While AI is becoming more prominent, public perceptions, especially in Eastern Europe, have not been thoroughly investigated, this research closes the gap by examining the views of Ukrainian and Russian people on AI by analyzing online news media and social media discourse. Here we demonstrate that news mostly highlights the innovations in AI and its advantages, often neglecting potential hazards, whereas social media users frequently engage in discussions about a wider array of subjects, encompassing potential risks of AI. These findings indicate that in Ukraine and Russia, news mainly pushes the narrative of the advancements of AI to the general public, which can lead to the adoption of a one-sided perception of the technology by people. However, there is an interest in discussing possible risks of AI, reflected in social media users' AI anxieties. Grasping these viewpoints is essential for creating a thorough and balanced discussion of AI and its consequences in media, including news, as well as developing well-informed AI regulations.

### **Keywords:**

AI, Artificial Intelligence, public opinion, topic modeling, LDA, sentiment analysis, Eastern Europe, Ukraine, Russia

**CERCS:** P170 Computer science, numerical analysis, systems, control

## **Avalik arusaam tehisintellektist Ukrainas ja Venemaal: uudised ja sotsiaalmeedia**

### **Lühikokkuvõte:**

Tehisintellekt on tänapäeva ühiskonnas erinevates valdkondades hädavajalik. Teatud AI edusammud on populaarsust kogunud ja avalikkus kasutab neid aktiivselt. Selleks, et uurida, kuidas tehisintellekt ühiskonda mõjutab, ja kehtestada selle arengut suunavad vastavad regulatsioonid, saab uurida inimeste arvamusi tehisintellekti kohta. Avalikkuse vaated hõlmavad ootusi ja emotsioone seoses tehnoloogiaga, eriti selle võimaliku negatiivse mõjuga. See analüüs võib aidata rakendada viise, kuidas kohandada ühiskonda tehisintellekti edusammudega. Kuigi tehisintellekt on muutumas üha silmapaistvamaks, ei ole avalikkuse arusaamu, eriti Ida-Euroopas, põhjalikult uuritud, kuid käesolev uurimus vähendab lünka, uurides Ukraina ja Venemaa inimeste

seisukohti tehisintellekti kohta, analüüsides veebiuudiste meediat ja sotsiaalmeedia diskursust. Siin demonstreerime, et uudised tõstavad enamasti esile AI uuendusi ja selle eeliseid, jättes sageli tähelepanuta võimalikud ohud, samas kui sotsiaalmeedia kasutajad osalevad sageli aruteludes laiemal hulgal teemade üle, mis hõlmavad tehisintellektiga seotud võimalikke riske. Need leiud näitavad, et Ukrainas ja Venemaal levivad uudised peamiselt AI edusammude narratiivi laiemale avalikkusele, mis võib viia selleni, et inimesed võtavad tehnoloogiast ühekülgse ettekujutuse. Siiski on huvi arutada võimalikke tehisintellektiga seotud riske, mis kajastuvad sotsiaalmeedia kasutajate tehisintellekti ärevuses. Nende seisukohtade mõistmine on oluline, et luua põhjalik ja tasakaalustatud arutelu AI ja selle tagajärgede üle meedias, sealhulgas uudistes, ning samuti hästi informeeritud tehisintellekti eeskirjade väljatöötamiseks.

**Võtmesõnad:**

AI, tehisintellekt, avalik arvamus, teemade modelleerimine, LDA, sentimendianalüüs, Venemaa, Ida-Euroopa, Ukraina

**CERCS:** P170 Computer science, numerical analysis, systems, control

# Contents

<b>1</b>	<b>Introduction</b>	<b>5</b>
<b>2</b>	<b>Literature review</b>	<b>7</b>
2.1	Public Perception of AI Globally . . . . .	7
2.1.1	Public attitudes toward AI in various countries and cultures . .	7
2.1.2	Factors that influence AI perceptions . . . . .	10
2.2	Public Perception of AI in Ukraine and Russia . . . . .	13
<b>3</b>	<b>Methodology</b>	<b>16</b>
3.1	Data . . . . .	16
3.2	AI opinions operationalization . . . . .	17
3.3	Methods . . . . .	20
3.3.1	Topic modeling . . . . .	20
3.3.2	Sentiment analysis . . . . .	21
<b>4</b>	<b>Results</b>	<b>22</b>
4.1	News media . . . . .	22
4.2	Social media . . . . .	28
4.2.1	Gender differences . . . . .	30
4.2.2	City size differences . . . . .	33
<b>5</b>	<b>Discussion</b>	<b>36</b>
<b>6</b>	<b>Conclusion</b>	<b>38</b>
	<b>References</b>	<b>40</b>
	<b>Appendix A</b>	<b>51</b>
	<b>Appendix B</b>	<b>52</b>
	<b>Appendix C</b>	<b>54</b>
	<b>Appendix D</b>	<b>55</b>

# 1 Introduction

In the modern world, artificial intelligence (AI) plays a crucial role in many areas. AI is used in but not limited to the spheres of advertising, web search, smart homes, health, transport, food system, and the public sector (What Is Artificial Intelligence and How Is It Used?, 2020). Being widely used, AI is also discussed by the public. Indeed, there is a significant interest of people around the world in AI, which can be seen based on the monthly Google search volume of different generative AI tools (Why We Must Think Locally When Planning Globally With AI, 2024).

Researchers have identified many positive impacts of AI as well as many negative ones. The positive impacts include but are not limited to diminishing human errors, improving the speed of decision-making and various processes, and being valuable in the medical sphere (Maheshwari, 2023). However, AI can be harmful to society, as well. It is threatening the job market, can make personal data public, has a range of moral and ethical questions, and can sabotage social equality (Thomas, 2024). Thus, AI is an instrument that can be used for good and for harm. It is important to develop AI taking possible harms into account and implement the means of control of the AI. This way, the negative impacts of AI can be minimized.

To investigate the impact of AI on society and develop meaningful regulations of the technology to lead the development of AI in the right direction, one can investigate the opinions of people regarding AI. Public opinions can point at the expectations and feelings of people about this technology, in particular, at possible harmful and beneficial effects of it. Such analysis may help to adapt the realms of AI to the needs of society.

Perception of the public of AI varies in different parts of the world. That is why such analysis should be held across different countries. Europe is an important region in terms of technological and innovation development (Kuo, 2023; Ren, 2024; Statista, 2023; Statistics Explained, 2023). There is a relatively large number of works on the opinions about AI in Europe. However, few pieces consider the opinions of Eastern European citizens. Eastern Europe is also an important player in AI development and implementation (Mayo, 2024). Thus, the perceptions of AI of people from Eastern Europe should be studied.

The relevance of this study is the need to analyze the opinions of Eastern European citizens about AI to formulate a thoughtful policy in the area of AI that would take into account the interests and needs of people. Moreover, this analysis can lead to the strengthening of international cooperation and knowledge exchange in the area of regulating AI.

The research aims to study the opinions of Eastern Europeans, namely Ukrainian and Russian citizens, about AI, to understand the main tendencies and problems related to the perception of AI in these countries. The main research question is: What are the perceptions of Ukrainian and Russian citizens about AI? In particular, what are the main topics in the discourse of online media sources and social networks? The

following steps were identified:

- 1) To study the academic literature on the topic of opinions about AI:
  - to study what is known about the public perception of AI in the world;
  - to study what factors influence these perceptions;
  - to study what is known about the public perception of AI in Eastern Europe, in particular, Ukraine and Russia;
- 2) To find topics and sentiments in Ukrainian and Russian online news media discourse;
- 3) To find topics and sentiments in Ukrainian and Russian social media discourse.

The results of topic modeling demonstrated that both Ukrainian and Russian online news media discourse and Ukrainian and Russian social media users' discourse included topics about the research and development of AI, innovations in AI and its application in different spheres of life. At the same time, possible risks of AI were often ignored by the news media. Social media users, on the other hand, were found to discuss possible threats AI may bring more often. The language of online news and social media discourse analyzed via sentiment analysis was rather neutral throughout the time period.

The structure of this paper is as follows: Chapter 2 presents the literature review. It includes reviewing existing works on public perception of AI globally (section 2.1), in particular attitudes of people toward AI in different nations and cultures (Section 2.1.1), and factors affecting the perception of AI (Section 2.1.2). Public perceptions of AI in Ukraine and Russia is reviewed in Section 2.2. The methodology of the research is described in Chapter 3, with Section 3.1 being about the data used, Section 3.2 about AI opinions operationalization, and Section 3.3 explaining the methods used (3.3.1 - topic modeling and 3.3.2 - sentiment analysis). Chapter 4 presents the results of the research, in particular, 4.1 describes the results for news media and 4.2 - for social media. Sections 4.2.1 and 4.2.2 focus on the results of gender differences of the social media discourse, and city size differences. Results are followed by discussion (Chapter 5), which summarizes the main results, continued by conclusion (Chapter 6), which highlights the steps done for the analysis, presents the results in the broader context, and suggests the next steps for the research about AI opinions in Eastern Europe. After the references, one can find Appendices (the content of Appendices is described in each Appendix section).

## **2 Literature review**

### **2.1 Public Perception of AI Globally**

Understanding the perspectives on Artificial Intelligence (AI) in different countries and cultures is crucial for assessing its societal acceptance, adoption, and impact. This section explores studies that have examined global public attitudes toward AI, discussing the factors of these perspectives and identifying recurring themes or trends in how people view AI and its effects on society.

Before reviewing public opinions about artificial intelligence, it is important to give the definition of it. IBM company defined AI as a technology with which computers and machines can simulate intelligence of humans as well as their problem-solving skills (What is Artificial Intelligence (AI)?, n.d.). However, according to Neyazi et al. (2023), defining the concept depends on who is asked, i.e., to experts the concept lies in the area of machine learning and data science, and to others it is important to view AI from social and cultural aspects. Kelly et al. (2023) agreed that AI definition may differ and added that this means that people may have different concepts in mind when thinking about AI, so the acceptance of AI depends on the area in which it is used.

#### **2.1.1 Public attitudes toward AI in various countries and cultures**

In general, people across the world are aware of what AI is. A survey with more than 66 thousand respondents from countries around the world revealed that half of the respondents knew something about AI and around 10 percent were well educated about it (We Asked People Around the World How They Feel About Artificial Intelligence. Here's What We Learned., 2019). Another survey from eight countries with varying income levels had similar results: it showed that most participants were aware of the concept of AI (Kelley et al., 2019). Carmichael (2023) found similar results, and argued that most respondents from 31 countries claimed to have a good grasp of AI. What is more, the knowledge about AI was found to vary by different socio-economic factors. Younger adults, men, employed individuals, those with higher education levels, or individuals with higher incomes were found to be more likely to be knowledgeable about which products and services utilize AI. Having knowledge of what AI is, people expected it to affect their lives. Jackson (2022) showed that people across 28 countries expected significant changes in their daily lives over the next three to five years due to the use of AI in products and services. To conclude, people around the world are mainly aware of what AI is and think of it as a technology to affect their lives.

While people are aware of AI, there is a lack of understanding of the various ways it is used (Zhang & Dafoe 2019; Samayeva, 2023). Carmichael (2023) highlighted the unawareness of people about the different ways AI is used in daily life and showed that only around half of respondents from 31 countries were aware of which products

and services utilize AI technology. Another survey showed that although close to half of businesses have integrated AI into their operations, only five percent of those surveyed in the US believed that the everyday services they utilized, such as banking, online shopping, and streaming media, were AI-driven (Survey Shows Wide Gap in Consumer Sentiment on Artificial Intelligence, 2019). The authors have found that despite having some understanding of the terms and being able to recognize their use in certain technological applications, the unawareness of the presence of AI and machine learning in everyday technology was widespread in many countries of the world, including the developed ones. Even though the understanding of people about where AI is used is rather limited, the results of a survey showed that people believed it is crucial to comprehend the process behind AI decisions, even if making the system explainable leads to a decrease in accuracy (Ada Lovelace Institute and The Alan Turing Institute, 2023). Thus, while people may understand the basics of AI, they underestimate its inclusion in today's world. Having a limited understanding of AI usage for daily activities, they feel the need to understand the work behind the technology.

There are many reasons to think that the perception of AI is quite positive around the world. According to a survey, there was a general sense of optimism toward AI, particularly among technology executives (Edelman, 2019). The authors showed that both AI experts and the general population shared the belief that AI has the ability to revolutionize business, industry, and society, providing certain social services to an unparalleled extent and with remarkable quickness. Similar results were found by a recent Pew Research survey in America, Europe, and Asia that showed that 53 percent of respondents believed AI had brought the greatest benefit to society, compared with 22 percent who believed it had harmed society the most (Funk et al., 2020). Having improved people's lives, AI is also expected to bring mostly positive impacts on them in a decade (Northeastern University, 2018). The benefits of AI include improvements in customer experience, medical sphere, automation of tasks, decreasing of errors as well as advancements in games, finance, robotics, translation, driving, and other numerous spheres (Littman et al., 2020; Team, 2021).

On the other hand, the opinions of people about AI are not always positive. The general population holds complex opinions and, other than the advantages and possibilities, identifies dangers and disadvantages of current and future applications of AI in various spheres. In a study by Fietta Valentina et al. (2022) with 829 participants' explicit and implicit reactions analyzed, the findings demonstrated that even though the majority of participants openly showed a favorable opinion of AI, their underlying reactions suggested the opposite. Indeed, there is evidence that AI and its prevalence in today's world make people quite nervous. Approximately the same number of Americans were found to feel scared and lack information about AI as the number of those who feel hopeful and knowledgeable about it (Survey Shows Wide Gap in Consumer Sentiment on Artificial Intelligence, 2019). Cave et al. (2019) studied AI responses created by a

diverse group of UK citizens. The researchers measured the frequency of hopes and fears and found that negative opinions were dominant, with many people expressing concerns about the potential negative effects of AI in the future. Similar results were found among respondents in 31 countries, out of whom around the same number were anxious as they were enthusiastic about products and services utilizing AI (Carmichael, 2023). The highest levels of nervousness, according to the researcher, were found in the predominantly English-speaking countries. In Japan, South Korea, and Eastern Europe, it was at its lowest point.

There are different reasons people feel nervous about AI. It was found that in some areas where culture plays an important role, the opinions about the usage of AI may be, if not nervous but still not accepting. As an example, in religion, the implementation of AI is not seen as a good strategy (Tran & Nguyen, 2021). Also, consumers are most at ease in regards to AI when it is utilized for shopping and entertainment but exhibit much greater caution when it concerns cybersecurity and healthcare (Survey Shows Wide Gap in Consumer Sentiment on Artificial Intelligence, 2019). Carrasco et al. (2021) showed that people were more willing to embrace AI technology for certain uses, such as traffic optimization, than for others, such as making decisions for the justice system. Reeve et al. (2023) argued that although the public was supportive of AI when it was used to enhance efficiency, accessibility, and benefit people, and were more critical of other potential uses and impacts, particularly when AI decisions replaced those made by humans and impacted people's lives. The concern about loss of jobs was also dominant among a larger share of Americans who claimed they were "more concerned than excited" by the increased use of AI in daily life (Rainie et al., 2022). Their other concerns included privacy as well as a lack of human interaction.

Indeed, ethics of AI usage were found to worry people. A study showed that together with concerns about advanced robotics in cars and weapons, for technologies like smart speakers and targeted social media advertisements, people were concerned about personal data being shared (Ada Lovelace Institute and The Alan Turing Institute, 2022). Fenech et al. (2018) described possible social and ethical concerns about AI in healthcare. According to the researchers, over 50 percent of adults in the UK did not support the idea of AI systems taking over tasks traditionally done by doctors and nurses. Similarly, approximately half of Russians who were asked about the possibility of being diagnosed by AI said they would be uneasy if AI was utilized in the medical field. This was shown by the findings of a survey conducted by the All-Russian Center for Public Opinion Research (VTsIOM), which used similar questions as those carried out by the Pew Research Center in the US (Progress Ili Ugroza, Ili Ob Iskusstvennom Intellekte V Medicine [Progress or Threat, or About Artificial Intelligence in Medicine], 2023). Other ethical concerns related to AI included the intensifying monitoring of residents and aid in silencing labor organizations (Chen & Wen, 2020). What is more, human biases reflected in the AI systems lead to distortion of the AI results making

these results not reliable (Ferrara, 2023; PS, 2023; Horner, 2024; Mehrabi et al., 2021; Solans et al., 2022; Vicente & Matute, 2023).

To conclude, the AI-related papers suggest that there is a broad awareness but rather a surface level of understanding of AI in the world. While the look at AI is rather optimistic, acknowledging its ability to improve efficiency and accessibility around the world, some fears and concerns about AI are present. Concerns of the public regarding AI arise from different reasons, such as worries about job loss and various ethical reasons like privacy concerns. It is important to consider AI from the perspective of an area it is used in, since the opinions of people about AI in different spheres may significantly differ.

### **2.1.2 Factors that influence AI perceptions**

Multiple factors influence public perception of AI, including media depictions, education, personal experiences, cultural values, societal norms, technological understanding, and more. Views on AI vary significantly across cultures and nations and across individuals based on their demographic factors.

**Large-scale factors:** Starting with the macro level, a significant factor influencing public opinions about AI is the development of a country. Myers (2022) showed that residents of developing countries were more likely to claim to have knowledge of AI, were confident in companies that use AI, and hopeful about the effects of AI products and services on their daily lives than those in advanced countries. Indeed, Kelley et al. (2019) pointed out that the most widespread sentiment regarding AI was 'concern' in developed nations and 'anticipation' in developing countries. The supporting findings demonstrated that the common word describing people's feelings about AI in North America, Europe, and Oceania is 'concern' and in South America, Africa, and Asia, the common word is 'excitement' (We Asked People Around the World How They Feel About Artificial Intelligence. Here's What We Learned., 2019). The researchers of the Oxford Internet Institute also highlight that more than 40 percent of Americans were worried about AI and only 11 percent of East Asia were doubtful about the technology (Neudert et al., 2020).

There may be various underlying reasons for rather opposite opinions in different countries. A factor that can play a significant role is cultural beliefs. One of them is trust in the government. Carrasco et al. (2021) suggested that AI may be chosen over humans in nations with low trust in governments. What is more, in cultures that prioritize privacy, individuals may have stronger objections to AI technologies that depend on collecting data. At the same time, in cultures that value the welfare of the collective more than personal boundaries, these requirements may be more readily accepted. There are reasons to conclude that the majority of residents in Britain, a well-developed nation known for its data privacy laws, are in favor of regulations for AI and are requesting transparent guidelines for distinguishing between human and

AI decision-making (Ada Lovelace Institute and The Alan Turing Institute, 2022). The overwhelming majority of Americans similarly believe that robots and AI should be carefully managed (Zhang and Dafoe, 2019). Similar thoughts are expressed by the EU respondents, majority of whom said that AI regulation is critical (Edelman, 2019). As the researchers showed, most believed this should be managed by a public oversight body, while few said that those developing and deploying AI should regulate AI themselves. At the same time, in China where the welfare of the collective is more important than the individuals' boundaries, people view regulating AI as less important (Ge et al., 2024).

**Small-scale factors:** As Kelly et al. (2023) summarized, one of the most popular models to investigate the acceptance of technology, in particular AI, is the Unified Theory of Acceptance and Use of Technology model. The model uses factors, such as gender, age, and experience as mediators of the effects of predictors on users' behavioral intentions to use a technology. Multiple research studies based on this model have shown that demographic factors are indeed associated with the extent of personal acceptance of new technologies (Mensah and Onyancha, 2021; Pangriya, 2022; Ugwu et al., 2021), in particular AI (Andrews et al., 2021; Jain et al., 2022; Venkatesh, 2021). Other than users' behavioral intentions to use a technology, demographic factors have a vital role in the general perception of new technologies (Ho et al., 2010; Lee et al., 2005; Mohamed Noh et al., 2016), including AI (Here's How Opinions on the Impact of Artificial Intelligence Differ Around the World, 2020).

As for education and occupation, people with no higher education are more likely not to trust AI than those who have high education or work in spheres where AI is widely used (Jackson, 2022). Age is an important parameter in terms of AI perception, as well. Younger people were found to have better attitudes about the technology (Here's How Opinions on the Impact of Artificial Intelligence Differ Around the World, 2020; We Asked People Around the World How They Feel About Artificial Intelligence. Here's What We Learned., 2019). Gender is another factor that predicts the opinion about AI. This factor has been widely discussed in the scientific papers, and many works have shown that men were more likely to have more positive opinions of AI compared to women (Here's How Opinions on the Impact of Artificial Intelligence Differ Around the World, 2020; We Asked People Around the World How They Feel About Artificial Intelligence. Here's What We Learned., 2019; Zhang & Dafoe, 2019). Raine et al. (2022) agreed with this statement and argued that a larger percentage of men believed AI programs can consistently make fair decisions, with more women being unsure about this possibility. What is interesting, according to the researchers, smaller percentages of people believed that women's perspectives were considered not as broadly as men's by AI developers.

The effects of personal characteristics on the perception of AI have been also analyzed. Park and Woo (2022) explored the connection between people's personality characteristics categorized with the Big Five personality traits and their attitudes toward

AI. Attitudes were categorized based on the affective and cognitive aspects. The results showed a clear correlation between personality traits and attitudes toward AI. Stein et al. (2024) examined such predictors of AI perception as the Big Five, the Dark Triad, and conspiracy mentality. They argued that younger age and agreeableness predict a more positive opinion about AI, and the susceptibility to conspiracy beliefs explains more negative views.

**Media influence:** Media reporting has been proven to have a significant impact on shaping public views on technologies (Abbas & Ahmad, 2022). The media provides information as a source of informal knowledge about new scientific developments. In the field of social psychology, this is referred to as conceptual framing or choice architecture (Choice Architecture - the Decision Lab, 2021). Creating a story about a phenomenon or new technology, emphasizing positive or negative elements, and selecting comparable reference points influences society's acceptance or rejection of a new phenomenon. Nudging entails gently directing people toward a chosen option by indirectly influencing their thoughts and actions while creating the illusion of freedom to choose (Hansen, 2016). The majority of people (classified by the academic field as early majority adopters and late majority adopters) do not rush to use a technology as soon as it is released, they take time to form opinion about it first (Beal & Bohlen, 1956). Thus, presenting a technology in a good way can help these people start using it, and presenting it in a negative light may stop possible users from trying it.

Media influence on technology acceptance was analyzed, with taking AI into account (Kelley et al., 2019). The findings showed that consumers in eight countries learnt about AI mostly through social media, TV news and commentaries, and movies or TV series. As the authors concluded, when the media portrayed AI in a positive light, it provided viewers with useful cues to quickly form an opinion about it. Midler (2022), who analyzed coverage of British magazines, also showed that there is a correlation between the public opinions about AI and news coverage of AI-related topics. Such a conclusion was made based on the observation that topics that people associated with AI appeared more often in the magazines analyzed than topics about which people felt less sure. Thus, it can be argued that nations where the media shows AI as a threat to humanity might view AI with doubt. In contrast, countries that portray AI positively in the media may have a more hopeful outlook.

There is evidence that often media in the West portray AI as a good technology for people. Moriniello et al. (2024) discovered a general enthusiasm about AI in Wired magazine, with both positive and negative attitudes on the upswing. According to the researchers, this division in opinions signals a shift toward more radical stances, which is likely to have an impact on future public policy and decisions. Fast et al. (2016) analyzed publications about AI in Times magazine over 30 years. The authors argued that the discussion of AI has increased sharply since 2009, and these discussions have been consistently more optimistic than pessimistic (while still having concerns about

AI ethics).

Media discourse not only affects the opinions of people about technologies like AI but may also be impacted by the public opinions (Wlezien, 2024). This indicates that the analysis of news discourse about AI may give insights not only about the topics that shape the public perception via news but also reflect the public perception in the first place.

To conclude, how AI is depicted in public communication channels, in particular news media, has a significant impact on AI's status in society, its acceptance, and reputation. By highlighting AI's triumphs, media like news can shape a good opinion about the technology, and by discussing the replacement of humans by machines, the result will have a contrary effect.

## **2.2 Public Perception of AI in Ukraine and Russia**

European countries are interested in AI and actively develop the technology (European Approach to Artificial Intelligence, 2024; Kuo, 2023; Ren, 2024; Statista, 2023; Statistics Explained, 2023). European citizens view AI as an easy-to-use opportunity for life improvement with time-saving, and good results, which, however, has some threats, including the ones for the job market (Franke, 2024). The same can be said about Eastern European countries. As is shown in an infographic summary, Eastern European governments are focused on investing in and advancing AI within their borders (AI In Eastern Europe Infographic Summary, 2019). The summary shows that these nations prioritize investing in education and startups to boost the AI industry's growth in alignment with economic progress. What is more, Russia, Belarus, and Ukraine are leading recipients of international grants for AI development in this region, winning competitions and securing significant investments as well.

As for Ukraine, there is indeed a growing interest in AI. Government support for the IT sector, and the development of high-tech industries contribute to the active implementation of artificial intelligence in various areas of the economy and education. In 2014, investments in Ukrainian companies utilizing AI were 42.4 million, but by 2021, the amount had soared to 440.9 million (Deep Knowledge Analytics, 2022). The majority of businesses surveyed by Forbes in Ukraine, used AI in their tasks (Lavrentii, 2024). Kravchenko (2019) argued that Ukraine ranked second among Eastern European countries in terms of the number of AI companies. Compared to other Eastern European countries by the number of AI investors, Ukraine ranked fifth and is ahead in the number of outsourcing firms specializing in artificial intelligence in both Eastern Europe and Western Europe, with 11.5 percent of the total outsourcing companies worldwide specializing in AI. Various conferences on AI and machine learning are held in Ukraine. Some of the examples of various AI projects in the country are one for creating 3D assets for games and virtual spaces, the system predicting court decisions, and an AI educational charity project (Krivyi Rig LIFE, 2023). To conclude, AI technology

received a lot of attention in Ukraine, with various AI projects receiving funding from the government and private sector.

In Russia, AI development is also on the rise. Due to its accumulated technological base and strong engineering and mathematics schools, Russia actively participates in the development of the field of AI. The country scored in the top 10 countries by the participation of the government in AI development (Yakov i Partnyory, 2023). Conferences are organized (Professii Budushhego: Kak Iskusstvenny'J Intellekt Menyaet Nashu Zhizn' [Professions of the Future: How Artificial Intelligence Is Changing Our Lives], 2024), many companies use AI for their work (Iskusstvennyj Intellekt V Rossii: Kto, Chto I Kak Vnedryaet [Artificial Intelligence in Russia: Who Is Implementing What and How], 2022).

The familiarity with AI in Russia and Ukraine is similar to the European levels. In research where 1,000 individuals between the ages of 16 and 65 were surveyed across Ukraine, excluding Crimea and parts of Donetsk and Lugansk regions, 84.4 percent reported having heard the term "artificial intelligence" (Demchenko, 2017). What is more, roughly 75 percent of Ukrainians acknowledged the impact of AI on their lives. As for the understanding of the term, Samayeva (2023) highlighted that nearly 34 percent of Ukrainians said that they didn't know what AI is. As is argued, although most of these people were 50 and above, around 20 percent of respondents aged 30-39 were unaware of AI.

The knowledge of the AI concept is rather similar in Russia. It grew from 75 percent in 2020 (Iskusstvennyj Intellekt Ne Pugaet Rossiyan [Artificial Intelligence Does Not Scare Russians], 2020) to 87 percent in 2022 (Iskusstvennyj Intellekt: Ugroza Ili Svetloe Budushchee? [Artificial Intelligence: Threat or Bright Future?], 2022). According to a survey, more than 35 percent of all the respondents could explain the concept of AI. The most informed on this matter were young people, citizens with higher education, as well as residents of big cities.

Perceptions of AI in these countries include AI possibilities and risks. According to Demchenko (2017), 80 percent of the survey participants felt that AI technologies benefited their lives, while 12 percent disagreed with that. The majority of respondents surveyed in another study approved the development of AI (76 percent) and thought that in the country, AI should be used to optimize production processes, fight corruption, in the military and security spheres, find solutions to environmental issues, for counter-propaganda, and for making decisions in the field of state management (AI In Ukraine, 2022). Also, although people generally did not consider AI a threat, they were worried about the technology development, with the most popular fears of AI being deprivation of jobs, autonomy, and aggression toward people. What is more, respondents believed AI would not be able to resolve moral issues. As the authors concluded, the respondents saw risks associated with AI, such as ethical, socio-economic, and existential.

It was found that in Russia, the level of trust in AI technologies in 2022 increased to

55 percent, with the top 3 motives for the trust being the ability to transfer to AI types of work that are dangerous for humans, the objectivity of artificial intelligence, and the improvement and simplification of human life and work (Iskusstvennyj Intellekt: Ugroza Ili Svetloe Budushchee? [Artificial Intelligence: Threat or Bright Future?], 2022). At the same time, 32 percent of respondents viewed AI as a threat. The most popular reasons for being concerned about AI were errors and failures that can happen in the work of AI, respondents' trust only in people, and AI influencing population degradation. What is more, half of Russians would not like the use of artificial intelligence in medicine for diagnostics and treatment (Progress Ili Ugroza, Ili Ob Iskusstvennom Intellekte V Medicine [Progress or Threat, or About Artificial Intelligence in Medicine], 2023).

Thus, Ukraine and Russia invest in the development of AI, viewing AI as a perspective technology. People in these countries have heard about AI but small percentages understand the concept clearly, with most of the people who can explain AI being young, educated, and from big cities. In general, people favour the development of AI but recognize the risks associated with it, including economic, ethical, and existential. However, the research about public attitudes toward AI in Ukraine and Russia is not developed enough. While there are some surveys published, there do not exist a sufficient amount of research papers on the topic.

## 3 Methodology

### 3.1 Data

This research aims to understand the main topics present in the AI-related discourse in news and social media in Ukraine and Russia. The publications from social media were argued to be a useful source for analyzing the opinions of people (Dong & Lian, 2021; D'Andrea et al., 2019). In particular, social media content analysis is used to understand the public opinions about AI (Gao et al., 2020). However, not all researchers agree with using social media as a source of public opinion analysis (Bil-Jaruzelska, 2019). One reason is that social media public opinion does not represent the opinion of the general public, since users who post or comment on social media differ by their personal characteristics and willingness to publicly express their opinions (Gambini, 2022).

This research acknowledges that social media users form a specific group, and therefore, the findings cannot be generalized to all Ukrainian and Russian citizens, as well as to all Eastern European citizens. Indeed, there are more male users than female users on Facebook (Statista, 2024b). As of Twitter, in Russia, there is an unequal gender distribution with more than 60 percent of males (Statista, 2024a). The audience of Twitter is unevenly distributed in other socio-demographic characteristics, as well. In particular, the Twitter audience, along with the audience of the Vkontakte social network, is generally younger than the audience of other social media popular in Ukraine and Russia, such as Odnoklassniki or Facebook. As of 2014, users between 12 and 35 years old made up 56 percent of Russian Twitter users, with users aged 18 to 24 accounting for 23 percent, the highest among other age groups (Mail.Ru Group, 2014). Thus, while the analysis of users' posts provides valuable insights into the opinions of certain segments of Russian and Ukrainian populations, it cannot be generalized to the entire population of these nations.

Analyzing news discourse offers insight into how Ukrainian and Russian news forms public opinion and, according to Wlezien (2024), may even reflect the perspectives of the public. News outlets frequently act as one of the main sources of information for numerous people (TV Still Main Source for News but Social Media Is Gaining Ground | News | European Parliament, 2023). By providing people with views on AI, and emphasizing some issues while minimizing others, online news may shape the public discourse. Thus, through the examination of news articles, one can identify the narratives being pushed to the public. This includes grasping what topics related to AI are depicted, if AI risks are discussed as widely as AI advances, thereby affecting the public's perception of the technology. By including news publications in this study, a thorough examination of AI-related discussion is possible. This enhances the examination of social media, providing comprehension of pushed narratives about AI.

The data used in the study was collected by YouScan (<https://youscan.io/>). This

is a platform based in Ukraine that works with data mining and analytics using AI technologies. Publications were collected based on the keywords related to AI from Ukrainian and Russian news media and social media from March 15th, 2021 to May 29th, 2021. News media includes 1516 Ukrainian and Russian online news sources, and social media is represented by the most popular social media in Russia and Ukraine, namely Telegram, Facebook, Vk, Odnoklassniki, YouTube, Instagram, Livejournal, and Pikabu. Social media observations consist of posts by public groups and posts of users. The corpora include publications mainly in Russian and Ukrainian languages, with a not significant number of texts in other languages. Texts in Ukrainian language were translated into Russian. This step was done in order to have a bigger one-language corpus for further analysis.

The data preprocessing was done in Python (Python 3.9.7, [MSC v.1929 64 bit (AMD64)] on win32). The process can be seen in Figure 1. Preprocessing steps included removing stopwords, punctuation, numbers, symbols, and links; performing text tokenization and lemmatization; and removing frequent words. This is a general procedure for natural language processing and is done to bring the data into a form suitable for further analysis and get rid of tokens that do not carry meaningful information. What is more, part of the advertisement posts were removed based on the keywords found. The complete deletion of redundant posts was not achieved. However, it is still possible to analyze text corpora with a certain amount of irrelevant documents (Spaiser et al., 2017).

The data were categorized into social media users' posts (SM-U) and news publications. News publications were further divided into online news media (NM) and social media news portals (SM-N), which have also become an important source of information for many people (TV Still Main Source for News but Social Media Is Gaining Ground | News | European Parliament, 2023). NM and SM-N were analyzed separately due to evidence that social media news portals often limit users' exposure to a smaller range of news topics compared to traditional news sites (Understanding the Impact of Social Media on Online News, 2024). Thus, the initial dataset was divided into three smaller ones, as can be seen in Figure 1. For each dataset, duplicated texts were removed. Given the importance of demographic factors in shaping AI opinions, the SM-U dataset was further divided by location (big cities vs. small towns) and gender (men vs. women) of users. The observations analyzed include text of news publications for NM and SM-N and posts, reposts (with added text), and comments for SM-U publications. For ease, they are referred to as posts in the paper.

### **3.2 AI opinions operationalization**

The opinions of people about AI can be measured from different dimensions. First of all, one can measure the general understanding of the concept of AI. This may include a basic familiarity with AI (Kassens-Noor et al., 2021), with specific applications, or

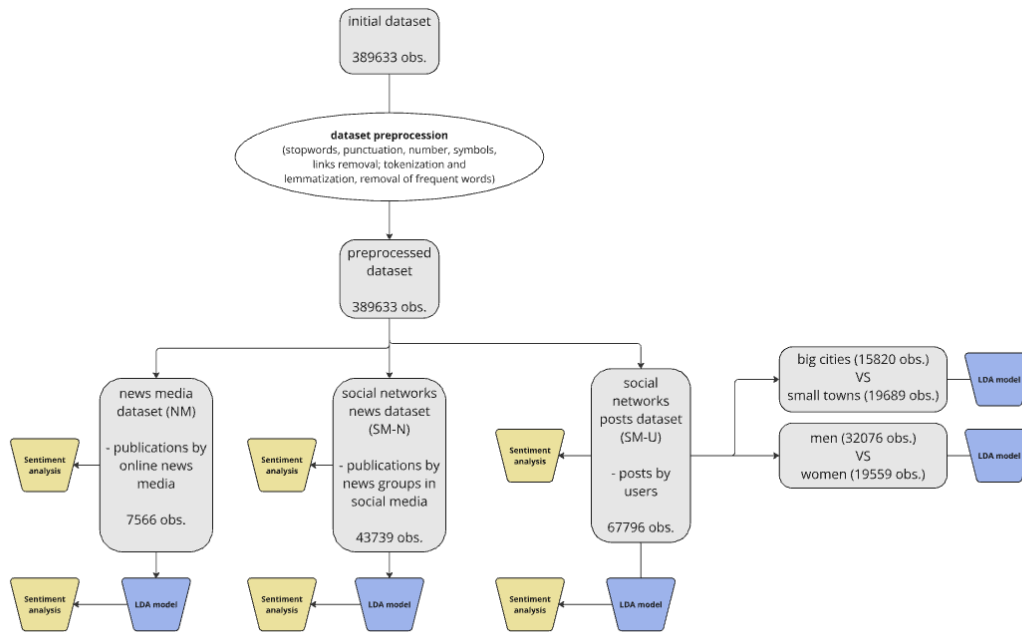


Figure 1. Data preprocessing and analysis.

technological literacy. Another dimension is attitudes toward AI (Selwyn & Cordoba, 2021). Such analysis can be continued, for instance, by looking into the general sentiment (Murphy, 2023) or trust in AI (Bristows et al., 2018). Another way may be to consider the emotional reaction to the technology (Kim et al., 2023; Li & Huang, 2020). This may include emotions like fear, excitement and optimism, or indifference. Another dimension often analyzed is the perceived benefits of AI (Ada Lovelace Institute and The Alan Turing Institute, 2022; Cui & Wu, 2019; Grassini, 2023; Omoga, 2023; Onososen & Musonda, 2022). Perceived benefits can be analyzed from the perspective of usefulness of the technology, its benefits to society, efficiency and productivity, or innovations it brings. What is more, it is possible to measure perceived risks of AI (Neri & Cozman, 2019; Neyazi et al., 2023). As for the possible risks of AI, Thomas (2024) highlighted job displacement, privacy violations, bias of AI, automation of weapons, and AI autonomy. Another dimension is the intentions of people to use AI, in particular, adoption willingness (Al-Shboul, 2023; Wu et al., 2022) and usage patterns (Allam, 2016; Bawack et al., 2022).

The aim of the research is to study the opinions of people in Ukraine and Russia about AI, identifying trends in the discourse. For this, the content of the discourse of Ukrainian and Russian online news and social media was analyzed. Topics discussed in news media and social media were identified, and the overall sentiment of the discourse and the topics was investigated. The study provides insights into areas of AI that require

more attention by highlighting potential AI anxieties from the viewpoint of Russian and Ukrainian online social media users.

As the literature shows, anxieties of people about AI can arise from the risks stemming from economic, ethical concerns, and existential threats because of AI's far-reaching impacts. Some researchers have measured AI-related anxieties by using well-established concepts, for instance, such as existential anxiety (Alkhalifah et al., 2024). However, another novel concept, AI anxiety, becomes commonly used to measure various anxieties associated with AI. The concept is related to already developed ones, such as computer and robot anxieties (Wang and Wang, 2019). It describes the fear from the issues originating from AI-related changes in personal and social life (Norris, 2022). Researchers have found that factors of AI anxiety coming from the perceived risks of AI predict negative attitudes toward AI (Kaya et al., 2022; Yigitcanlar et al., 2023) and indirectly negatively predict behavior intentions to use a technology, for instance, in education (Wu et al., 2022). Thus, recognizing AI anxieties is essential for creating plans to reduce AI risks and alleviate public fears.

AI anxiety is a rather new concept, and there have been not many research papers based on it (Wen et al., 2024). AI anxiety has been operationalized by the researchers to have different levels of granularity of the factors. For instance, Johnson and Verdicchio (2017) identified 3 factors of the anxiety, namely focus on AI that leaves humans out, not accurate understanding of technological development concept, and confusion about AI autonomy. Kim et al. (2018) described AI anxiety as the fear of job displacement, ethical dilemmas, and AI exceeding human intelligence and AI control. In their AI anxiety scale, Wang and Wang (2019) recognized job replacement anxiety, sociotechnical blindness, configuration, and learning anxiety. At the same time, Li and Huang (2020) used 8 factors for AI anxiety, including anxiety of privacy violation, bias behavior, learning, job replacement, existential risk, AI consciousness, violations against ethics, and lack of transparency anxiety. This research categorizes AI anxiety in accordance with Li and Huang (2020).

On the other hand, categorizing the potential benefits of AI poses a difficulty. What is advantageous for some people may be seen as harmful by others. Some may view the incorporation of AI in education as a major progression, improving learning opportunities and availability. At the same time, other people may see it as a danger to traditional teaching positions or a depersonalization of the education system (Hamilton, 2024; Pew Research Center, 2024). Similar division of opinions can be found for other spheres, for instance, medicine (Gao et al., 2020; Yakar et al., 2022). This division highlights the challenge of impartially classifying advantages. Hence, a practical method used was to classify topics not directly related to AI risks, represented by the AI anxieties factors, into sets of similar topics and describe their content. This approach recognizes the diverse aspects of AI discourse and enables a more even-handed conversation without biased evaluations of benefits.

The analysis process can be seen in Figure 1. The topics of the discourse of AI were found with topic modeling. The models were constructed for NM, SM-N, and SM-U. The topics were named based on the top keywords and the content of the representative documents. After, the topics were categorized into sets of similar topics. The sets were described, including the perspective of AI anxiety.

The review of the literature revealed that AI opinions differ by demographic characteristics, so for SM-U, additional models were created to study the differences between users' AI anxiety in regard to their place of residence and gender. The models were constructed for big cities, towns, men, and women. While users' gender was a column in the initial dataset, a categorical variable with two categories, big city or town, was engineered based on the city of residence the user showed on their page. Big cities were recognized as cities with more than or equal to 500 thousand residents, and towns were recognized as those with less than 500 thousand inhabitants (Naselenie Po Gorodam Ukrainy' [Population by Cities of Ukraine], 2024). It is important to note that only Ukrainian cities were analyzed, since only Ukrainian cities' metadata was present in the dataset. The percentage of users who showed their location and gender on their profiles was rather small, so the final datasets based on location and gender consist of 15820 observations for big cities, 19869 observations for small towns; 32076 observations for men, and 19559 observations for women.

To understand the emotional aspect of news publications and posts of users, the overall sentiment of topics was found with the sentiment analysis. Sentiment analysis was also performed on the topics separately.

The code for data preprocessing and the analysis can be found at <https://github.com/olga-chemod/opinios-about-AI>.

### **3.3 Methods**

#### **3.3.1 Topic modeling**

The first method that was performed is topic modeling, which extracts latent topics from a set of documents. So, it can be said that it is a quantitative method that is used for the qualitative approach and is more advanced than common discourse analysis (Jacobs & Tschötschel, 2019). In particular, Latent Dirichlet allocation (LDA) was performed. LDA is a Bayesian model for topic extraction (Blei et al., 2003). This is a fairly popular model for text analysis and is actively used in the study of social media discourse (Hidayatullah, et al., 2019; Rohani et al., 2016; Shirolkar & Deshmukh, 2018; Zhang, 2019).

Generally, LDA is based on the bag-of-words model, which means that only the frequency of words but not their order is considered. LDA takes the co-occurrence of words in a document (in this case a news publication or a social media post) into account – words that occur in one document are more likely to constitute one topic.

In general, a topic in LDA consists of a set of words that have different probabilities of appearing in this topic. Words can appear in different topics and documents may incorporate several topics.

Topic modeling was performed using R 4.0.4 (R Core Team, 2021), the Mallet (Mimno & Mans, 2015) package. To build a model, one needs to select the number of topics to be found. The basic method to find the best number of topics is to build models with several different numbers and choose the one that is the most coherent among others and in which topics do not overlap. In this study, several models were built with different numbers of topics: 5, 15, 25, 35, 45, and 50. Ultimately, a model with 35 topics was chosen based on the exploration of the resulting topics' content and coherency. Other important parameters to be specified before running the model are alpha and beta. The former is responsible for document-topic density and the latter is responsible for topic-word density. In other words, with an increase of the value of alpha, documents consist of more topics, and with an increase of the value of beta, topics consist of more words. That is, for a homogeneous corpus it is better to have a small alpha, while for a heterogenous corpus a larger alpha is a better option (Blei, 2009). The values of alpha and beta were set in accordance with Griffiths and Steyvers (2004), who suggested using  $50/k$  ( $k$  is the number of topics) for alpha and 0.1 for beta.

Although LDA does not take the time of post creation into account when building a model, it is still possible to look at the distribution of topics' proportions over time. Thus, to see the shares of topics over time, posts were aggregated by the days when they were posted. The shares of topics for each day were visualized, so the popularity of topics over time was explored.

### **3.3.2 Sentiment analysis**

With sentiment analysis, it is possible to identify the emotional coloring of documents in a corpus. Works that use sentiment analysis are in different fields. For instance, a study about moral judgment (Love, et al., 2018), marketing research (Rambocas, 2013), and monitoring public opinion (Karamouzas et al., 2022; Kaimakamidis & Pitas, 2024) are based on the method.

There are several approaches to sentiment analysis: rule-based approach, dictionary-based approach, supervised machine learning, and unsupervised machine learning. The advantage of the first and second approaches is that they are quite simple to implement. For instance, a dictionary-based approach, which is used in this research, is built on dictionaries that contain words in initial form and their sentiment values. The idea is to sum up the values of sentiments in a document and calculate the average. On the other hand, the dictionary-based approach has several disadvantages. One of them is that to use it effectively, one needs large vocabularies of words. These vocabularies also need to be constantly replenished (Bogdanov & Dulya, 2019).

For the analysis, the kartaslov dictionary that was collected via crowd-sourcing

was used (Kulagin, 2017). This dictionary is comparable to and even exceeds one of the most popular dictionaries used for the analysis of the English language in terms of the number of words - kartaslov contains 28000 widespread words, while Vader (Hutto, 2014) contains approximately 9000 words. Each word in the kartaslov dictionary has the score of its sentiment. The scores range from the most negative (-1) to the most positive (1), where 0 is neutral. The respondents were asked to rate a particular word as neutral, positive, or negative. Then the sentiments of the words were calculated as the average of the ratings. On a chance that a respondent was not sure what sentiment to attribute a word to, there was a variant "I do not know".

For convenience, the dictionary contains a «distortion» measure that shows how much respondents' ratings differ in terms of determining the sentiment of a word. The higher this value, the more scattered users' ratings were. In this study, it was decided to remove words with a distortion value greater than 0.5 so that the results were not biased by these words. Moreover, since this dictionary is generic and does not focus on a specific topic, some words could be misleading when analyzing posts about AI. An example of such a word is «intelligence». In the dictionary, this word has a positive value, but in the context of AI, the word should be considered neutral. For the prevention of misleading, the dictionary was manually looked through, and possibly confusing words in the context of the study were removed from the dictionary. To overcome the decrease of accuracy because of the particle «not» the wrong sentiment score, posts with this particle were removed.

With sentiment analysis, it is possible to evaluate the affective component of AI-related attitudes. Thus, sentiment analysis was performed on the whole corpus of NM, SM-N, and SM-U datasets to explore the overall sentiment of Ukrainian and Russian news and users' discourses. What is more, the sentiments were estimated in relation to the topics themselves to analyze the affective component of each separate topic.

Although the thought that a post may contain multiple topics was not rejected, the main topic of each post was identified for further analysis. Each post was assigned to a topic that was the dominant one for that post. Then, the sentiment values were determined for each word of a post, according to the kartaslov dictionary. The average sentiment value for each day was calculated and the results were visualized.

## **4 Results**

### **4.1 News media**

#### **Online news media (NM)**

The analysis of news media (NM) revealed the most popular topics of news articles (Figure 2). In general, all the topics discussed the implementation of AI in different spheres. The subjects span a wide range of interests, from advances in tech to the



games, and computer graphics. The media sources published texts about militaristic innovations that used AI, as can be seen in the topics from the *Military* set. They include news about the development of war technologies with AI in different countries like Russia, the USA, and China. Another aspect of news attention is the international scale of AI development, as can be seen by the *Country landscape* set. This represents the interest of the news media in the development of AI in home country and internationally. The *Programming and AI development* topics represent news about the ways to develop AI, ex. the usage of programming languages. Another actively discussed set of topics is the *Education and research*, which represents the possible application of AI in education as well as the research and funding of AI. Another big set of topics, the *AI technologies*, includes other news about applications of AI in various spheres, such as automobiles, electronics, computer equipment, smart devices and infrastructure devices, household technologies, and software.

As was stated above, topics like those related to *Medicine and healthcare* or *Military* may be attributed to both benefits (ex., usage of AI to help with diagnostics) and risks (ex., ethical concerns), so they were not classified directly as anxieties. However, some publications related to AI anxiety were found, which can be seen in the *AI anxiety* topic, which accounts for nearly 9 percent of all the topics (Figure 3 shows the share of topics over time, see the average share of topics for the whole period for NM, SM-N, and SM-U in Appendix A). The *AI anxiety* publications reflected on the possible future of people with the spread of AI. The content of the set is rather broad, so 414 documents where this topic was dominant, were analyzed via a word cloud and the LDA model to look into the subtopics (see Appendix B for the word cloud and the subtopics). The analysis revealed that AI anxiety-related subtopics were focused on jobs in the context of AI and threats to humanity that AI may cause, which may be categorized into *job replacement* and *existential risk* anxieties. The texts about AI threats were mostly negative while those about job replacement often had rather positive connotations. For instance, describing how AI may help HRs with their work. These subtopics account for around 25 percent of the *AI anxiety* set. This implies that AI anxiety-related topics hold around 2.25 percent of the whole corpus.

The general sentiment of the discourse fluctuated but was rather neutral, as the rolling average over five days shows (see Figure 4). The same can be said about the average daily sentiment of each topic.

So, based on the topics of publications, it can be said that NM seemed to focus on the research and development of AI, innovations in AI, and their applications. In other words, the majority of publications were written about AI applications, focusing on possible benefits and innovations. The publications that reflected AI anxiety were about the future of humanity in the AI context, and categorized by the chosen AI anxiety scale, included publications about AI risks for *job replacement* and *existential anxiety* related to the spread of AI, accounting for around 2,25 percent of the whole discourse. The

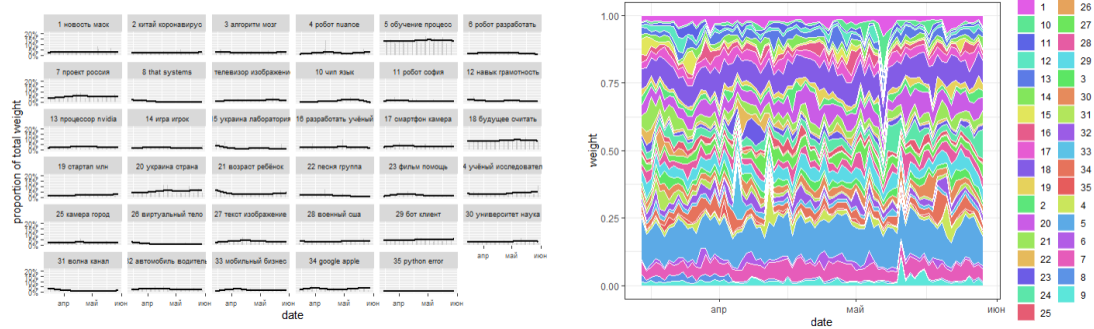


Figure 3. Online news media topics' share over time.

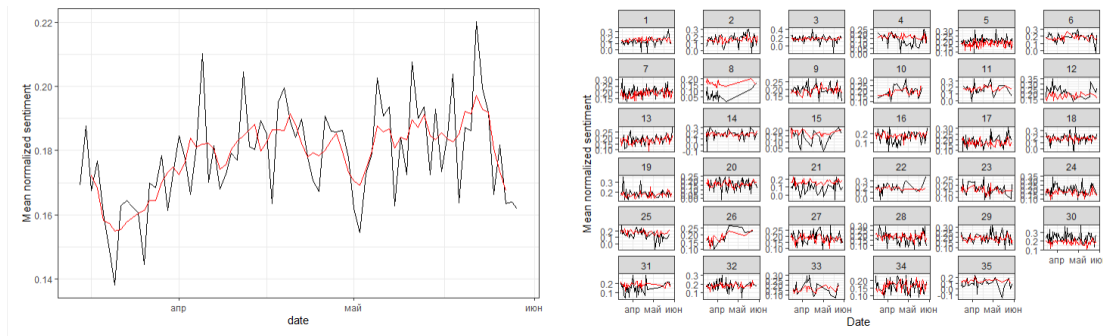


Figure 4. Online news media topics' mean sentiments over time.



- 7. AI technologies (num. 3, 7, 11, 16, 22, 26, 28, 32, 33, 34) - other topics related to AI applications in different spheres (ex., automobile, infrastructure devices, VR);
- 8.\* AI anxiety (num. 4, 25) - replacement in jobs by AI, AI ethics and regulations.

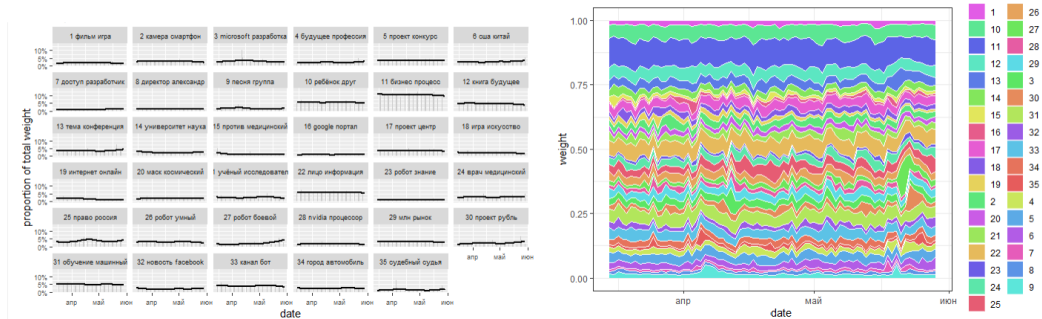


Figure 6. Social media news topics' share over time.

The sentiment of the posts in social media groups was also rather neutral (Figure 7). While there was a downward trend in the general discourse, conclusions cannot be made about the significance of it. The sentiments of separate topics fluctuated but remained stable throughout the period.

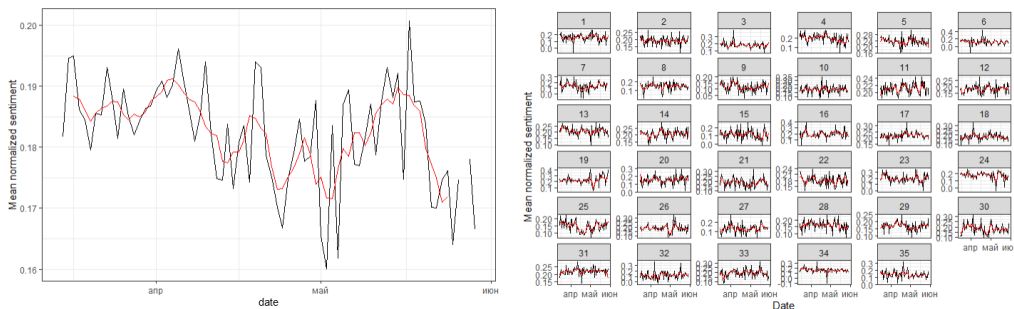


Figure 7. Social media news topic' mean sentiment over time.

In conclusion, the topics of both online news sites and social media news groups gave a diverse perspective on AI-related online news in Ukraine and Russia. The two types of sources, NM and SM-N, mainly posted similar content in regard to the topics. Online news websites provided coverage of AI applications in various spheres, AI innovations, and AI development and research. Similar content as of news media was shown to spread in social media that may reach a larger audience and foster a lively discourse among Russian and Ukrainian social media users. Even though the NM and SM-N publications were found to be focused on AI advancements and innovations,

they included publications about the possible risks of AI expressed by AI anxieties, including job replacement, existential anxiety, and AI ethics and regulations. These topics accounted for less than 6 percent of the discourse, being more prominent in social media news groups.

## 4.2 Social media

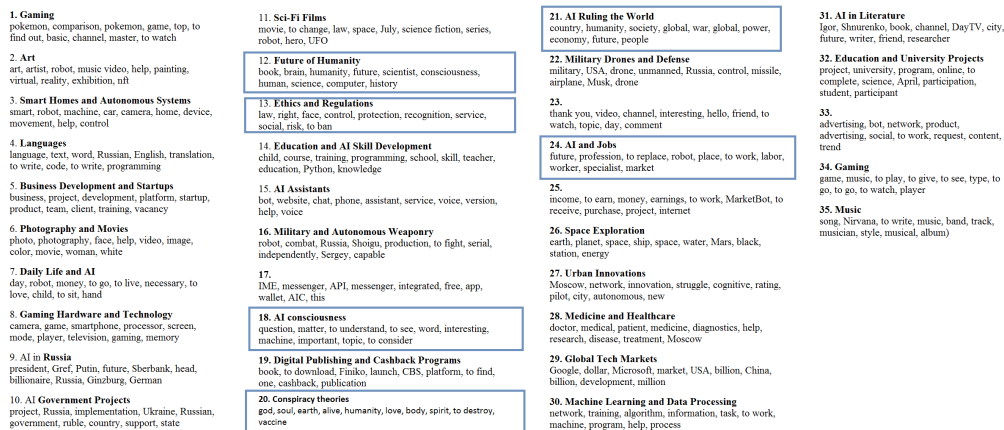


Figure 8. Social media users topics. AI anxieties are in blue.

The SM-U topics received via the LDA model can be seen in Figure 8. They show a wide range of interests and opinions that users shared. The topics vary from posting about technology upgrades in AI to the possible risks AI can bring.

1. Medicine and healthcare (num. 28) - AI applications in medicine and healthcare;
2. Art and games (num. 2, 6, 8, 11, 19, 31, 34, 35) - AI usage in areas like music, movies, and games;
3. Military (num. 16, 22) - AI development in military and defense;
4. Country landscape (num. 9, 19) - AI in different countries;
5. Programming and AI development (num. 30) - topics related to the development of AI technologies;
6. Education and research (num. 14, 32) - AI in education and AI-related research;
7. AI technologies (num. 3, 4, 5, 7, 15, 19, 26, 27, 29) - other topics related to AI applications in different spheres (ex., business, automotive, law);
- 8\* AI anxiety (num. 12, 13, 18, 20, 21, 24) - future of humanity, law and social control, AI consciousness, conspiracy theories, existential threats of AI, AI and jobs.

The sets of topics mainly correspond to the ones of the news media and represent general interests in the advancements in the AI technologies, including AI innovations

and applications, and AI research and development. Reflecting the news media topics, users discussed AI in *Art and games*, *Military*, *Medicine and healthcare*, *Country landscape*, *Programming and AI development*, *Education and research*, and *AI technologies*.

Compared to NM and SM-N, discourse of users' posts was found to include more topics about the perceived risks of AI as can be seen by the *AI anxiety* set. The AI consciousness topic (num. 18) was one of several found related to AI anxiety. The posts of this topic expressed opinions about the possible consciousness of AI. Similar texts were found in the topic about the future of humanity (num. 12), which was partially about AI consciousness and partially about the threats of AI to humankind. The topic about AI ruling the world (num. 21) expressed users' anxieties about AI controlling the world and ruling humanity. The topic about conspiracy theories (num. 20) consisted of posts about AI being used to control the whole humankind or some groups of people by different elites, exposing users' concerns about possible AI bias and autonomy. The AI and jobs topic (num. 24) was focused on the replacement of humans by AI in their jobs. The discourse also included the AI ethics and regulations topic (num. 13), in which users shared their opinions about possibilities to regulate AI.

These topics can be attributed to the factors of AI anxiety. The content of the topics was found to intertwine, so some topics were placed into several AI anxiety factors, namely *artificial consciousness anxiety* (num. 18, 12), *bias behavior anxiety* (num. 20), *job replacement anxiety* (num. 24), *existential risk anxiety* (num. 12, 20, 21), and lastly, *violations against ethics anxiety* (num. 13, 20).

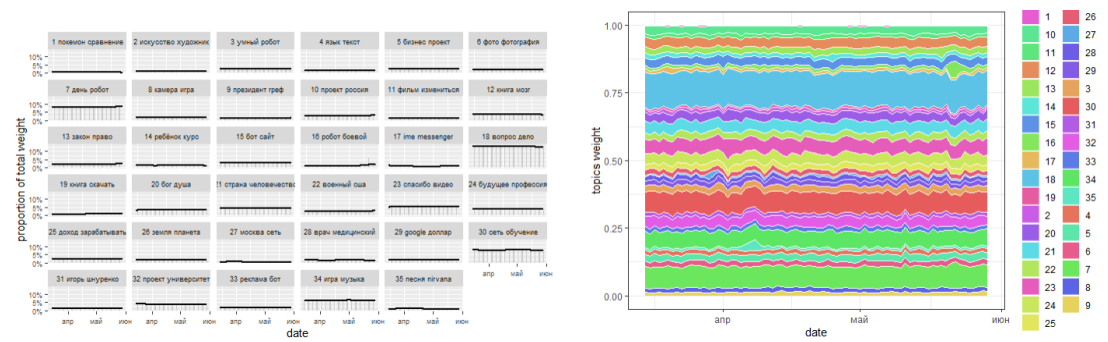


Figure 9. Social media users topics' share over time.

Based on Figure 9 and Appendix A, one can conclude that the topics related to AI anxiety were presented in the overall SM-U discourse rather widely, with AI consciousness topic (num. 18) holding around 13 percent of all the discourse, AI ruling the world (num. 21) accounting for 4 percent, conspiracy theories (num.20), future of humanity (num. 12), and AI and jobs (num. 24) accounting for 3 percent each, while 2 percent held by AI ethics and regulations (num 13).

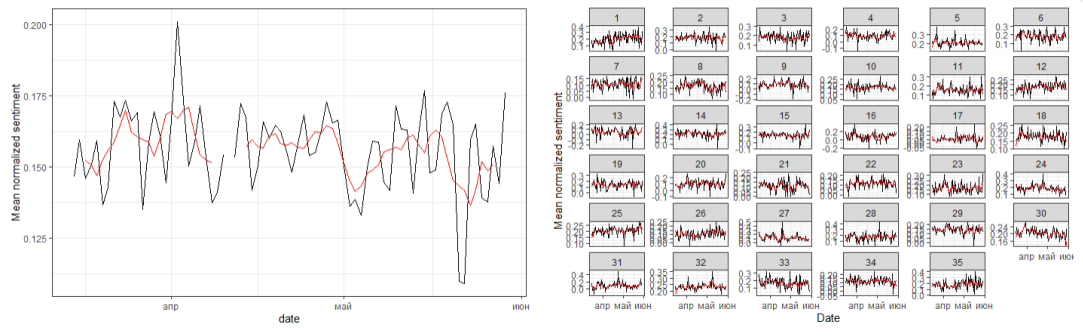


Figure 10. Social media users' mean sentiment over time.

The general sentiment of the users' posts about AI was rather neutral (Figure 10). There were some fluctuations over time but the rolling average across five days showed that there was no upward or downward trend in the sentiment of the posts in general as well as by the topics.

So, it can be argued that while Ukrainian and Russian social media users discussed possible innovations, applications of AI, and AI development and research, they also actively shared opinions about risks of AI they felt anxious about.

#### 4.2.1 Gender differences

In general, the topics discussed were similar for men and women. People shared news and opinions related to AI and its development in different spheres. As for the perceived threats of AI expressed in AI anxiety, men and women expressed discussed AI ruling the world and conspiracy theories about AI. Such theories included opinions about AI being used for control over humans and destroying the current world order. Examples of the representative documents can be seen in Table 1 and Table 2. The examples were translated into English. The original posts can be seen in Appendix C.

Men. Conspiracy theories.
..deprivation of private property. And I will tell you below how this will happen. We went through this too. - Digitalization of everything and everyone due to the abolition of availability (more on this below) and due to robotization, artificial intelligence, and other aspects of the fourth industrial revolution..
And then complete economic chaos, political decline, and democratic collapse. Plus natural disasters, fear, global psychosis, and artificial intelligence.
..For thousands of years, there has been a war against the Slavic peoples, and through the inculcation of faith and the replacement of the alphabet, and the introduction of discord between a single people, linguistic and other methods. Unfortunately, few people understand this. They have been wanting to destroy us for a very long time because we have a crumb of rebellious will, and the territories of Ukraine, Russia, and Belarus. New world rule with the advent of artificial intelligence (Antichrist), chipization, cryptocurrencies, abolition of private property, total control - slavery for those who survive!!!
..things that were described in Rockefeller's book back in 2009. It clearly spells out the scenario of how to achieve total control and global digitalization through a pandemic around the world. According to the plans of the Rodschilds..there is a clearly defined scenario of how to create a single digital state by 2030 through a pandemic, with a single digital crypto-currency and a single world governance. Where there will be no private property, where artificial intelligence will lead. And people will be humble slaves, and the disobedient will simply be disconnected from the system, and they will be doomed to starvation. And so far we are following exactly their scenario..
Men. AI will rule the world.
..And in the near future, due to these genetic manipulations, the memory that we are human will be destroyed at the DNA level. The ultimate goal is to completely abandon humanity's internal sense of self-identity. The rights to a dignified life of all sentient beings, be they artificial intelligences, humans, post-humans, or non-human animals, will soon be protected..
..Fear of our own thoughts All our expectations for the coming of Artificial Intelligence are just an unconscious attempt to forever deprive ourselves of this annoying responsibility..
WHAT THE CRAP? Stephen Hawking believed that full-fledged artificial intelligence would spell the end of the human race, but not all scientists share this opinion. Some believe that in the future, AI and humans will become colleagues, while others will become lovers.
My theory is that we live in a time loop, which in the future will create a supercomputer that will download our entire universe, for this the Masons collect all the information about each person, such artificial intelligence..

Table 1. Men's representative documents. Conspiracy theories, AI will rule the world.

Women. Conspiracy theories.
That's all conspiracy theory! Billionaire Ginsburg in the near future with chips and artificial intelligence
So what is the conspiracy theory here? Schizoids dream of total power and the destruction of people. Billionaire Ginsburg in the near future with chips and artificial intelligence
Women. AI will rule the world.
..Lord Jesus Christ, have mercy and save us and our country from Satanism, globalism, Freemasonry, heretics, ecumenism, vaccination, chipization, digitalization and artificial intelligence that operate in our country, and all this is the destruction of humanity and Divine life on earth, and Russia!..
by the government of the whole world and Russia to destroy the human race and create their own satanic world with the help of artificial intelligence and vaccination, chipization! Help us, Most Holy Theotokos, save and preserve us from all evil!!! ..
Think about it! 6 signs of the end of the world! Apocalypse! American and British scientists recently released a terrifying forecast for all life on Earth! They submitted a report to the US Academy of Sciences with risk factors that will inevitably lead our civilization to disaster. Among them are the dangers of artificial intelligence, the development of which may follow an unplanned scenario.. God bless you! Thank God for your open heart!

Table 2. Women's representative documents. Conspiracy theories, AI will rule the world.

However, job replacement was found to be actively discussed only among men (Table 3). Men also discussed the consciousness of AI more often than women, as can be seen by a separate topic (Table 3). This does not indicate that women did not post about these aspects at all. Instead, one should think of these topics not being posted by women as widely as by men, so they were not considered separate topics by the model.

Men. Job replacement.
..In a taxi, the role of driver can be performed by a person, or it can be performed by a robot with artificial intelligence..
We don't need this kind of hockey. Robots may appear at waste sorting plants in the Russian Federation in five years.
Robotization..? What kind of work can we expect..? We live in an era of change and today the introduction of robotics and artificial intelligence is radically changing our society..Will I have a job in 10 years? What kind of work can we count on in the future? Over the next decade, all routine and low-skilled professions will disappear, followed by police officers, teachers, lawyers, doctors, and accountants.
mental work will disappear within a decade, all routine low-skilled professions will be followed by police doctors, miners, journalists, accountants, teachers, lawyers, etc. Now to do people, the rich will get richer because they own the jobs, others will get poorer, how to protect yourself and your loved ones from the risks of losing your job as a result of robotization
Alas, Tanya! There are already plans to replace live nurses with artificial intelligence jobs.
Men. AI consciousness/autonomy.
..If there are quadrillions connected there anyway, then can we even say which brain is smart and which is stupid? In this case, what kind of artificial intelligence are we creating? Smart? What does it mean? All intelligence tests are mainly focused on counting: smart is the one who counts quickly. Forgive me for my indiscretion, but I have to say: I think it's very bad, but somehow it doesn't seem to me that I'm a complete fool..
..The result is a mechanism: Artificial intelligence, kind of on its own, try to understand it in time, and it doesn't last long, but it fascinates...

Table 3. Men's representative documents. Job replacement, AI consciousness/autonomy.

Among women unlike men, AI ethics and regulation were found to be an important topic discussed (Table 4).

Women. AI ethics and regulations.
Artificial intelligence should act only within the limits only permissible by a person, in his interests and strict control, and not issue its machine conclusions that limit human activity.
the absurdity is that humanity is more interested in creating a machine that imitates mental activity (or some part of it), while no longer mastering or even trying to master this process, and all efforts are aimed at ensuring that people never learn think.

Table 4. Women's representative documents. AI ethics and regulations.

#### 4.2.2 City size differences

In general, people in big cities and small towns discussed similar topics. From the point of view of AI anxiety, some differences were found.

**Big cities:**

Regardless of a settlement size and thus, development of one, people discussed conspiracy theories and AI rule of the world (Table 5, Table 7). However, additionally, users from big cities were found to discuss job replacement and ethics and regulations of AI as can be seen in Table 6.

Big cities. AI will rule the world.
I know what kind of president and other servants we need... Who do you think this is?) Smart, doesn't steal, has no godfathers and all other virtues. I'll say right away that it's AI (artificial intelligence).
On your own head! This will all come back to haunt them later! We haven't had enough artificial intelligence yet! And robots! This will all destroy humanity!
Big cities. Conspiracy theories.
..that your Garmin is artificial intelligence, and you are its guinea pig
Who else is not quite crazy listen to Billionaire Ginsburg in the near future with chips.

Table 5. Big cities' representative documents. AI will rule the world, Conspiracy theories.

Big cities. Job replacement.
..The world is changing. And such professions will not be needed in the near future. And replaced by artificial intelligence.
What do you think, is the idea that the fairest court is an artificial intelligence/robot realistic? Or is the human factor and heart still needed when making decisions?
You cannot become your own therapist for approximately the same reasons that you cannot become your own neurosurgeon or martial arts trainer - this is a job that inherently requires an external observer, who has also undergone long and complex special training. The professional skills that are used and are effective in psychotherapy are so complex that no existing artificial intelligence technology has even come close to simulating them.
Big cities. AI ethics and regulations.
The development of artificial intelligence is shrouded in rumors, speculation and fears. Scientists around the world are thinking about how to direct it for the benefit of humanity.. an online meeting of the Intergovernmental Ad Hoc Committee of Experts on Technical and Legal Issues is being held as part of the development of a Recommendation on the Ethical Principles of Artificial Intelligence with the participation of representatives of all UNESCO Member States.
Protection from artificial intelligence: The EC has developed a bill. It must be considered and adopted by the European Parliament and supported at the level of EU member states. The EC has developed a bill.
Or, to put it more officially... the rights will belong to the group (oddly enough for people) that will lobby the situation in its favor at the legislative level.

Table 6. Big cities’ representative documents. Job replacement, AI ethics and regulations.

**Towns:**

In towns, the only topics related to AI anxieties were found to be several topics about conspiracy theories and AI’s possible rule of the world in the future, as can be seen in Table 7.

Towns. AI will rule the world.
This shit must be destroyed, there is no Humanity with it.
Humanity will lose the war to artificial intelligence Scientists are confident that people have no chance of surviving a war with artificial intelligence. If there is a collision between cars and people in the future, the latter are doomed..
Towns. AI will rule the world/conspiracy theories.
on planet Earth, they have already become so accustomed to all sorts of technical innovations such as artificial intelligence, implanting chips in human flesh, and other amusements of a sophisticated mind that they themselves have begun to resemble some biological computers living in their own virtual spaces. (And these spaces, I note by the way, seemed to them more real than reality itself)..
Soon these idiots will rule people. It’s Boston Dynamics that has made the most progress in artificial intelligence.
The “saving” measures of our “kind” and “caring” authorities have nothing to do with protection from the much-hyped virus..This is all being implemented to cultivate the obedience of future slaves of a digital concentration camp controlled by Artificial Intelligence..
Towns. Conspiracy theories.
Just look at their plans! They don’t even hide them! Writer, what are they up to! Billionaire Ginsburg in the near future with chips and artificial intelligence
Interview with billionaire Ginsburg, which he gave to Gordon. So, he clearly voices what the ultra-globalists are leading you to. He says that medicine will no longer be mass, but will be elitist..that millions of people will soon be left without work and livelihoods, thanks to the introduction of artificial intelligence; about the elite chipization of rich people in order to become a superman.

Table 7. Towns’ representative documents. AI will rule the world, Conspiracy theories.

## 5 Discussion

The results showed that news media (online news and social media groups' news) in Ukraine and Russia covered various aspects of AI. The majority of topics discussed by news media publications were about the applications of the technology, AI innovations, and AI research and development. At the same time, not much of the discourse of news media was focused on the possible risks of AI. The potential risks discussed were found to be about job replacement by AI and possible threats AI may bring to humanity in the future in online news, and job replacement and ethics and regulations of AI in social media news groups. The share of these topics was rather small and did not exceed 6 percent in social media news groups and was less than 3 percent in online news. This trend has been observed in other countries, as well. For instance, Brause et al. (2023) found a predominantly positive evaluation of AI technology in news. Dandurand et al. (2022) also showed that most AI news were optimistic and were presented in 'glorious terms' in Canada. Similarly, a study on UK media coverage of AI found that approximately 60 percent of news articles were focused on AI products and announcements, and AI projects were often portrayed as solutions to public issues without sufficient scrutiny (Brennen & Nielsen, 2018). To ensure a more balanced discourse, media should also address potential risks associated with AI.

Social media discourse of Ukrainian and Russian users was found to consist of more topics about possible AI risks, including AI consciousness, threats of AI to humankind, AI ruling the world, conspiracy theories about AI, AI job replacement, and AI ethics and regulations. Thus, social media users were rather interested in discussing not only the positive but also the negative sides of AI. As was pointed out by Sun et al. (2020), the opinions of the public are not present enough in media publications about AI. Thus, one may suggest that including these opinions in the media may lead to a more lively representation and more productive discussion of the technology.

The discourse of social media users was found to have some similarities but also consists of different topics related to AI anxiety based on place of residence and gender of users. Starting with gender, men and women were interested in discussing conspiracy theories and AI ruling the world. Nevertheless, males also tend to prioritize issues like job displacement, despite the fact that females have a higher chance of losing their jobs to AI based on statistics (Hess, 2024). Another factor of AI anxiety discussed mostly by men was AI consciousness. On the contrary, women focused on discussing AI ethics and regulations. This may be related to the fact that women are believed to face greater difficulties in advocating for their own interests in the area of AI (Raine et al., 2022). One may illustrate women's interest's inferior position in AI by the fact that female-like robots often display submissive traits (Manasi et al., 2023). This tendency may change in the future since women are encouraged to shape AI ethics (Radulovski, 2024). Furthermore, the AI anxiety-related discourse differed based on the level of urbanization of users' places of residence. Inhabitants of major cities and small towns shared an

interest in discussing AI conspiracy theories about AI and AI rule of the world in the future. However, people from big cities exhibited a stronger interest in job displacement and ethics and regulations surrounding AI. More pronounced interest of small towns residents in conspiracy theories about AI may be explained by a lower level of education (Slinkin & Belskaya, 2013) as well as lower exposure to AI technologies by big cities' residents. Indeed, Kaya et al. (2022) suggested that the knowledge and experience of AI may cause the attitude toward AI to be more positive. To conclude, anxieties about AI were found to be impacted by social and demographic factors, emphasizing the role of individual-level factors on the opinion about AI.

As for the affective side of the discourse, the results of sentiment analysis showed that the general discourse of online news sites, social media news groups, and social media users' posts was rather neutral. The same was concluded about the topics inside each discourse. This may be the actual state of the affective side of the discourse. However, this may also be due to the selected method of sentiment analysis. Although the manual analysis of random samples of texts with sentiments prescribed showed rather good results, the dictionary-based method does not take all the complexities of a language into account, for instance, does not recognize sarcasm.

Thus, some improvements can be made to this research. Starting with sentiment analysis results, it can be improved by having a more advanced approach. For instance, a machine learning-based approach can be a good alternative to a dictionary-based one. LDA models does not have limitations by the minimum number of the observations, and the corpus analyzed in the research is big enough, however, a larger corpus may improve the overall quality of the models. This can be applied to the online news corpus, which had fewer observations compared to social media corpus. What is more, time period analyzed in this research is rather short, so not much about trends in time can be concluded. A larger time period can help to study the trends throughout time in the discourse.

It is important to note that while it is vital to analyze the opinions of people about AI, these opinions should not be viewed as expertise. According to Bostrom (1997), even though expert risk assessments can be influenced by value judgments and biases, they are still based on specialized information that the average person is unlikely to know or have the means to obtain. Still, public opinion can impact the policies being made (Davison, 1998). Thus, analyzing the opinions of people in Russia and Ukraine may lead to an understanding of where to forward the AI-related policies in these countries.

## 6 Conclusion

The research was conducted to analyze the opinions of Ukrainian and Russian citizens about AI. The main research question, what are the main perceptions of Ukrainian and Russian citizens about AI, was studied. For that, the academic literature was reviewed, and the online news media and social media discourse were investigated with topic modeling and sentiment analysis.

In conclusion, the discourse of the online news media in Ukraine and Russia focused mostly on the innovations, applications, research and development of AI. While job replacement, existential risk and ethics violation factors of AI anxiety were present in the news media discourse, other potential risks and obstacles of the technology were mainly ignored. News publications used rather neutral language when publishing news about AI throughout the time period. The trend of ignoring writing about risks of AI in news is common in other countries, for instance, the UK or Canada. As AI keeps advancing and spreading into different parts of society, it's important for media outlets to keep educating and involving the public in productive discussions about the potential benefits of AI, and also focus on potential risks and difficulties of AI technologies.

Ukrainian and Russian users of social media platforms engaged in a more balanced discussion about AI, actively discussing not only the advancements of the technology but also perceived risks of AI reflected in AI anxiety factors, namely job replacement, AI consciousness, existential risk, bias behavior, as well as violations against ethics. The language with which users discussed AI was rather neutral and have not changed throughout the analyzed time period. The results of users' discourse highlights the gaps in Ukrainian and Russian news media coverage of artificial intelligence and underscores the importance of including diverse public opinions in media publications to foster a more robust and nuanced debate.

While Ukraine and Russia are considered developing countries (World Economic Outlook Database - Groups and Aggregates, 2023), Ukrainian and Russian social media users showed some concerns about the development of AI, which is more typical to citizens of developed countries. However, this cannot be generalized to the whole population of these countries.

Furthermore, demographic factors such as place of residence and gender affected the AI-related risk perceptions on social media by Ukrainian and Russian users. Men tend to focus more on job replacement and AI consciousness, while women discussed AI ethics and regulation. At the same time, residents of big cities showed a greater interest in job replacement and ethical issues compared to those from smaller towns.

To enhance future research, increasing the number of observations as well as period analyzed and adopting advanced machine learning-based sentiment analysis techniques can provide more comprehensive insights into public perceptions of AI in Ukraine and Russia. By doing this, researchers can contribute to a more balanced analysis of AI-related discourse. Other methods for opinion analysis, including qualitative and

quantitative approaches, can also be used. Overall, there should be more research on social media discourse about AI since now it is not studied enough as was concluded by Brause et al. (2023). In particular, this is applicable to the current state of Eastern European AI public opinion research.

## References

- Abbas, F., & Ahmad, N. (2022). The role of journalism in shaping public opinion: A case study of political campaigns introduction: The... *ResearchGate*. [https://www.researchgate.net/publication/372518207\\_The\\_Role\\_of\\_Journalism\\_in\\_Shaping\\_Public\\_Opinion\\_A\\_Case\\_Study\\_of\\_Political\\_Campaigns\\_Introduction\\_The\\_Role\\_of\\_Journalism\\_in\\_Shaping\\_Public\\_Opinion\\_-\\_A\\_Case\\_Study\\_of\\_Political](https://www.researchgate.net/publication/372518207_The_Role_of_Journalism_in_Shaping_Public_Opinion_A_Case_Study_of_Political_Campaigns_Introduction_The_Role_of_Journalism_in_Shaping_Public_Opinion_-_A_Case_Study_of_Political)
- Ada Lovelace Institute and The Alan Turing Institute. (2023a). *How do people feel about ai?* Ada Lovelace Institute. <https://www.adalovelaceinstitute.org/report/public-attitudes-ai/>
- Ada Lovelace Institute and The Alan Turing Institute. (2023b). *How do people feel about ai? a nationally representative survey of public attitudes to artificial intelligence in britain*. [https://www.turing.ac.uk/sites/default/files/2023-06/how\\_do\\_people\\_feel\\_about\\_ai\\_-\\_ada\\_turing.pdf](https://www.turing.ac.uk/sites/default/files/2023-06/how_do_people_feel_about_ai_-_ada_turing.pdf)
- Ai in eastern europe infographic summary. (2019). <https://www.slideshare.net/slideshow/ai-in-eastern-europe-infographic-summary/131982002>
- Ai in ukraine*. (2022). <https://www.kantar.com/ua/inspiration/consumers/ai-in-ukraine>
- Alkhalifah, J. M., Bedaiwi, A. M., Shaikh, N., Seddiq, W., & Meo, S. A. (2024). Existential anxiety about artificial intelligence (ai)- is it the end of humanity era or a new chapter in the human revolution: Questionnaire-based observational study. *Frontiers in Psychiatry, 15*. <https://doi.org/10.3389/fpsyt.2024.1368122>
- Allam, S. (2016). Artificial intelligence and its applications. *ResearchGate*. [https://www.researchgate.net/publication/343600621\\_ARTIFICIAL\\_INTELLIGENCE\\_AND\\_ITS\\_APPLICATIONS](https://www.researchgate.net/publication/343600621_ARTIFICIAL_INTELLIGENCE_AND_ITS_APPLICATIONS)
- Al-Shboul, M. A. (2023). Artificial intelligence drivers' effect on willingness to adopt in human capital supply chain resources management in manufacturing firms: An empirical investigation from developing countries-a mediation model. *SSRN*. <https://doi.org/10.2139/ssrn.4659015>
- Andrews, J. E., Ward, H., & Yoon, J. (2021). Utaut as a model for understanding intention to adopt ai and related technologies among librarians. *The Journal of Academic Librarianship, 47*(6), 102437. <https://doi.org/10.1016/j.acalib.2021.102437>
- Bawack, R., ICN Business School, France, Desveaud, K., & Kedge Business School, France. (2022). Consumer adoption of artificial intelligence: A review of theories and antecedents. *Proceedings of the 55th Hawaii International Conference on System Sciences*, 4306-. <https://scholarspace.manoa.hawaii.edu/server/api/core/bitstreams/4c0b3ae5-3836-46bb-b657-66b36392ff80/content>
- Beal, G. M., & Bohlen, J. M. (1956). The diffusion process. *Increasing understanding of public problems and policies*, 111–121. <https://doi.org/10.22004/ag.econ.17351>

- Bil-Jaruzelska, A. (2019, May 19). *Why social media data don't tell us very much about public opinion*. <https://www.ntnu.no/blogger/realsocialmedia/2019/05/22/why-social-media-data-dont-tell-us-very-much-about-public-opinion/>
- Bogdanov, A., & Dulya, I. (2019). *Sentiment-analiz korotkikh russkoyazychnykh tekstov v social'nykh media [sentiment analysis of short russian-language texts in social media]*. <https://cyberleninka.ru/article/n/sentiment-analiz-korotkih-russkoyazychnyh-tekstov-v-sotsialnyh-media>
- Bostrom, A. (1997). Risk perception: “experts” vs. “lay people”. *ResearchGate*. [https://www.researchgate.net/publication/254585787\\_Risk\\_Perception\\_Experts\\_vs\\_Lay\\_People](https://www.researchgate.net/publication/254585787_Risk_Perception_Experts_vs_Lay_People)
- Brause, S. R., Zeng, J., Schäfer, M. S., & Katzenbach, C. (2023a, November 14). *Media representations of artificial intelligence: Surveying the field*. <https://doi.org/10.4337/9781803928562.00030>
- Brause, S. R., Zeng, J., Schäfer, M. S., & Katzenbach, C. (2023b, November 14). *Media representations of artificial intelligence: Surveying the field*. <https://doi.org/10.4337/9781803928562.00030>
- Brennen, J., & Nielsen, R. (2018). *An industry-led debate: How uk media cover artificial intelligence*. <https://reutersinstitute.politics.ox.ac.uk/our-research/industry-led-debate-how-uk-media-cover-artificial-intelligence>
- Bristows, Holder, C., Watts, M., & Khurana, V. (2018). *Artificial intelligence: Public perception, attitude and trust*. <https://www.bristows.com/app/uploads/2019/06/Artificial-Intelligence-Public-Perception-Attitude-and-Trust.pdf>
- Carmichael, M. (2023). *Ai is making the world more nervous*. <https://www.ipsos.com/en/ai-making-world-more-nervous>
- Cave, S., Coughlan, K., & Dihal, K. (2019). *'scary robots': Examining public responses to ai*. <https://www.repository.cam.ac.uk/items/70d00e4c-51f9-4615-b767-486e44e5946f>
- Chen, Y. K., & Wen, C. R. (2020). Impacts of attitudes toward government and corporations on public trust in artificial intelligence. *Communication studies*, 72(1), 115–131. <https://doi.org/10.1080/10510974.2020.1807380>
- Choice architecture - the decision lab*. (2021). <https://thedeclarationlab.com/reference-guide/psychology/choice-architecture>
- Chto ukrainczy' dumayut ob iskusstvennom intellekte – rezul'taty' oprosa [what ukrainians think about artificial intelligence – survey results]*. (2024, July 13). <https://informator.ua/ru/chto-ukraincy-dumayut-ob-iskusstvennom-intellekte-vidyat-ego-preimushchestva-odnako-boyatsya-poteryat-professiyu>
- Chto ukrainczy' dumayut ob iskusstvennom intellekte: Vidyat ego preimushchestva, odnako boyatsya poteryat' professiyu [what ukrainians think about artificial intelligence: They see its advantages, but are afraid of losing their profession]*. (2023). <https://www.ukr.net/ru/news/details/society/101500720.html>

- Cui, D., & Wu, F. (2019). The influence of media use on public perceptions of artificial intelligence in china: Evidence from an online survey. *Information development*, 37(1), 45–57. <https://doi.org/10.1177/0266666919893411>
- D’Andrea, E., Ducange, P., Bechini, A., Renda, A., & Marcelloni, F. (2019). Monitoring the public opinion about the vaccination topic from tweets analysis. *Expert Systems with Applications*, 116, 209–226. <https://doi.org/10.1016/j.eswa.2018.09.009>
- Dandurand, G., Blottière, M., Jorandon, G., Gertler, N., Wester, M., Chartier-Edwards, N., Roberge, J., & McKelvey, F. (2022). *Training the news: Coverage of canada’s ai hype cycle (2012-2021)*.
- Davison, W. P. (1998, July 20). *Public opinion | definition, characteristics, examples, polls, types, importance, facts*. <https://www.britannica.com/topic/public-opinion/Public-opinion-and-government>
- Deep Knowledge Analytics. (2022). *Deep knowledge analytics | deeptech and ai ecosystem in ukraine*. <https://analytics.dkv.global/Ukraine/digest-deeptech-and-ai-ecosystem-in-ukraine.pdf>
- Demchenko, D. (2017). *Bol’she treti ukraincev schitayut, chto iskusstvennyj intellekt pomozhet pobedit’ korrupciyu [more than a third of ukrainians believe that artificial intelligence will help defeat corruption]*. <https://ain.ua/ru/2018/12/11/issledovanie-ukraincy-ai/>
- Dong, X., & Lian, Y. (2021). A review of social media-based public opinion analyses: Challenges and recommendations. *Technology in Society*, 67, 101724. <https://doi.org/10.1016/j.techsoc.2021.101724>
- Edelman. (2019, March). *2019 edelman ai survey*. [https://www.edelman.com/sites/g/files/aatuss191/files/2019-03/2019\\_Edelman\\_AI\\_Survey\\_Whitepaper.pdf](https://www.edelman.com/sites/g/files/aatuss191/files/2019-03/2019_Edelman_AI_Survey_Whitepaper.pdf)
- European approach to artificial intelligence*. (2024, April 30). <https://digital-strategy.ec.europa.eu/en/policies/european-approach-artificial-intelligence>
- Fast, E., Horvitz, E., & Association for the Advancement of Artificial Intelligence. (2016). Long-term trends in the public perception of artificial intelligence. *arXiv:1609.04904v1 [cs.CL]*. [https://www.microsoft.com/en-us/research/wp-content/uploads/2016/11/long\\_term\\_AI\\_trends.pdf](https://www.microsoft.com/en-us/research/wp-content/uploads/2016/11/long_term_AI_trends.pdf)
- Fenech, M., Strukelj, N., & Buston, O. (2018, April). *Ethical, social, and political challenges of artificial intelligence in health - future advocacy*. Future Advocac. <https://futureadvocacy.com/publications/ethical-social-and-political-challenges-of-artificial-intelligence-in-health/>
- Ferrara, E. (2023). Fairness and bias in artificial intelligence: A brief survey of sources, impacts, and mitigation strategies. *Sci*, 6(1), 3. <https://doi.org/10.3390/sci6010003>
- Fietta, V., Zecchinato, F., Stasi, B., Polato, M., & Monaro, M. (2022). Dissociation between users’ explicit and implicit attitudes toward artificial intelligence: An experimental study. *IEEE Transactions on Human-Machine Systems*, 52(3), 481–489. <https://ieeexplore-ieee-org.ezproxy.utlib.ut.ee/document/9627595>

- Franke, S. (2024, March 15). *Why european consumers are split over the future of ai*. <https://think.ing.com/articles/european-consumers-split-on-future-of-ai/>
- Funk, C., Tyson, A., Kennedy, B., & Johnson, C. (2020). 4. *publics express a mix of views on ai, childhood vaccines, food and space issues*. <https://www.pewresearch.org/science/2020/09/29/publics-express-a-mix-of-views-on-ai-childhood-vaccines-food-and-space-issues/>
- Gambini, B. (2022, March 1). *What's the prevailing opinion on social media? look at the flocks, says ub researcher*. <https://www.buffalo.edu/news/releases/2022/03/014.html>
- Gao, S., He, L., Chen, Y., Li, D., & Lai, K. (2020). Public perception of artificial intelligence in medical care: Content analysis of social media. *Journal of Medical Internet Research*, 22(7), e16649. <https://doi.org/10.2196/16649>
- Ge, Xu, C., Misaki, D., Markus, H., & Tsai, J. (2024). How culture shapes what people want from ai. *arXiv:2403.05104v1*. <https://arxiv.org/html/2403.05104v1>
- Grassini, S. (2023). Development and validation of the ai attitude scale (aias-4): A brief measure of general attitude toward artificial intelligence. *Frontiers in psychology*, 14. <https://doi.org/10.3389/fpsyg.2023.1191628>
- Gursoy, D., Chi, O. H., Lu, L., & Nunkoo, R. (2019). Consumers acceptance of artificially intelligent (ai) device use in service delivery. *International journal of information management*, 49, 157–169. <https://doi.org/10.1016/j.ijinfomgt.2019.03.008>
- Hamilton, I. (2024, June 6). *Artificial intelligence in education: Teachers' opinions on ai in the classroom*. <https://www.forbes.com/advisor/education/it-and-tech/artificial-intelligence-in-school/>
- Hansen, P. G. (2016). The definition of nudge and libertarian paternalism: Does the hand fit the glove? *European Journal of Risk Regulation*, 7(1), 155–174. <https://doi.org/10.1017/s1867299x00005468>
- Here's how opinions on the impact of artificial intelligence differ around the world*. (2020, December 18). <https://www.weforum.org/agenda/2020/12/mixed-views-of-the-impact-of-artificial-intelligence/>
- Hess, A. (2024, April 24). *Women are more likely to be replaced by ai, according to linkedin*. <https://www.fastcompany.com/91111430/women-are-more-likely-be-replaced-by-ai-according-to-linkedin>
- Ho, S. S., Scheufele, D. A., & Corley, E. A. (2010). Making sense of policy choices: Understanding the roles of value predispositions, mass media, and cognitive processing in public attitudes toward nanotechnology. *Journal of nanoparticle research*, 12(8), 2703–2715. <https://doi.org/10.1007/s11051-010-0038-8>
- Horner, H. (2024). Artificial intelligence and automation: Decoding human fears. <https://www.eit.edu.au/artificial-intelligence-decoding-human-fears/>

- Iskusstvennyj intellekt ne pugaet rossiyan [artificial intelligence does not scare russians]*. (2020, January 28). <https://www.comnews.ru/content/204243/2020-01-28/2020-w05/iskusstvennyy-intellekt-ne-pugaet-rossiyan>
- Iskusstvennyj intellekt v rossii: Kto, chto i kak vnedryaet [artificial intelligence in russia: Who is implementing what and how]*. (2022). <https://issek.hse.ru/news/862013645.html>
- Iskusstvennyj intellekt: Ugroza ili svetloe budushchee? [artificial intelligence: Threat or bright future?]* (2022). <https://wciom.ru/analytical-reviews/analiticheskii-obzor/iskusstvennyi-intellekt-ugroza-ili-svetloe-budushchee>
- Jackson, C. (2022). Opinions about ai vary depending on countries' level of economic development. <https://www.ipsos.com/en/global-opinions-about-ai-january-2022>
- Jain, R., Garg, N., & Khera, S. N. (2022). Adoption of ai-enabled tools in social development organizations in india: An extension of utaut model. *Frontiers in Psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.893691>
- Johnson, D. G., & Verdicchio, M. (2017). Ai anxiety. *Journal of the Association for Information Science and Technology*, 68(9), 2267–2270. <https://doi.org/10.1002/asi.23867>
- Kaimakamidis, A., & Pitas, I. (2024). Political tweet sentiment analysis for public opinion polling. <https://doi.org/10.1109/icassp48485.2024.10448327>
- Kang, Y., Wang, Y., Zhang, D., & Zhou, L. (2017). The public's opinions on a new school meals policy for childhood obesity prevention in the u.s.: A social media analytics approach. *International Journal of Medical Informatics*, 103, 83–88. <https://doi.org/10.1016/j.ijmedinf.2017.04.013>
- Kassens-Noor, E., Wilson, M., Kotval-Karamchandani, Z., Cai, M., & Decaminada, T. (2021). Living with autonomy: Public perceptions of an ai-mediated future. *Journal of Planning Education and Research*, 44(1), 375–386. <https://doi.org/10.1177/0739456x20984529>
- Kaya, F., Aydin, F., Schepman, A., Rodway, P., Yetişensoy, O., & Kaya, M. D. (2022). The roles of personality traits, ai anxiety, and demographic factors in attitudes toward artificial intelligence. *International Journal of Human-Computer Interaction*, 40(2), 497–514. <https://doi.org/10.1080/10447318.2022.2151730>
- Kelley, P. G., Yang, Y., Heldreth, C., & Woodruff, A. (2019). "happy and assured that life will be easy 10years from now.": Perceptions of artificial intelligence in 8... *ResearchGate*. [https://www.researchgate.net/publication/338354995\\_Happy\\_and\\_Assured\\_that\\_life\\_will\\_be\\_easy\\_10years\\_from\\_now\\_Perceptions\\_of\\_Artificial\\_Intelligence\\_in\\_8\\_Countries](https://www.researchgate.net/publication/338354995_Happy_and_Assured_that_life_will_be_easy_10years_from_now_Perceptions_of_Artificial_Intelligence_in_8_Countries)
- Kelly, S., Kaye, S., & Oviedo-Trespalacios, Ó. (2023). What factors contribute to the acceptance of artificial intelligence? a systematic review. *Telematics and informatics*, 77, 101925. <https://doi.org/10.1016/j.tele.2022.101925>

- Kerasidou, C., Kerasidou, A., Büscher, M., & Wilkinson, S. (2021). Before and beyond trust: Reliance in medical ai. *Journal of medical ethics*, 48(11), 852–856. <https://doi.org/10.1136/medethics-2020-107095>
- Kim, J., Kadkol, S., Solomon, I., Yeh, H., Soh, J. Y., Nguyen, T. M., Choi, J. Y., Lee, S., Srivatsa, A., V, Nahass, G. R., & Ajilore, O. A. (2023). Ai anxiety: A comprehensive analysis of psychological factors and interventions. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.4573394>
- Kravchenko, E. (2019). Iskusstvennyj intellekt v ukraine ne tol'ko zhiv, no i v armiyu, blagodarya odessitam, goden [artificial intelligence is not only alive in ukraine, but also fit for the army, thanks to odessa residents]. <https://www.048.ua/news/2422260/iskusstvennyj-intellekt-v-ukraine-ne-tolko-ziv-no-i-v-armiu-blagodara-odessitam-goden>
- Krivyi Rig LIFE. (2023, December 13). *Ukraina kak ploshchadka dlya testirovaniya ai-tekhnologij: Sergej tokarev rasskazal o vozmozhnostyakh iskusstvennogo intellekta [ukraine as a platform for testing ai technologies: Sergey tokarev spoke about the capabilities of artificial intelligence]*. <https://krlife.com.ua/news/ukrayna-kak-ploshhadka-dlya-testyrovanyya-ai-tehnologyj-sergej-tokarev-rasskazal-o-vozmozhnostyah-yskusstvennogo-yntellekta/>
- Kulagin, D. (2017). *Kartaslov [github repository]*. (comp. software; Version Version 3). <https://github.com/dkulagin/kartaslov/blob/master/README.md>
- Kuo, M. A. (2023). 'digital empires': The china-eu-us competition over tech regulations. <https://thediplomat.com/2023/10/digital-empires-the-china-eu-us-competition-over-tech-regulations/>
- Lavrentii, V. (2024, May 12). *Perelomny'j instrument. kak ukrainskij biznes integriroval instrumenty' iskusstvennogo intellekta. forbes sobral 29 ii-servisov dlya raboty' s tekstom, izobrazheniyami, video, audio i kodom [breaking tool. how ukrainian business integrated artificial intelligence tools. forbes has collected 29 ai services for working with text, images, video, audio and code]*. <https://forbes.ua/ru/innovations/perelomniy-instrument-yak-ukrainskiy-biznes-integravav-instrumenti-shtuchnogo-intelektu-u-svoyu-diyalnist-ta-yak-tse-vplinulo-na-yogo-rezultativnist-26022024-19479>
- Lee, C., Scheufele, D. A., & Lewenstein, B. V. (2005). Public attitudes toward emerging technologies. *Science Communication*, 27(2), 240–267. <https://doi.org/10.1177/1075547005281474>
- Li, J., & Huang, J. (2020). *Dimensions of artificial intelligence anxiety based on the integrated fear acquisition theory*. <https://www.semanticscholar.org/paper/Dimensions-of-artificial-intelligence-anxiety-based-Li-Huang/acec34441fd4f0b2dc4c269803dc736c>
- Littman, M., Ajunwa, I., Berger, G., Boutilier, C., Currie, M., Doshi-Velez, F., Hadfield, G., Horowitz, M., Isbell, C., Kitano, H., Levy, K., Lyons, T., Mitchell, M., Shah, J., Sloman, S., Vallor, S., & Walsh, T. (2020). *Gathering strength, gathering storms:*

- The one hundred year study on artificial intelligence (ai100) 2021 study panel report.* Stanford University. <https://ai100.stanford.edu/gathering-strength-gathering-storms-one-hundred-year-study-artificial-intelligence-ai100-2021-1/sq2>
- Love, T. P., Davis, J. L., & Calvert, J. M. (2018, January 1). *A mixed-methods examination of morality work through sentiment analysis and qualitative coding of twitter data.* <https://doi.org/10.4135/9781526435323>
- Maheshwari, R. (2023). Advantages of artificial intelligence (ai) in 2024. <https://www.forbes.com/advisor/in/business/software/advantages-of-ai/>
- Mail.Ru Group. (2014, March 23). *Issledovanie mail.ru group: Social'nye seti v rossii [mail.ru group research: Social networks in russia].* <https://hi-tech.mail.ru/news/18206-social-mail/>
- Manasi, A., Panchanadeswaran, S., & Sours, E. (2023, March 17). *Addressing gender bias to achieve ethical ai.* <https://theglobalobservatory.org/2023/03/gender-bias-ethical-artificial-intelligence/>
- Mayo, F. (2024). *Technology and innovation in central and eastern europe.* Public. <https://www.public.io/report-post/technology-and-innovation-in-central-and-eastern-europe>
- Mehrabi, N., Morstatter, F., Saxena, N., Lerman, K., & Galstyan, A. (2021). A survey on bias and fairness in machine learning. *ACM Computing Surveys*, 54(6), 1–35. <https://doi.org/10.1145/3457607>
- Mensah, M., & Onyancha, O. B. (2021). Demographic factors influencing the adoption and use of social media in university libraries in ghana: A unified theory of acceptance and use of technology (utaut) approach. *Journal of Electronic Resources Librarianship*, 33(3), 170–194. <https://doi.org/10.1080/1941126x.2021.1949157>
- Midler. (n.d.). *News media coverage and public perception of artificial intelligence: A corpus-based study of two british online media sources.* University of Tartu.
- Mohamed Noh, N., Hamzah, M., & Abdullah, N. (2016). *The influence of demographic factor on personal innovativeness towards technology acceptance* (No. 1). <https://files.eric.ed.gov/fulltext/EJ1086240.pdf>
- Moriniello, F., Martí-Testón, A., Muñoz, A., Jasauí, D. S., Gracia, L., & Solanes, J. E. (2024). Exploring the relationship between the coverage of ai in wired magazine and public opinion using sentiment analysis. *Applied sciences*, 14(5), 1994. <https://doi.org/10.3390/app14051994>
- Movement, Q. -. P. A. P. W. (2024). Applications of artificial intelligence across various industries. <https://www.forbes.com/sites/qai/2023/01/06/applications-of-artificial-intelligence/?sh=39d200fc3be4>
- Murphy, E. F. J. W. A. R. (2023, June 15). *Understanding ai uptake and sentiment among people and businesses in the uk - office for national statistics.* <https://www.ons.gov.uk/businessindustryandtrade/itandinternetindustry/articles/understandingaiuptakeandsentimentamongpeopleandbusinessesintheuk/june2023>

- Naselenie po gorodam ukrainy' [population by cities of ukraine]. (2024, January 1). <https://index.minfin.com.ua/reference/people/town/>
- Neudert, L.-M., Knuutila, A., & Howard, P. (2020, October 7). *Global attitudes towards ai, machine learning automated decision making*. <https://philhoward.org/wp-content/uploads/2022/08/GlobalAttitudesTowardsAIMachineLearning2020.pdf>
- Neyazi, T. A., Ng, S. W. T., Hobbs, M., & Yue, A. (2023). Understanding user interactions and perceptions of ai risk in singapore. *Big data society*, 10(2). <https://doi.org/10.1177/20539517231213823>
- Norris, K. (2022). *What is ai anxiety and how can i manage it?* <https://happiful.com/what-is-ai-anxiety-and-how-can-i-manage-it>
- Northeastern University. (2018, January). *Optimism and anxiety. views on the impact of artificial intelligence and higher education's response*. Gallup.
- Omoga, C. O. (2023). Perceived benefits of artificial intelligence integration within management information system for decision-making processes in the context of county governments in kenya. *IARJSET*, 10(11). <https://doi.org/10.17148/iarjset.2023.101101>
- Onososen, A. O., & Musonda, I. (2022). Perceived benefits of automation and artificial intelligence in the aec sector: An interpretive structural modeling approach. *Frontiers in Built Environment*, 8. <https://doi.org/10.3389/fbuil.2022.864814>
- Pangriya, R. (2022). Impact of demographic factors on the readiness and acceptance of beacon technology. *ResearchGate*. [https://www.researchgate.net/publication/369579353\\_Impact\\_of\\_Demographic\\_Factors\\_on\\_the\\_Readiness\\_and\\_Acceptance\\_of\\_Beacon\\_Technology](https://www.researchgate.net/publication/369579353_Impact_of_Demographic_Factors_on_the_Readiness_and_Acceptance_of_Beacon_Technology)
- Park, J., & Woo, S. E. (2022). Who likes artificial intelligence? personality predictors of attitudes toward artificial intelligence. *Journal of psychology (Washington, D.C. Online)/The Journal of psychology*, 156(1), 68–94. <https://doi.org/10.1080/00223980.2021.2012109>
- Pew Research Center. (2024, May 15). *Artificial intelligence*. <https://www.pewresearch.org/topic/internet-technology/emerging-technology/artificial-intelligence/>
- Professii budushhego: Kak iskusstvenny'j intellekt menyaet nashu zhizn' [professions of the future: How artificial intelligence is changing our lives]. (2024, April 25). <https://cs.hse.ru/aicenter/news/915611532.html>
- Progress ili ugroza, ili ob iskusstvennom intellekte v medicine [progress or threat, or about artificial intelligence in medicine]. (2023, October 17). <https://wciom.ru/analytical-reviews/analiticheskii-obzor/progress-ili-ugroza-ili-ob-iskusstvennom-intellekte-v-medicine>
- Ps, V. (2023). How can we manage biases in artificial intelligence systems – a systematic literature review. *International Journal of Information Management Data Insights*, 3(1), 100165. <https://doi.org/10.1016/j.jjime.2023.100165>

- Radulovski, A. (2024, March 16). *What role do women play in shaping the ethics of artificial intelligence?* <https://www.womentech.net/en-es/how-to/what-role-do-women-play-in-shaping-ethics-artificial-intelligence>
- Raine, L., FUNK, C., ANDERSON, M., & TYSON, A. (2022, March 17). *How americans think about artificial intelligence.* <https://www.pewresearch.org/internet/2022/03/17/how-americans-think-about-artificial-intelligence/>
- Rambocas, M. (2013). Marketing research: The role of sentiment analysis. *ResearchGate*. [https://www.researchgate.net/publication/301549590\\_Marketing\\_research\\_The\\_role\\_of\\_sentiment\\_analysis](https://www.researchgate.net/publication/301549590_Marketing_research_The_role_of_sentiment_analysis)
- Ren, H. (2024). Europe's best tech stock of 2023 has room to run, goldman says. <https://www.bloomberg.com/news/articles/2024-01-17/europe-s-best-tech-stock-of-2023-has-room-to-run-goldman-says>
- Samayeva, U. (2023, July 16). *Otnoshenie ukraincev k iskusstvennomu intellektu na udivlenie legkomy'slennoe. a zrya [the attitude of ukrainians towards artificial intelligence is surprisingly frivolous. but in vain]*. <https://zn.ua/TECHNOLOGIES/otnoshenie-ukraintsev-k-iskusstvennomu-intellektu-na-udivlenie-lehkomyslennoe-a-zrja.html>
- Selwyn, N., & Cordoba, B. G. (2021). Australian public understandings of artificial intelligence. *AI Society*, 37(4), 1645–1662. <https://doi.org/10.1007/s00146-021-01268-z>
- Slinkin, S., & Belskaya, N. (2013). Vuz v malom gorode: Istoricheskie aspekty' i tendencii razvitiya- sovremenny'e problemy' nauki i obrazovaniya [university in maly gorod: Historical aspects and development trends - modern problems of science and education ]. *Sovremenniye problyemy nayki i obrazovaniya*, 2. <https://science-education.ru/ru/article/view?id=8886>
- Solans, D., Beretta, A., Portela, M., Castillo, C., & Monreale, A. (2022, March 24). *Human response to an ai-based decision support system: A user study on the effects of accuracy and bias.* <https://arxiv.org/abs/2203.15514>
- Statista. (2023, July 11). *Global ict market share 2013-2023, by selected country.* <https://www.statista.com/statistics/263801/global-market-share-held-by-selected-countries-in-the-ict-market/>
- Statista. (2024a, April 17). *X user share in russia 2024, by gender.* <https://www.statista.com/statistics/1110353/russia-twitter-audience-overview/>
- Statista. (2024b, May 22). *Facebook: Distribution of global audiences 2024, by age and gender.* <https://www.statista.com/statistics/376128/facebook-global-user-age-distribution/>
- Statistics explained.* (2023). [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=International\\_trade\\_and\\_production\\_of\\_high-tech\\_products](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=International_trade_and_production_of_high-tech_products)

- Stein, J., Messingschlager, T. V., Gnambs, T., Hutmacher, F., & Appel, M. (2024). Attitudes towards ai: Measurement and associations with personality. *Scientific reports*, 14(1). <https://doi.org/10.1038/s41598-024-53335-2>
- Sun, S., Zhai, Y., Shen, B., & Chen, Y. (2020). Newspaper coverage of artificial intelligence: A perspective of emerging technologies. *Telematics and Informatics*, 53, 101433. <https://doi.org/10.1016/j.tele.2020.101433>
- Survey shows wide gap in consumer sentiment on artificial intelligence.* (2019, August 1). <https://blumbergcapital.com/news-insights/2019-ai-survey-announced/>
- Team, X. (2021, November 19). *Top 10 benefits of artificial intelligence (ai) | 10xds.* <https://10xds.com/blog/benefits-of-artificial-intelligence-ai/>
- Thomas, M. (2024, July 25). *14 risks and dangers of artificial intelligence (ai).* <https://builtin.com/artificial-intelligence/risks-of-artificial-intelligence>
- Tran, K. T., & Nguyen, T. (2021). Preliminary research on the social attitudes toward ai's involvement in christian education in vietnam: Promoting ai technology for religious education. *Religions*, 12(3), 208. <https://doi.org/10.3390/rel12030208>
- Tv still main source for news but social media is gaining ground | news | european parliament.* (2023). <https://www.europarl.europa.eu/news/en/press-room/20231115IPR11303/tv-still-main-source-for-news-but-social-media-is-gaining-ground>
- Ugwu, K., Ikechukwu, E., Ejiike, D. E., & Kekeocha, M. E. (2021). Demographic factor, adoption of technology and competitive advantage in nigeria. *ResearchGate*. [https://www.researchgate.net/publication/353958102\\_Demographic\\_Factor\\_Adoption\\_of\\_Technology\\_and\\_Competitive\\_Advantage\\_in\\_Nigeria](https://www.researchgate.net/publication/353958102_Demographic_Factor_Adoption_of_Technology_and_Competitive_Advantage_in_Nigeria)
- Understanding the impact of social media on online news.* (2024, March 25). <https://www.ofcom.org.uk/media-use-and-attitudes/media-plurality/social-media-online-news/>
- Venkatesh, V. (2021). Adoption and use of ai tools: A research agenda grounded in utaut. *Annals of Operations Research*, 308(1-2), 641–652. <https://doi.org/10.1007/s10479-020-03918-9>
- Vicente, L., & Matute, H. (2023a). Humans inherit artificial intelligence biases. *Scientific Reports*, 13(1). <https://doi.org/10.1038/s41598-023-42384-8>
- Vicente, L., & Matute, H. (2023b). Humans inherit artificial intelligence biases. *Scientific Reports*, 13(1). <https://doi.org/10.1038/s41598-023-42384-8>
- Wang, Y., & Wang, Y. (2019). Development and validation of an artificial intelligence anxiety scale: An initial application in predicting motivated learning behavior. *Interactive learning environments*, 30(4), 619–634. <https://doi.org/10.1080/10494820.2019.1674887>
- We asked people around the world how they feel about artificial intelligence. here's what we learned.* (2019, November 7). <https://foundation.mozilla.org/en/blog/we-asked-people-around-the-world-how-they-feel-about-artificial-intelligence-here-s-what-we-learned/>

- asked-people-around-the-world-how-they-feel-about-artificial-intelligence-heres-what-we-learned/
- Wen, F., Li, Y., Zhou, Y., An, X., & Zou, Q. (2024). A study on the relationship between ai anxiety and ai behavioral intention of secondary school students learning english as a foreign language. *Journal of Educational Technology Development and Exchange*, 17(1).
- What is artificial intelligence (ai)?* (n.d.). <https://www.ibm.com/topics/artificial-intelligence>
- What is artificial intelligence and how is it used?* (2020, April 9). <https://www.europarl.europa.eu/topics/en/article/20200827STO85804/what-is-artificial-intelligence-and-how-is-it-used>
- Why we must think locally when planning globally with ai.* (2024, February 26). <https://www.weforum.org/agenda/2024/02/ai-think-locally-globally/>
- Wlezien, C. (2024). News and public opinion: Which comes first? *The Journal of Politics*, 86(1), 1–17. <https://doi.org/10.1086/726940>
- World economic outlook database - groups and aggregates.* (2023, April 8). <https://www.imf.org/en/Publications/WEO/weo-database/2023/April/groups-and-aggregates>
- Wu, C.-H., Hung, C.-H., Shen, C.-C., & Yu, J.-H. (2022). Enhancing the willingness of adopting ai in education using back-propagation neural networks. *Sensors and Materials*, 36(3).
- Yakar, D., Ongena, Y., Kwee, T., & Haan, M. (2022). Do people favor artificial intelligence over physicians? a survey among the general population and their view on artificial intelligence in medicine. *Science Direct*.
- Yakov i Partnyory. (2023). *Iskusstvenny'j intellekt v rossii – 2023: Trendy' i perspektivy' [artificial intelligence in russia – 2023: Trends and prospects]*. [https://yakov.partners/upload/iblock/c5e/c8t1wrkdne5y9a4nqlicderalwny7xh4/20231218\\_AI\\_future.pdf](https://yakov.partners/upload/iblock/c5e/c8t1wrkdne5y9a4nqlicderalwny7xh4/20231218_AI_future.pdf)
- Yigitcanlar, T., Li, R. Y. M., Beeramoole, P. B., & Paz, A. (2023). Artificial intelligence in local government services: Public perceptions from australia and hong kong. *Government Information Quarterly*, 40(3), 101833. <https://doi.org/10.1016/j.giq.2023.101833>
- Yigitcanlar, T., Li, R. Y. M., Beeramoole, P. B., & Paz, A. (2023). Artificial intelligence in local government services: Public perceptions from australia and hong kong. *Government information quarterly*, 40(3), 101833. <https://doi.org/10.1016/j.giq.2023.101833>
- Zhang, B., & Dafoe, A. (2019). Artificial intelligence: American attitudes and trends. *Social Science Research Network*. <https://doi.org/10.2139/ssrn.3312874>

# Appendix A

## Average share of topics for the whole period for a) NM; b) SM-n; c) SM-U

topic average share		topic average share		topic average share	
1	0.027156730	1	0.017494467	1	0.003214024
2	0.021647701	2	0.027945468	2	0.010757420
3	0.023505203	3	0.028557151	3	0.023647077
4	0.019490593	4	0.021652984	4	0.016035566
5	0.133414645	5	0.034694729	5	0.024894188
6	0.016062748	6	0.025329501	6	0.019442055
7	0.052482504	7	0.009629027	7	0.080238806
8	0.008924164	8	0.011603988	8	0.016113013
9	0.017886505	9	0.016715594	9	0.013205626
10	0.013782854	10	0.055431140	10	0.028711035
11	0.013896870	11	0.103938902	11	0.013747319
12	0.015059143	12	0.047201909	12	0.036006576
13	0.025394983	13	0.035815344	13	0.022633720
14	0.018418626	14	0.024398047	14	0.014803606
15	0.015293821	15	0.012661411	15	0.030455403
16	0.022838160	16	0.011341573	16	0.013250243
17	0.033461855	17	0.035377987	17	0.010149180
18	0.087074093	18	0.020641705	18	0.129967737
19	0.017997629	19	0.015130135	19	0.007877600
20	0.055410560	20	0.019328040	20	0.032910999
21	0.034295993	21	0.025052036	21	0.041825865
22	0.014991900	22	0.058989023	22	0.025120347
23	0.019243284	23	0.010860491	23	0.053042969
24	0.034865447	24	0.028398066	24	0.038629052
25	0.019384987	25	0.035503238	25	0.022249635
26	0.007186711	26	0.030295900	26	0.017073214
27	0.030313173	27	0.021845872	27	0.006172762
28	0.029896741	28	0.017472653	28	0.016097786
29	0.044058144	29	0.030777633	29	0.018119627
30	0.028716498	30	0.022732600	30	0.077643383
31	0.013687188	31	0.049285514	31	0.012850433
32	0.026931787	32	0.019305666	32	0.037159213
33	0.017505853	33	0.038366591	33	0.015919173
34	0.031905936	34	0.023470135	34	0.060415071
35	0.007816774	35	0.012755480	35	0.009620276

a) NM

b) SM-N

c) SM-U



## Subtopics for the 'Future of humanity' topic

### 1. Global AI Development

("Ukraine", "country", "global", "place", "city", "transport", "global", "market", "car", "revolution")

### 2. Existential Threats of AI

("revolution", "humanity", "achievement", "recent", "nuclear", "machine", "industrial", "change", "help", "war")

### 3. Art

("book", "to happen", "interesting", "global", "network", "to receive", "idea", "language", "problem", "business")

### 4. Future of AI and Humanity

("challenge", "team", "Veronika", "situation", "to elect", "Podlesnova", "to replace", "schoolchild", "response", "to occur")

### 5. AI Progress

("important", "trend", "market", "team", "worker", "role", "source", "activity", "smart", "scientific")

### 6. AI and Jobs

("reality", "profession", "to connect", "opportunity", "to create", "project", "future", "to consider", "second", "to become")

### 7. AI Development in the World

("society", "knowledge", "country", "technological", "scientific", "online", "reality", "social", "China", "science")

### 8. Future of AI and Humanity

("future", "bigger", "task", "change", "to tell", "word", "goal", "to become", "to note", "computer")

### 9. Future of AI and Humanity

("brain", "machine", "bigger", "civilization", "to consider", "help", "to exist", "scientist", "to manage", "existence")

### 10. AI and Jobs

("question", "child", "opportunity", "necessary", "knowledge", "profession", "to become", "expert", "to understand", "to replace")

### 11. Future of AI and Humanity

("modern", "country", "science", "direction", "society", "rapidly", "to lead", "measure", "place", "to turn out")

### 12. Future of AI and Humanity

("learning", "robot", "to become", "future", "day", "process", "measure", "algorithm", "to give", "transformation")

### 13. Innovations in AI

("task", "scientist", "method", "human", "to help", "to tell", "extinction", "opinion", "mass", "learning")

### 14. Threats to Humanity

("threat", "pandemic", "change", "climate", "factor", "bigger", "problem", "Gates", "epidemic", "biotechnology")

General subtopics about the future of humanity with the spread of AI are named 'Future of AI and Humanity'. Topics related to AI anxiety are 'AI and Jobs' and 'Existential Threats of AI'/'Threats to Humanity'. Topics about AI and job market account for 9 and 10 percent, while 'Existential Threats of AI'/'Threats to Humanity' account for 6 percent.

# Appendix C

## Original texts of posts of men/women, and users from big cities/towns

**Men. AI consciousness/autonomy.**  
... Если там все равно квантифицированы соединены, тогда мы можем вообще сказать, какой мозг умный, а какой — глупый? В таком случае мы какой искусственный интеллект создаем? Умный? А что это значит? Все геста интеллекта в основном заложено на сген: умный тот, кто быстро мыслит. Простите за некорректность, но в выдуманном смысле с точки зрения логика, но что то мне не кажется, что а полная дура.

Получился мемчик. Искусственный интеллект, задний, сам по себе, попросил его уметь мыслить, и мало знает, но завораживает...

**Men. Job replacement.**  
... В таком роли водители может выполнять человек, а может выполнять робот с искусственным интеллектом. В случае с человеком мы будем говорить о протестной роли, чтобы подчеркнуть участие человека. Но когда говорим о нем есть роль водителя, то в этом случае допустимо, что исполнителем данной роли может быть как человек, так и неодушевленный объект...

Роботы могут появиться на мусоросортировочных заводах в РФ через пять лет...

умственный труд в течение десятилетия исчезнет все рутинные низко квалифицированные профессии за ними работу потеряют полицейские врачи шахтер журналисты бухгалтеры учителя юристы и т.д. сейчас выполнять человек богаче будет богаче ведь они владеют работами другие будут беднее как защитить себя и близких от расов полярность работу в результате роботизации

Роботизация. ? На какую работу мы можем рассчитывать. ? Мы живем в эпоху перемен и уже сегодня вытеснение робототехники и искусственного интеллекта меняет наше общество кардинально. Достают кучку все и ба — не исключение? ? Будет ли у меня работа через 10 лет? ? На какую работу мы можем рассчитывать в будущем? В течение ближайшего десятилетия исчезнут все рутинные и низкоквалифицированные профессии, за которыми потеряют работу полицейские, учителя, юристы, врачи, бухгалтеры. Профессии могут оказаться

Увы, Тася! Увы! Планируют заменить живых мажордов работами с искусственным интеллектом.

**Men. AI will rule the world.**  
... в скором будущем, из-за эти генетические мутаций, на уровне ДНК будет уничтожена память о том, что мы люди. Конечная цель — полностью оставить человечество внутреннюю чистоту самоидентификации. Скоро будут защищать права на достойную жизнь всех существ с чувственным восприятием, будь то искусственные интеллект, пчелы, пост-люди или человекоподобные существа...

... вот знаете вот компьютер сейчас может быть логично мы можем понять это мы создали компьютер да и компьютер вообще из всего произведенного человеком это одно из величайших творений человека а ..о искусственный интеллект говорит вот о том что вот действительно в чужих ногах так могут эти программы боги дали человеку творить способность творить это одно из величайших подарение боженств...

... Страх собственных мыслей Все наши ожидания пришествия искусственного интеллекта — это лишь несознательная попытка навсегда лишить себя этой недоразумимой ответственности...

ЧТО ЗА БГЕД? Своего Кошачи считает, что полноценный искусственный интеллект положит конец человеческой расе, но не все ученые разделяют это мнение. Один говорит, что в будущем ИИ и человек станут коллегами, а другие — любовниками.

Моя теория мы живем в пять времен, которая в будущем создадут супер компьютер, который проглотит всю нашу вселенную, для этого мыслы собирают всю информацию о каждом человеке такой искусственный интеллект вселенский разум маточка ...

**Men. Conspiracy theories.**  
... увеличение и укрепление частной собственности чего-либо, включая движимое и недвижимое имущество. Да, лишние частной собственности. И я никак рассказу, как это происходит. ... Цифровизация всего и все из за отмены наличия (об этом ниже) и из-за роботизации, искусственного интеллекта и других аспектов четвертой промышленной революции...

А дальше полный экономический хаос, политический упадок, демократический распад. Плес природные катаклизмы, страх, мировой погоня и искусственный интеллект.

... Увы! Нашествиями идут войны против славянских народов, и посредством насаждения веры и заведной дубины в восточном лагере между одним народом, восточными и другими методами. К привычному созданию некоего это понимают. Нам сейчас дано колот умирать, потому что у нас есть крошка непереносимой войн, ну и территории Украины, России, Белорусии. Новое мировое правление с приходом искусственного интеллекта (антикризис), чужеземцы, отмена частной собственности, тотальный контроль — работа для тех, кто выживет!!!

... об очевидных вещах, которые были известны в конце 19-го века еще в 2009 году. Так четко прописан сценарий, как через пандемия по всему миру сделать тотальный контроль, глобальную цифровизацию. По плану россияне, ровериторов, Кораи ваньша, Бама Габига, Генри Билденбергера — четкий прописанный сценарий, как в 2030 году через пандемия сделать единое цифровое государство, с единой цифровой крипто-валютой и единое мировое управление. Где не будет частной собственности, где будет уничтожить искусственный интеллект. А люди будут вынуждены работать, и исполняющих работу будут отключать от системы, и они будут обречены на голодную смерть. И пока мы идем чего то по их сценарию.

**Big cities. AI ethics and regulations.**  
Разработка искусственного интеллекта окутана слухами, домыслами и опасениями. Ученые мира думают, как направить его в пользу человечества. Распространите сообщения об Украине в области науки, образования, культуры, осуществляемые в рамках ЮНЕСКО. Пусть мир узнает о наших действиях и стремлениях (IA/P R C 26 no 30 апреля в онлайн-формате проходит заседание Межправительственного специального комитета экспертов по техническим и юридическим вопросам в рамках разработки Рекомендации по этическим принципам искусственного интеллекта с участием представителей всех государств-членов

Защита от искусственного интеллекта: ЭК разработала законопроект Он должен быть рассмотрен и принят Европарламентом и поддержан на уровне стран-членов ЕС EK разработала законопроект Он должен быть рассмотрен и принят Европарламентом и поддержан на уровне стран-членов ЕС

Или выразимся более официально... права будут принадлежать той группе (как ни странно для людей), которая на законодательном уровне пролоббировать ситуации в свою пользу.

**Big cities. Job replacement.**  
... Мир ведь меняется. И подобные профессии будут в ближайшее время не нужны. И заменены искусственным интеллектом.

Что ты думаешь, реальная ли идея, что самый справедливый суд - искусственный интеллект/робот? Или все же нужен человеческий фактор и сердце при принятии решений?

Стать самому себе терапевтом нельзя примерно по тем же причинам, по которым нельзя стать самому себя нейрохирургом или тренером боевых искусств - это работа, которая по своей сути требует наличия внешнего наблюдателя, а тому же прошедшего долгую и сложную специальную подготовку. Профессиональные наставники, которые используются и обеспечивают эффект в психотерапии, настолько сложны, что никак их смоделировать...

**Big cities. Conspiracy theories.**  
...ваш Гармин - это искусственный интеллект, а Вы у него подопытный кролик

Кто еще не совсем ну-ну послушайте Миллардер Гинбург в ближайшем будущем с чипами.

**Big cities. AI will rule the world.**  
Я знаю, какой нам нужен президент и другие слухи... Как Вы думаете, кто это? Умный, но коррумпированный, кучковатый и все другие добродетели. Свою скажу это ИИ (искусственный интеллект).

На свою голову! Это все потому им вукнет! Нам еще не хватало искусственного интеллекта! И роботов! Это все уничтожит человечество!

**Towns. AI will rule the world/conspiracy theories.**  
на планете Земля уже так свались со всеми техническими новшествами вроде искусственного интеллекта, формирования чипов в человеческую голову и прочие забавы искусственного ума, что и сами стали подходить на некоторые биологические компьютеры, живущие в своих виртуальных пространствах. (И пространства эти, замечу кстати, казались им реальнее самой действительности)..

Скоро эти дрецы будут управлять людьми. Это же Бостон динамика наиболее продвинулся в искусственном интеллекте

"Составленные" мэры наши "добрых" и "заботливых" властей не имеют никакого отношения к защите от распространяемого вируса - все эти самоизоляция, , репараторы, перчатки, санитайзеры, унитайзеры - это все полнейший абсурд, совершенно бессмысленный, и иногда очень вредный и опасный для здоровья. Это все выдвинуто для воспитания покорности будущих рабов цифрового концлагеря, управляемого Искусственным Интеллектом...

**Towns. Conspiracy theories.**  
Та только посмотрите на их планы! Они ни дане не отрицают! Писатель, что они заглави! Миллардер Гинбург в ближайшем будущем с чипами и искусственным интеллекте

Интервью Миллардера Гинбурга, которое он дает Гордону. Так вот, он четко озвучивает то, к чему все ведут устаревшие власти. Он говорит о том, что машина больше не будет массовой, а будет элитарной, как и образование; о том, что пандемия была придумана, чтобы "перезагрузить" мир... о том, что миллионы людей останутся в скором времени без работы и средств к существованию, благодаря внедрению искусственного интеллекта об элитарной цивилизации богатых людей с целью стать сверхчеловеком.

**Towns. AI will rule the world.**  
Это дерямо Нада уничтожит с дним нет Человечества.

Человечество проиграет войну искусственному интеллекту Ученые уверены, что у людей нет шансов выжить в войне со искусственным интеллектом. Если в будущем произойдет столкновение машин и людей..

## Appendix D

### **Licence Non-exclusive licence to reproduce thesis and make thesis public**

I, **Olga Chemodanova**,  
(author's name)

1. herewith grant the University of Tartu a free permit (non-exclusive licence) to reproduce, for the purpose of preservation, including for adding to the DSpace digital archives until the expiry of the term of copyright,

**Public Perception of Artificial Intelligence in Ukraine and Russia: News Media and Social Media,**

(title of thesis)

supervised by Rajesh Sharma.

(supervisor's name)

2. I grant the University of Tartu a permit to make the work specified in p. 1 available to the public via the web environment of the University of Tartu, including via the DSpace digital archives, under the Creative Commons licence CC BY NC ND 3.0, which allows, by giving appropriate credit to the author, to reproduce, distribute the work and communicate it to the public, and prohibits the creation of derivative works and any commercial use of the work until the expiry of the term of copyright.
3. I am aware of the fact that the author retains the rights specified in p. 1 and 2.
4. I certify that granting the non-exclusive licence does not infringe other persons' intellectual property rights or rights arising from the personal data protection legislation.

Olga Chemodanova  
*13/08/2024*