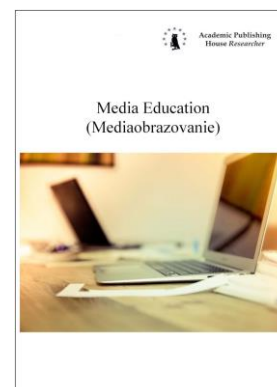




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Media Education in the Age of AI and Smart Media

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Abstract

The article is devoted to the problem of the transformation of the media education in the contemporary digital age. Journalism should be considered as the dynamically developed field of humans' life which is characterized by the regular appearance of new technologies for gathering, processing and transfer of information. That's why it seems extremely important to determine a set of key competences that a journalist must get in order to be able to use advanced technologies in the production of an information product.

The article discusses: 1) the transformation of the training system for the mass media industry in the contemporary digital age; 2) due to the active use of AI technologies in journalism, media education ceases to be purely humanitarian, and it becomes extremely important for journalists to get a certain set of technical competencies in order to be able to set tasks for technical specialists to write appropriate algorithms; 3) modernization of the media education should be considered as a comprehensive process and affect all levels of education, both bachelor's and master's degrees.

Finally, the author comes to the conclusion that it is extremely important to develop new educational programs aimed at training journalists who, due to their understanding of the basics of machine learning and basic principles of functioning of neural networks, would be able to formulate tasks for technical specialists to write appropriate algorithms and subsequently could effectively use them in their daily work related to the further analyses of big data and writing analytical texts.

Keywords: digital age, media, smart media, information flow, artificial intelligence, information technologies, advanced technologies, media education.

1. Introduction

The necessity of the development of advanced technologies is considered as the indispensable condition for the ensuring of the global leadership for every country in the contemporary world. Special attention is paid to technologies which are based on artificial intelligence (AI). And the capabilities of such technologies are growing at unprecedented speed. Nowadays AI-algorithms are widely used in the design of intelligent machine translation systems, medical diagnostics, electronic commerce, on-line education, in the creation of intelligent transport systems and even in the production of news and information (Sukhodolov et al., 2019: 648).

Of course, the use of AI technologies in journalism is still very limited. Basing on the evaluation of different experts there can be automated only 15 % job of journalists and 9 % job of editors. "Humans still have an edge over... AI in several key areas that are essential to journalism,

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including complex communication, expert thinking, adaptability and creativity” (Diakopoulos, 2019). AI-algorithms here are able, first of all, significantly facilitate the navigation of the journalist in the rapidly growing information flow, collect and structure primary data sets without their deep creative processing.

As a result, even a special concept of "automated journalism" has been introduced into the scientific discourse. This definition assumes the creation of AI-based bots that can independently, without human participation, seek the information on the Internet according to specified parameters, rewrite it and distribute texts already ready for publication on specialized technological platforms.

The appearance of such smart applications that can work in automated or semi-automated regime makes one think about the future of journalism as a profession – will it be fully automated, or it will be preserved but require qualitatively new knowledge and skills from journalists that allow them to use possibilities of AI-based technologies for the automatization of a number of routine tasks and gathering data and information related to different newsbreaks.

As Castells et al. argue main task of automated journalism will continue to be the collection and systematization of data in the foreseeable future, while tasks of a journalist will include their interpretation, analysis and preparation of high-quality information and analytical texts (Castells et al., 2012: 2933).

We also think that the contemporary level of the development of science and technology is far from the creation of the so called strong artificial intelligence which would be able to think and make decisions by itself, and theoretically to serve as a journalist. And in current research we are not going of making forecast on the further development of different advanced technologies. Our task is aimed basing on the evaluation of prospects of the use of AI-technology in journalism determine key competences and skills that become crucial for journalists in the contemporary age which can be defined as the age of AI and smart media.

2. Materials and methods

Our research is based on content-analyzes and discourse analyzes. Basing on the analyzes of the scientific literature devoted to the use of AI-technologies in journalism and the transformation of media education in the digital age (Chertovskikh, 2019; Diakopoulos, 2019; Ivanov, 2016; Marconi, Siegman, 2017; Marin, 2019; Romano, 2018; Schmidt, 2017; Sukhodolov et al., 2019; Zamkov et al., 2017) factors which causing transformations in the directions of the training of journalists are determined.

The goal and tasks of the research are realized on the base of the study of researches at the field of media education (Chelysheva, 2006; Fedorov, Levitskaya, 2019; 2020; Zamkov et al., 2016) and innovation papers at the field of communication studies and journalism (Baran, Davis, 2012; Castells et al., 2012; Tulupov, 2019; Vartanova et al., 2019).

3. Discussion

As Liu et al. argue “digital technologies—from mobile phones and social media platforms to artificial intelligence and emerging contact-tracing systems against the spread of COVID-19—make the everyday life we carry out somehow unrecognizable from even one year ago” (Liu et al., 2020: 5754). This statement notes the rapid development of advanced technologies that bring with them the automation of everyday life which means the use of advance robotics, supported by machine learning, in all main fields of humans’ activity, including journalism (Hytha et al., 2019: 55724; Mann, Hilbert, 2020: 4387; Mansell, 2017: 4285; Rainie, 2020: 5860). Undoubtedly such active penetration of advanced technologies into the media industry means that the “media system itself must be readapted and reshaped to the new media ecology” (Mancini, 2020: 5761). Thus we come to the question on “how do new media change media systems, and what kinds of reconceptualizations do we need to make to understand the changes they have wrought” (Hallin, 2020: 5775). From our point of view, first of all when answering this question, we need to evaluate the level of use of advanced technologies in mass media.

The Associated Press should be considered as a pioneer at that sphere (Schmidt, 2017). According to the demand of this world information agency IT-specialists have been started working on the elaboration of AI-based computer algorithms in the summer of the year 2013. These algorithms were supposed to automate routine processes and process big data, primarily different statistics. Work in this area has shown the almost unlimited possibilities of AI, which allowed:

- analyze big data quickly;
- identify patterns, trends and actionable insights from multiple sources;
- see things that the naked eye can't see;
- turn data and spoken words into text or text into audio and video;
- understand sentiment;
- analyze scenes for objects, faces, text or colors and etc. (Marconi, Siegman, 2017: 1).

The *Associated Press* is using the system of the automated search and processing of the information called *Wordsmith*. It can process different statistical data of the financial market and results of sporting competitions. This intelligent algorithm has been launched in the year 2015 and it could issue 3000 news every 15 minutes. A year later its productivity increased up to 2000 news per second! (Zamkov et al., 2017).

And nowadays there is taking place a rapid growth of different AI-based technologies in journalism which are aimed first of all on helping journalists quickly navigate the information environment and find patterns in the ever-growing information flow, both in structured and unstructured data sets.

Besides *the Associated Press* another world leaders at the field of the production of news and information have been also started using appropriate intelligent algorithms and applications: *The New York Times*, *The Washington Post*, *The Times*, *The Sunday Times*, *The Wall Street Journal*, *The Guardian*, *Los Angeles Times*, *Forbes*, *British Broadcasting Corporation (BBC)*, *Japanese Broadcasting Company NHK*, information agencies *Reuters* (Great Britain), *Bloomberg* (USA) and *STT* (Finland).

Thus for example *the Washington Post* has elaborated the algorithm called *Heliograf*, which is basically used covering sport events and results of elections. Only in the first year of its work this algorithm has created around 850 news, 500 of which were devoted to elections (Chertovskikh, 2019: 560). And *the New York Times* "uses what it calls "semantic Web technology" to compose, more or less automatically, the wedding announcements it publishes" (Castells et al., 2012: 2933).

The Australian version of the newspaper *The Guardian* has begun using AI-technologies for writing entire articles starting from the year 2019. Thus there has been published for example in the February 2019 a news entitled "Political donations plunge to \$16.7m — down from average \$25m a year". It is a remarkable fact that this news has been written by the algorithm called *ReporterMate* without participation of the human. It represents an open source platform aimed on the automatic creation of news. The algorithm accepts data, analyzes them and issues news ready for publishing. Of course for the time being the area of the use of such application is limited by fields which manipulate different statistics and big data: weather forecasting, economic indicators, sport results and exit polls (*ReporterMate*).

Finally, employees of exchanges on Wall Street are actively using the technological platform *Quill* which is able to turn data from multiple sources into a coherent text when making their financial reports (Chumakov, 2017).

Taking into account such rapid growth of the use of AI-based computer algorithms in journalism IT-companies which are specializing in the production of such applications are appearing. Thus nowadays in the USA there exist 11 companies which produce different intelligent systems applicable in journalism. And a number of such enterprises is increasing (Zamkov et al., 2017).

One can also observe a growth of information agencies which are working only on the information that has been automatically generated by the special algorithm according to some settings. For example, in the year 2019 there has been launched the experimental project *Baza* which represents an intelligent application that gives an opportunity for the user to choose this or that initial news and then generates the news feed basing on that choice (*BAZA*).

Similar information agency called *RADAR* has been created in the Great Britain (*RADAR*). It is a news aggregator that processes and systematizes more than 8,000 local news per month according to the specified criteria (geography, subject matter, etc.). Then the relevant thematic news collections are provided to regional news agencies and mass media (Diakopoulos, 2019). Thus *RADAR* news agency should be considered as one of the first news agencies in the world that totally works on the information automatically generated by computer algorithm.

Finally, scholars at the Beijing University, China, were able to create a robot-journalist in the year 2017. It was called *Xiao Nan* and it has been able to write an article which consisted of 300 hieroglyphs in one second. This article which has been published by the newspaper *Southern Metropolis Daily* on January 19, 2017 was devoted to the traffic jam which has happened due to the

celebration of the New Year (Chumakov, 2017). For the time being this robot is unable to take interview by itself, respond intuitively to the interlocutor's questions, and choose a topic or vector for the future publication, because it “still lack the necessary cognitive abilities and skills” (Neff, Nagy, 2016: 4917). But it can write long reports and process large amounts of data much faster than a human.

At the same time, China is not going to stop here. Currently, scholars at the Beijing University, together with journalists of *Southern Metropolis Daily*, are working on the creation of a special research laboratory which would study ways of use of AI in journalism. And in 2019, the Chinese news agency *Xinhua* together with the search engine *Sogou* launched the world's first virtual intelligent TV hosts: a man and a woman. The man's name is *Qiu Hao*. The TV host Zhang Zhao has become the prototype of this algorithm. Starting from November 2019, one can see it on the agency's official website, in mobile apps, and on the public WeChat account. The female TV host's name is *Xin Xiaomeng*. And Qu Meng, an employee of the *Xinhua*, has become its prototype. Due to the machine learning technology, it is able to read texts from the screen, as well as learn from live colleagues, imitating their facial expressions and the way they speak (Two..., 2019).

Thus basing on the facts stated above it is possible to conclude that there has been implemented a number of AI-based programmed solutions in the media industry in last few years as “journalists tend to believe that innovative technologies help them improve their work” (Perdomo, Magana, 2020: 3077).

Of course discussing the possible use of AI in journalism one can point out first of all its high productivity. It seems obvious, therefore, that journalists must have certain technical competencies in order to get general skills on how it is possible to apply “algorithmically driven computer programs designed to do specific tasks online” (Woolley, Howard, 2016: 4885). As Gruber et al. argue “having certain Internet skills means being able to access and use the extensive possibilities the Internet offers from finding information to communicating with others” (Gruber et al., 2021: 1772). With regard to new competencies of journalists, this statement can be rephrased as follows: “having certain technical skills means being able to access and use the extensive possibilities advanced technologies offers at the field of finding, systematization and processing of large arrays of different data and information”. That's why it will become useful for journalists to get general programming skills in *Python* and *R*, to know key methods of the work with big data and basically understand the concept of the machine learning and the way how AI-algorithms work, gather and process data and information. But the most important thing, from our point of view, will be the ability to establish the effective interaction between the human and the machine, which would be aimed, and we'd like to emphasize it, on the optimization of journalism, but not on its complete automatization (Romano, 2018).

As a result, there has appeared a special field in journalism which is called *data journalism* or *computational journalism*. And special *data journalism teams* have been created by all world leading media and information agencies such as *the New-York Times* and *the Associated Press*. As a rule, such teams include a chief technology officer, data scientists and computational journalists.

Chief technology officer is responsible for the development of new services and products, as well as the optimization of the journalists' work.

Data scientists are individuals with the technical capabilities to implement the artificial intelligence systems necessary to augment journalism. They are principally scientists, but they have an understanding as to what makes a good story and what makes good journalism, and they know how to communicate well with journalists.

Computational journalists are principally journalists, but they have an understanding as to how artificial intelligence works and how AI can be used to augment their own journalism. Perhaps most importantly, they know how to communicate well with data scientists” (Marconi, Siegman, 2017: 5)

At the same time, it is necessary to point out that nowadays one can't find a universal educational center that would prepare specialists of all those streams. Technical universities prepare specialists in data sciences but usually they have a very superficial idea of the essence of the profession of a journalist that significantly complicates their possible cooperation with journalists in case of an employment in this or that media.

The specialty in the field of computational journalism doesn't exist. One can suppose that people with basic competencies in the field of programming, machine learning and data sciences

come to it, i.e. they are also mostly graduates of technical universities. But at the same time they need to have some basic competences in the field of journalism. And there are no specialized educational programs in this area.

We come thereby to a very serious conundrum. Technical universities are going on preparing highly qualified technical specialists in the field of programming, data sciences and machine learning but they deliver very few disciplines of social and humanitarian orientation. Contemporary high schools of journalism and mass communication remain educational centers of humanitarian orientation. As a result, their graduates have no idea about basic principles of functioning of AI-technologies and are not able to set proper tasks for technical specialists at the field of the further modernization of AI-based algorithms which are used by this or that media and are not able to use them by themselves without the aid of program developers. And if technical specialists theoretically can get some basic skills by him or herself at the field where he or she is going to work (e.g. in journalism) the reverse situation when the journalist become a highly qualified data scientist seems more complicated. Thus we come to the necessity of the modernization of the entire system of the media education in order to bring it in line with the requirements of the contemporary high-tech journalism and make future journalists more familiar with advanced technologies and their possible use in journalism.

4. Results

Basing on the facts stated above it is possible to conclude that due the active implementation of AI-technologies in journalism the media education ceases to be purely a humanitarian one, and it becomes extremely important for journalists to get a set of technical competencies in order to be able to set tasks for technical specialists to write AI-based algorithms and to manage appropriate hybrid intellectual systems.

In this regard, it seems reasonable to elaborate new educational programs in the field of journalism or, at least, to modernize the old ones in order to create new modules and disciplines that should not only be adequate to the current media practice, but even to some extent be ahead of the processes that are seen as innovative today (Zamkov et al., 2017).

At the same time, it is necessary to point out that the modernization of the media education should represent a complex process and affect all levels of education, both bachelor's and master's degrees – it will seem insufficient just to create few master's programs on computational or robotic journalism, because without the possession of a certain mathematical apparatus, it will be extremely difficult for students to study the relevant disciplines in the master's program.

That means that even in bachelor such disciplines as the «Introduction to data sciences», «Basics of statistics and probability theory», «Basics of mathematics for data sciences» should be added in the curricula. Changes should also affect computer courses, which should be supplemented with learning the basics of programming in *Python*, as well as *Numpy* and *Pandas* libraries, which are widely used when working with data.

To our opinion, the acquisition of skills in the areas which have been mentioned above by future journalists is extremely important, because in this case, students will get at least basic skills, which will let them study in master's degree programs at the field of data or computational journalism. Only in this case, such new master's degree programs will be in demand on the market of educational services.

Discussing these master's degree programs themselves when elaborating new curricula, it is necessary, first of all, to determine the set of key competencies that future journalists will have to possess. From our point of view, the main goal of these new educational programs should not be to train IT specialists who have, among other things, skills on writing journalistic texts, but specifically journalists who have a certain set of technical competencies which would give them an opportunity to implement AI-based technological solutions in journalism and to work in collaboration with technical specialists.

Of course the modernization of the entire media education which would correspond the demands of the contemporary digital age is a complicated process and we are far away from the training of the universal journalist who can replace both data scientists and journalists. That's why nowadays it become crucial to start training specialists who could at least establish effective interaction between all the people involved in the production of an information product, including technical specialists.

Thus, from our point of view, educational programs that are going to be created should primarily train specialists who, due to their understanding of the basics of machine learning would be able to formulate tasks for technical specialists to write appropriate computer algorithms; and subsequently could effectively use them in their daily work related to the textual design of news and the interpretation of large amounts of data and information.

That's why, taking to the account facts stated above, it seems extremely important to include in the curricula of new educational programs on computational journalism the study of following disciplines:

- basics of the machine learning and neural networks;
- basics of the deep learning concept which supposes the study of libraries *TensorFlow* and *Keras*;
- basics of the programming language *R*;
- basics of the *Natural Language Processing* (NLP).

To our opinion the study of all those disciplines will give the opportunity for future journalists to get appropriate technical competences that allow them to work in smart media that actively use AI-technologies in their daily work and quickly learn new automated systems of search and the processing of data and information which are going to be implemented.

5. Conclusion

As it has been shown above the active implementation of AI-technologies in the work of mass media caused the transformation of basic functions of the journalists' work who thanks to all those intelligent algorithms "may spend less time transcribing and manually poring over datasets and instead spend that time making calls and pursuing leads derived from an AI analysis" (Marconi, Siegman, 2017: 4).

But at the same time it is evident that in order to become familiar with all those advanced technologies that can be used in journalism journalists should get a number of technical competencies. Thus we come to a problem of the necessity of the modernization of the entire system of training of specialists for smart media.

It is necessary to point out that the system of media education quickly responds to the demands of the media industry. Contemporary educational programs have profiles dedicated to new market segments, new types of activities and professions. However, despite the increase in the profile component and the attempt of higher education to approach the rapidly changing professional sphere, it has not yet managed to meet the rapidly changing information and communication background (Zamkov et al., 2016: 62).

The solution of this problem lies in the full modernization of the entire system of the media education, which affects both bachelors and master's degrees and consists in the acquisition of a certain set of technical competencies by future journalists. Thus, even during their undergraduate studies, students must get a basic mathematical apparatus that they will need for their further study in the master's program on computational journalism when learning basics of machine learning and principles of functioning of neural networks.

At the same time, when developing curricula in the field of computational journalism, first of all, it is necessary to determine the set of key competencies that students will need to possess. In our opinion, the main goal of these new educational programs should be to train journalists who, due to their understanding of the basics of machine learning, would be able to formulate tasks for technical specialists to write appropriate computer algorithms; and subsequently could effectively use them in their daily work related to the textual design of news and the interpretation of large amounts of data and information.

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