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The Connotation, Features, and Mechanism of Computational Propaganda

Abstract: The purpose of the work is to identify the connotation, features of computational propaganda and reveal how computational propaganda uses new technologies to manipulate public opinion.

The study's hypothesis is the assumption that computational propaganda, as a new type of propaganda and manipulation of public opinion spawned in the era of artificial intelligence, stealthily and massively steers public opinion using new technologies to influence political and social processes.

With the scientific methods such as event analysis and case-study, the work concludes that more and more governments, political parties, and strategic communication companies use social media as the digital platform, Internet bots as the automated executors, and algorithms as the computational technical guarantee, by participating in, guiding and creating controversial topics and events, to manipulate public opinion and win international competitions, policy debates, elections, etc.

Key words: computational propaganda, manipulation, social media, Internet bots, algorithms

Introduction

Information is power. Technology is power. When massive and comprehensive information is combined with automatic and intelligent technology, what changes may this bring to the world?

Up to 2020, 81 countries are found to spread computational propaganda about politics. Since 2018 there have been more than 65 firms offering computational propaganda services. Almost 60 million US dollars were spent on hiring firms for computational propaganda since 2009 (Bradshaw, Bailey, Howard, 2021, p. 2).

Computational propaganda is the intersection of technology and politics on social media, big data, and artificial intelligence. Although a comprehensive and in-depth study in this field has not yet been launched, computation-

al propaganda has already been widely used worldwide, and it has become an enormous challenge for international communication today.

The purpose of the work is to identify the connotation, features of computational propaganda and reveal how computational propaganda uses new technologies to manipulate public opinion.

To achieve this purpose, the following tasks were solved in the study:
1) to identify the definition of computational social science and computational political science;
2) to identify the definition of computational propaganda;
3) to analyze the features of computational propaganda;
4) to find out the mechanism of computational propaganda.

General scientific methods of generalization, comparison, and synthesis were used to identify the definition and features of computational propaganda. Special political research methods, including event analysis and a case study, are used to track and analyze large amounts of information reflecting the computational propaganda mechanism.

The study's hypothesis is the assumption that computational propaganda, as a new type of propaganda and manipulation of public opinion spawned in the era of artificial intelligence, stealthily and massively steers public opinion using new technologies to influence political and social processes.

As a kind of conscious and organized communication to stir up public sentiment and manipulate public opinion in political struggles through one or more means of information dissemination, propaganda has been used on a large scale since World War I. Its forms range from flyers and posters in the initial era to newspapers, radio, and television in the era of mass media, from websites and social media in the Internet era. Computational propaganda is a new form of propaganda in the artificial intelligence era. The technical threshold of propaganda is getting higher, its stealthiness is getting stronger, and the scope of propaganda and the degree of coercion are getting bigger.

In 2009, 15 scientists jointly proposed the concept of computational social science. It is a branch of social science, which reflects on computational reality, and it is often involved in computational enterprises, including political communication and computational propaganda. Computational propaganda was proposed by Samuel Woolley and Philip Howard in 2016 (Woolley, Howard, 2016, pp. 4482–4490). It is the new branch of propagandistic practices using social media, Internet bots, and algorithms to manipulate public opinion and political interests.

The manipulators behind computational propaganda are mainly governments, political parties, political candidates, and strategic communication companies (Bradshaw, Bailey, Howard, 2021). The main applications of computational propaganda are international competitions, policy debates, elections, and political crises.

The main features of computational propaganda are good concealment, highly targeted objectives, fast implementation, broad ripple effect, automation, and high threat. Computational propaganda uses social media as the digital platform, Internet bots as the automated executors, and algorithms as the computational technical guarantee. Participating in, guiding, and creating controversial topics and events, it achieves the purpose of manipulating public opinion. Nowadays, computational propaganda is being used by an increasing number of countries and organizations, seriously disrupting the Internet information environment and threatening the stability of the domestic and international political situation.

Computational social science and computational political science

The Internet is an environment in which actors are fully monitored, and all their behaviors are recorded. In 2020, there were 4.66 billion Internet users and 5.19 billion mobile phone users worldwide (Kemp, 2020). This large volume of users has left a vast number of digital traces. These traces involve all aspects of modern life. Especially for digital native, they will be recorded by the Internet from birth to death. We have gone from an era of lack of behavioral data to an era of extremely rich behavioral data. In 2009, David Lazer and other 14 scientists published "Computational social science," marking the official establishment of computational social science (Lazer et al., 2009, pp. 721–723).

The first essential element of computational social science is big data. Due to the widespread popularity of mobile phones and other electronic recording devices, most of the activities we do every day are recorded. It allows sociologists to rely on electronic data to observe social behavior and understand social processes.

Nowadays, big data is widely known, but there is still no unified consensus on the definition. In 2001, Doug Lenny described the 3V feathers of big data: volume, variety, and velocity (Laney, 2001). In 2017, Matthew Salganik gave a detailed supplementary description in his book. Big data in the era of artificial intelligence has 10 features: big, always-on,

and nonreactive, incomplete, inaccessible, non-representative, drifting, algorithmically confounded, dirty, and sensitive (Salganik, 2017, p. 9). These features have promoted the development of computational social science, but still, many traditional sociological scientists question the re-search results of computational social science.

The second element of computational social science is algorithms and computational tools. Computational social science is commonly used to generate inferences through algorithmic solutions such as automatic information capture, social network analysis, and complexity models to study the applicability of sociological theories in various fields (Shorey, Howard, 2016, pp. 5032–5055). Algorithms and computational tools pro-vide a new method and a system for social science research. More and more sociologists begin to learn computer technology.

In the context of big data and artificial intelligence, traditional social sciences are undergoing a huge paradigm shift in research. It is gradually moving up the path of data analysis and constructing models. In addition, computational social science is being widely used for more interdisci-plinary research, including computational journalism, computational lin-guistics, computational criminology, etc. Computational political science, a sub-discipline of computational social science, has also grown for the last decade.

Computational political science uses computationally focused for-mulas or characters to explain and process political events and citizens' political behavior and analyze current political phenomena. Its main com-putational research methods include automatic text analysis, visualization methods, and data mining (Lin, 2017, p. 11).

The main application areas of computational political science are in-ternational politics, government management, party relations, political decision-making. Computational political science includes two aspects. One is the use of emerging computer technologies for calculating relevant data. The second is using network science and data science techniques to analyze and study political subjects and political phenomena. The most important advantage of computational political science over traditional political science is that the former does not have to stick to a small sam-ple of data to analyze and generalize to draw conclusions. It has many random samples and powerful data analysis techniques, so the research scope is broader, and the results are general.

At the same time, computational politics are being applied by more and more political subjects. They use computational methods to collect

data from online and offline sources for conducting persuasion, mobilization, and manipulation in the service of electing, furthering, or opposing a candidate, policy, or legislation (Tufekci, 2014, p. 2).

The main computational methods are statistical analysis, probabilistic models, and visualization of data. By making models and systems, these methods can observe political behaviors from the present technical perspective. Now computational politics are widely exploited for political purposes such as opinion mining, polls, and political campaigns (Haq, Braud, Kwon, Pan, 2020, p. 197379). Computational propaganda is a typical application of computational politics in political practices.

The connotation and features of computational propaganda

Woolley and Howard first proposed computational propaganda in 2016 (Woolley, Howard, 2016, pp. 4482–4490). By the report of Oxford University, until 2020, 81 countries are found to use computational propaganda to defend political interests. From 2018 to 2020, more than 65 firms have offered computational propaganda services for different government agencies and political parties (Bradshaw, Bailey, Howard, 2021, p. 2). In the era of artificial intelligence, propaganda turns out to be the collaboration of social media, Internet bots, and algorithms. The technical threshold of propaganda is getting higher, its stealthiness is getting stronger, and the scope of propaganda and the degree of coercion are getting bigger.

Computational propaganda has been defined as using algorithms and automation to purposefully distribute misleading information over social media networks (Bentzen, 2018). Computational propaganda uses social media as the platform, Internet bots as the executors, and algorithms as the technical guarantee. It is a new branch of propagandistic practices in the artificial intelligence era. It also is the inevitable product of a combination of public opinion control and new computer technologies catalyzed by political struggles. Participating in, guiding, and creating controversial topics and events, it achieves the purpose of defending different political interests.

Computational propaganda mainly aims to achieve the following five purposes: spreading propaganda messages supporting the government and political parties, attacking and discrediting competitors and opponents, distracting and diverting public attention, creating social separatism, and suppressing citizens' political participation (Ou, Xia, 2019).

For example, in discussions about the China-US trade negotiations, Internet bots accounts accounted for 13%, and their posted content accounted for nearly 20% of traffic (Zhang, Zhao, Shi, 2020, p. 46). In June 2016, 77,000 bots signed the online petition for the second Brexit referendum, and 13,493 Twitter bots formed an online campaign to support leaving the EU (Bastos, Mercea, 2019, pp. 38–54). During the 2016 US presidential campaign, bots traffic accounted for more than 60% of all online traffic (Condliffe, 2016).

Computational propaganda has main features such as good concealment, highly targeted objectives, fast implementation, broad ripple effect, automation, and high threat. Because of these features, computational propaganda has already become one of the most important tools for political games in the era of information politics of artificial intelligence.

The mechanism of computational propaganda

Computational propaganda is an inevitable product of political struggle in the age of artificial intelligence. The massive volume, accuracy, high performance, and automation of computational technologies such as big data and algorithms have brought unprecedented changes to political advocacy. It is also a great threat to the stability of the global political ecosystem.

Manipulators use social media as the propaganda platform, Internet bots as the propaganda executors, and algorithms as their technical guarantee. By participating in or making controversial topics or events, they achieve the purpose of manipulating public opinion, thus, to change the political process, defend their political interests, and win political battles.

Digital propaganda platform: social media

In 2020, the number of social media users reached 3.8 billion. Various forms of social media have penetrated most people's daily lives and have become the main channels for young people to know about political situations, express political opinions, and participate in political events. Because of its communication features such as virtualization, decentralization, popularization, strong participation, and strong "number orientation," now social media works as the main channel of computational propaganda.

The decentralization of social media refers to the decentralization of the production and dissemination of content. A popular hashtag on social media can quickly bring thousands of users' attention together and trigger large-scale discussions. "#" (Hashtag) has become one of the most sensitive characters for every social media user.

Social media has improved the transparency of political policies, expanded the scope of discussions on political events, enhanced people's political awareness and enthusiasm for political participation. But now, these advantages are severely challenged and threatened by computational propaganda.

Various hashtags, views, likes, reposts, and comments, these basic social media functions have become important areas of political struggles. Virtualized social media has a strong "number" orientation: the number of fans, the number of views, the number of likes, reposts, and comments. First, from the algorithm perspective, the larger the number of fans, likes, or comments means the more exposure weight and more rights of priority on social media. Secondly, from the perspective of user psychology, the larger the number means, the more popular a person or a view is, and the more correct they are, which can cause a large-scale convergence effect.

The virtuality and "number orientation" of social media have provided great convenience to implementing computational propaganda. Today's social media is flooded with fake accounts. These accounts are controlled by bots and can quickly create countless "big numbers" to attract public attention, create hot spots and manipulate public opinion.

At the same time, social media collects a large amount of the latest user data, then bots that execute computational propaganda use these data resources to carry out targeted communication to achieve their purposes more efficiently.

One of the organizations making excellent use of these social media features for its own activities is ISIS. ISIS has a mass of bot accounts on Twitter, Facebook, YouTube, etc., to post various propaganda information. When the posted content is deleted, and the account is blocked, it will create more new accounts. The social media application of ISIS has surpassed the one-way information transmission of web 1.0 and the interactive communication stage of web 2.0 and entered the personalized content customization of web 3.0. ISIS has not only a large real territory but also a place in virtual space. It uses armed forces and computational propaganda technology to carry out online and offline jihad at the same time (Wan, 2016).

Automated propaganda executor: bots

The big difference between computational propaganda and other forms of propaganda is that computational propaganda uses intelligent bots to imitate humans for information dissemination and online interaction to manipulate public opinion. In the era of artificial intelligence, the main executor of propaganda has changed from humans to robots.

The word "robot" first appeared in *Rosom's Universal Robot* by Czech writer Chapek in 1920 (Cheng, 2017). In the past 100 years, robotics technology has advanced a lot. An Internet bot refers to an automated account programmed to interact like a user, especially on social media. Bots make up nearly 50% of all online traffic and account for a significant portion of active users on social media (Bentzen, 2018).

According to the functions, current political Internet bots for computational propaganda are mainly divided into four types.

Follower bots: this type of bots increases the number of fans by following social media accounts or liking, reposting, and commenting on the published content to create the illusion that a certain person or his ideas have received widespread attention and recognition. By running bot detection software on Donald Trump's personal account, 59% of his followers were bots (Pyrinis, 2017). After Twitter permanently blocked D. Trump's account, Indian Prime Minister Narendra Modi became the current government leader with the most fans. But it was tested that 60% of his followers were fake accounts (Bureau, 2020).

Promotional bots: this type of bots copy and spread widely beneficial information about relevant people or events to help them get more attention and increase their influence. The information disseminated can be divided into different types: entirely true information, partially true information, and completely false information. During the 2012 South Korean presidential election, the National Intelligence Agency released mass Twitter messages through intermediaries to guide the public to support Park Geun Hye. Won Se-Hoon, the director of the National Intelligence Agency of South Korea, was charged with crimes such as violating the election law (Choe, 2017).

Attacking bots: they work similarly to the promotional bots, but their target objects and published content are the opposite. They aim to destroy competitors' image and weaken their social influence by spreading unfavorable information. Trolls often use false or out-of-context news as a basis to incite extreme emotions such as racism and xenophobia. During

the Gulf crisis in 2017, at least 71% of active accounts on social media that participated in the related hashtags were bots. They were used to help UAE, Egypt, Saudi Arabia, and Bahrain spread negative information about Qatar (Jones, 2019, pp. 1389–1415).

Roadblock bots: this kind of bots uses to promote other hot events to distract or divert the public's attention, thereby reducing the pressure of public opinion and passing the crisis smoothly; Or when the opponent gains public opinion advantage, by creating other hot spots, to disrupt the opponents' propaganda process so that their influences can be reduced.

As social platforms such as Facebook and Twitter have increased their testing efforts, many fake accounts have been deleted. Experts predict that the next generation of bots will use natural language processing to help avoid detection and make the interaction feel more real (Bentzen, 2018). Different kinds of bot spread information on a large scale at a cost far lower than labor, but with much higher efficiency, to change the proportion of information and public opinion.

Computational propaganda technology: algorithms

An algorithm is a finite sequence of well-defined, computer-implementable instructions, typically to solve a class of problems or perform a computation (Vault, 2019). Using algorithmic technology, it is possible to create political Internet memes quickly and accurately, including burstiness, high participation, and massive replication (Luo, Zhang, 2019).

First of all, algorithms can enhance the visibility of specific information and enhance the invisibility of information through filtering. Computational propaganda is based on these features of algorithms to spread political Internet memes. There are four main ways to manipulate public opinion through algorithms: making trends, recommending information, filtering information, and diverting public attention.

For instance, in the 2016 US presidential election, many political memes and attacks on candidates using algorithm technology have been made. Hillary Clinton nearly fainted in public at the "9.11" memorial ceremony (Alba, Welker, Vitali, Hasani, 2016), and political memes related to this quickly appeared on social media, "Hillary used a substitute," "Hillary looked at least 10 years younger than before when she appeared again," "When Hillary appeared again, even the style of the earrings she wore was different."

Algorithms can promote the highly visible and massive dissemination of political memes with misleading information. Politicians who implement computational propaganda can attack opponents through this model and create a favorable public opinion environment for themself.

Controversial propaganda content: controversial topics

Computational propaganda often uses highly controversial topics as an opportunity to manipulate public opinion. The shadow of computing propaganda has been constantly found in international conflicts, elections, racial discrimination, human rights, religions, etc. In the two public protests in Brazil in 2015, it was confirmed that some political groups used Internet bots on Twitter to post misleading information to call more people to march on the streets (Oliveira et al., 2016, pp. 2068–2076).

By spread misleading information about controversial events, computational propaganda can strengthen public disagreements, intensify confrontation, split social consensus, and undermine social stability.

The mechanism of computational propaganda vividly illustrates how modern computational technologies and political science are integrated and collaborated. The rapid development of modern technology has opened unlimited possibilities for political science research, but at the same time, the other side of advanced technology implies a powerful threat as well. Social media, Internet bots, and algorithms work in tandem to create a new information environment and social space. As social media becomes more and more embedded in most people's lives and algorithms continue to advance, it becomes increasingly difficult to distinguish the virtual from the real. Bots have taken advantage of this feature to invade social media, posing as real people's accounts. Once a controversial event breaks out within a country, the bots will act quickly and post much misleading information, thus changing and guiding public opinion for their own purposes.

Conclusions

When massive and comprehensive information is combined with automatic and intelligent technology, what changes may this bring to the world? Digital propaganda platforms, automated propaganda executors,

and computational propaganda technology jointly ferment controversial propaganda content. By integrating social media, intelligent bots, and algorithmic techniques, computational propaganda makes powerful misleading and covert control.

The analysis firstly has shown the definition and features of computational social science. Its two main elements are big data and algorithms and computational tools. In this way, traditional social sciences are undergoing a huge paradigm shift in research. It is gradually moving up the path of data analysis and constructing models to observe and analyze social structures and social behaviors.

Computational political science, a sub-discipline of computational social science, has also grown fast in the last few years. The main application areas of computational political science can be international relations, government management, party relations, political decision-making, etc. At the same time, computational politics are being applied by more and more political subjects. They use computational methods to collect data from online and offline sources for conducting persuasion, mobilization, and manipulation in the service of international competition, elections, policy implementation, and national governance, etc.

Computational propaganda is a typical application of computational politics. It is a new branch of propagandistic practices by using algorithms and automation to distribute misleading information over social media networks to manipulate public opinion. It is also the inevitable product of political propaganda and political struggle in the age of artificial intelligence.

It mainly has five aims: supporting the government or political parties, attacking and discrediting competitors and opponents, distracting public attention, suppressing citizens' political participation, and creating social separatism and instability.

Computational propaganda has main features such as good concealment, highly targeted objectives, fast implementation, broad ripple effect, automation, and high threat. Because of these features, computational propaganda has already become one of the most important tools for political games in the era of information politics of artificial intelligence.

The manipulators behind computational propaganda are government agencies, political parties, political candidates, and strategic communication companies. They use social media as a propaganda platform, Internet bots as propaganda executors, and algorithms as their technical guaran-

tee. By participating in or making controversial topics or events, they achieve the purpose of changing the political process, defend their political interests, and win political battles.

Social media is the digital channel of computational propaganda. Because of the features such as virtualization, decentralization, popularization, strong participation, strong "number orientation," and large user' data, social media have provided great facilities for computational propaganda.

Internet bots are the automated propaganda executor. In the era of artificial intelligence, the main executor of propaganda has changed from humans to robots. Computational propaganda uses intelligent bots to imitate humans for information dissemination and online interaction to manipulate public opinion. Current political Internet bots for computational propaganda are mainly divided into four types: follower bots, promotional bots, attacking bots, and roadblock bots. Different type bots have different functions, such as by following social media accounts or supporting published content to create the illusion of widespread attention and recognition, by spreading beneficial information to help get attention and their influence, by spreading unfavorable content to destroy competitors' image and weaken their speaking right, and by creating other hot spots to reduce the pressure of public opinion or to disrupt the opponents' propaganda process. Bots cost far less than real people, but their efficiency is millions of times higher.

Algorithms are computational propaganda technology. It can enhance the visibility and invisibility of specific information through recommendation and filtering algorithms. Computational propaganda is based on these features to spread political Internet memes to manipulation of public opinion.

When the platform, executor, and technology are all already, the manipulators of computational propaganda need to wait or look for controversial topics and events. Because conflict events can attract a great deal of public attention in the shortest possible time, and it is easier to manipulate public opinion in such situations to have a greater impact and threat.

The digital, automated, computational, and controversial mechanism of computational propaganda shows how modern computational technologies and politics can collaborate. As more and more countries and organizations adopt computational propaganda, it is time to think about restraining its continuous expansion.

In the age of more advanced technology, the more we need moral restraint and legal restraint. But only new technology can defeat new technology. On the one hand, social bots and algorithmic techniques are constantly getting closer to humans. On the other hand, social bot detection technology is becoming more and more mature. The contest between these two technologies will profoundly affect the Internet environment, political situations, and the entire social process. But, no matter which one, a huge capital investment is essential. For most individuals and organizations, the only thing that we can do in this rapidly changing era is to "sharpen our eyes."

Bibliography

Alba M., Welker K., Vitali A., Hasani G. (2016), *Hillary Clinton Leaves 9/11 Memorial Early After Feeling 'Overheated,' Has Pneumonia*, "NBC News", https://www.nbcnews.com/politics/2016-election/hillary-clinton-falls-ill-9-11-memorial-n-y-n646376, 09.03.2021.

Bastos M., Mercea D. (2019), *The Brexit Botnet and User-Generated Hyperpartisan News*, "Social Science Computer Review", vol. 37, no. 1.

Bentzen N. (2018), *Computational propaganda techniques*, "European Parliamentary Research Service", https://www.europarl.europa.eu/RegData/etudes/ATAG/2018/628284/EPRS_ATA(2018)628284_EN.pdf, 09.03.2021.

Bradshaw S., Bailey H., Howard P. (2021), *Industrialized Disinformation: 2020 Global Inventory of Organized Social Media Manipulation*, "Working Paper 2021", Project on Computational Propaganda, Oxford, UK.

Bureau T. (2020), *Fake Followers; Half of the Followers of PM Narendra Modi are Fake in Twitter*, "The policy times", https://thepolicytimes.com/fake-followers-half-of-the-followers-of-pm-narendra-modi-are-fake-in-twitter/, 09.03.2021.

Condliffe J. (2013), *Over 60 Percent of Internet Traffic Is Now Driven by Bots*, "Gizmodo", https://www.gizmodo.com.au/2013/12/over-60-percent-of-internet-traffic-is-now-driven-by-bots/, 09.03.2021.

Chen B. (2007), *A brief history of all things*, Yuanhua.

Choe S. (2017), *Former South Korean spy chief sentenced for trying to sway election*, "The New York Times", https://www.nytimes.com/2017/08/30/world/asia/south-korea-spy-chief-sentenced.html, 09.03.2021.

Kemp S. (2020), *Digital in 2020*, "We are social", https://wearesocial.com/blog/2020/01/digital-2020-3-8-billion-people-use-social-media, 09.03.2021.

Haq E., Braud T., Kwon Y., Pan H. (2020), *A Survey on Computational Politic*, https://www.researchgate.net/publication/335233362_A_Survey_on_Computational_Politics, 09.03.2021.

Jones M. (2019), *Propaganda, Fake News, and Fake Trends: The Weaponization of Twitter Bots in the Gulf Crisis*, "International Journal of Communication", vol. 13, https://ijoc.org/index.php/ijoc/article/viewFile/8994/2604, 09.03.2021.

Laney D. (2001), *3D data management: Controlling data volume, velocity and variety*, "META Group Research Note".

Lazer D. et al. (2009), *Computational social science*, "Science", no. 5915.

Lin H., Yang L., Ren J. (2017), *A Study of Computational Politics in the Era of Big Data*, "Journal of Chinese information processing", vol. 31, no. 3.

Luo X., Zhang M. (2019), *Operational mechanisms of Western computational propaganda and global governance, Media Watch, Hillary's health doubts continue to appear again stand-in conspiracy theory*, "Shijie", https://kknews.cc/world/g3ekzl.html, 09.03.2021.

Pyrinis A. (2017), *Fake News is Real: The Rise of Computational Propaganda and Its Political Ramifications, Berkeley Political Review*, "Berkeley Political Review", https://bpr.berkeley.edu/2017/11/06/fake-news-is-real-the-rise-of-computational-propaganda-and-its-political-ramifications/, 09.03.2021.

Oliveira F. et al. (2016), *The Influence of Retweeting Robots During Brazilian Protests*, "49th Hawaii International Conference on System Sciences", https://folivetti.github.io/files/HICSS-Eric.pdf, 09.03.2021.

Ou Y., Xia Y. (2019), *The Hidden Persuasion*, "Cankaowang", https://m.fx361.com/news/2019/0103/6256077.html, 09.03.2021.

Salganik M. (2017), *Bit by Bit: Social Research in the Digital Age*, Princeton University Press, Open review edition, Princeton, NJ.

Shorey S., Howard N. (2016), *Automation, Big Data, and Politics A Research Review*, "International Journal of Communication", vol. 10, http://www.datascienceassn.org/sites/default/files/Automation%2C%20Big%20Data%2C%20and%20Politics%20-%20A%20Research%20Review.pdf, 09.03.2021.

Tufekci Z. (2014), *Engineering the public: Big data, surveillance and computational politics*, First Monday, vol. 19, no. 7.

Vault M. (2019), *The Definitive Glossary of Higher Mathematical Jargon – Algorithm*. https://mathvault.ca/math-glossary.

Wan J. (2016), *Islamic State's online propaganda*, "Renminwang", http://media.people.com.cn/n1/2016/0309/c402792-28184900.html, 09.03.2021.

Woolley S., Howard P. (2016), *Political Communication, Computational Propaganda, and Autonomous Agents*, "International journal of Communication", vol. 10, https://ijoc.org/index.php/ijoc/article/viewFile/6298/1809, 09.03.2021.

Zhang H., Zhao B., Shi W. (2020), *Social bots: A behavioral analysis of Twitter participation in Sino-US trade negotiation issues*, "Journalism", vol. 2, no. 2.

Konotacje, cechy i mechanizm propagandy obliczeniowej

Streszczenie

Celem pracy jest zidentyfikowanie konotacji, cech propagandy obliczeniowej oraz ujawnienie, w jaki sposób propaganda obliczeniowa wykorzystuje nowe technologie do manipulowania opinią publiczną.

Hipotezą badania jest założenie, że propaganda obliczeniowa, jako nowy rodzaj propagandy i manipulacji opinią publiczną, zrodzony w erze sztucznej inteligencji, potajemnie i masowo steruje opinią publiczną za pomocą nowych technologii, aby wpływać na procesy polityczne i społeczne.

Słowa kluczowe: propaganda obliczeniowa, manipulacja, media społecznościowe, boty internetowe, algorytmy