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Data journalism visualization in Ukraine and in Europe: a comparative analysis

Візуалізація журналістики даних в Україні та Європі: порівняльний аналіз

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Abstract

The article aims to investigate the peculiarities of data visualization in Ukrainian and European data media, which will help outline trends and development tendencies in data journalism. The research results will form a list of promising methods and forms of data visualization in journalistic practice. The research used the method of content analysis of journalistic materials and comparative analysis of Ukrainian and European data media. The use of such a methodological toolkit is due to the visual component of the analyzed objects and the need to fill a gap in data journalism research as a comparative analysis of the Ukrainian and European practice of visualizing materials in data media has not been conducted before. The study results showed common trends in using visual resources as the most common way of visualizing data. The European edition uses more types of visual objects in the same material. It was also found that the European data media pay more attention to the text, while the Ukrainian one focuses on the visual component. Common trends are observed when analyzing visualization and interactivity functions. Both editions mostly use visualization to reinforce and supplement

Анотація

Стаття має на меті дослідити особливості візуалізації даних в українських та європейських дата-медіа, що допоможе окреслити тенденції та тренди розвитку в цій царині журналістики даних. Результати дослідження дозволять сформувати перелік способів та форм візуалізації даних, що є перспективними в журналістській практиці. У дослідженні використано метод контент-аналізу журналістських матеріалів та порівняльний аналіз українського та європейського дата-медіа. Використання такого методологічного інструментарію обумовлено візуальною складовою аналізованих об'єктів та необхідністю заповнити прогалину в дослідженнях журналістики даних, оскільки порівняльний аналіз української та європейської практики візуалізації матеріалів у дата-медіа не проводився раніше. Результати дослідження показали спільні тенденції використання візуальних ресурсів як найпоширенішого способу візуалізації даних. Також було виявлено, що європейське дата-медіа приділяє більше уваги тексту, у той час як українське

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textual information, and the hypothesis of a fading trend toward interactivity is confirmed.

Keywords: data visualization, data media, data journalism, content analysis, comparative analysis.

зосереджене на візуальній складовій. Спільні тенденції спостерігаються при аналізі функцій візуалізації та інтерактивності. Обидві редакції здебільшого використовують візуалізацію для підсилення та доповнення текстової інформації, а гіпотеза про згасання тренду на інтерактивність підтверджується.

Ключові слова: візуалізація даних, дата-медіа, журналістика даних, контент-аналіз, порівняльний аналіз.

Introduction

The development of digital technologies and the global trend of "datafication" are increasingly important in journalism. One of the forms of manifestation of digitization and the development of open data is data journalism. A data journalist is engaged not only in collecting information and creating text but also in the production of complex text formats that combine words and numbers with graphic elements. This can only be done with the help of new software tools, which means the data journalist performs the functions of an analyst, a journalist, a designer, and partly a programmer. Adequate visualization of information is considered a fundamental factor in data journalism, as it affects the quality of content, attracts users, and allows them to interact with content (Engebretsen et al., 2018).

Visualization in data journalism develops along with techniques and technologies. Although the methods and tools for creating visual elements are similar worldwide, the practice of using "visual language" and visual content have their own characteristics in different countries. Such differences can be caused by norms and principles of information submitted in the country, technical and financial capabilities of the media resource, and access to open data. Regarding the last factor, it should be noted that, according to the research of the public organization Open Data Watch, the Open Data Inventory (ODIN) was calculated - the identifier of the openness of official statistics and open data for 187 countries of the world for 2020-2021 (Open Data Inventory, 2021). The results of a comparative analysis with European countries showed that Ukraine is in 45th place according to the ODIN indicator, ahead of Great Britain by 20 steps and France by five. Poland, Holland, and Sweden were identified as unexpected data quality and availability leaders. Therefore, Ukraine has good potential in this regard. However, European data media still have more opportunities for development due to higher indicators of transparency of state policy and availability of statistical information.

Differences in access to open data, methods, techniques, and visualization styles determine the need for a comparative data visualization analysis in Ukrainian and European media. And although the study of aspects of data visualization in data journalism has long been a field of interest of the scientific community, a comparative analysis of leading European and Ukrainian media in terms of data visualization in data media has not been conducted.

The purpose of the study is to identify the features of visualization of data information in Ukrainian and European data media, which will provide an understanding of trends in the development of visualization of data journalism. This study can become a road map for finding new ways and forms of visualization in journalistic practice. This study seeks to answer the question: what characterizes the data visualization processes in European and domestic editorial offices?

The following sections will first outline the theoretical approaches of the study (Section 2). A description of the applied methodology is in Section 3. Then the results and discussion will be presented: key features of data visualization in different countries and their comparative characteristics (Section 4). The article concludes with a summary of the main findings and a consideration of further research perspectives (Section 5).

Theoretical Framework

Data journalism, becoming a new media phenomenon, has caused a real boom in scientific research.

The review of scientific works made it possible to draw conclusions that three groups of

scientific research can be distinguished in the context of the mentioned topic. Some scientists deal with the conceptual aspects of data journalism, developing theoretical approaches and studying the conceptual apparatus of the principal terms used in the direction mentioned above, as well as consider the history of the formation and development of data journalism (Paraise & Dagiral, 2012; Coddington, 2015; Howard, 2014; Royal & Blasingame, 2015; Borges-Rey, 2016; Gray, Bounegru & Chambers, 2012; Weber & Rall, 2012; Medvedeva, 2020; Bidzilya & Kravets, 2019 Polyuga, 2019; Hannaford, 2015).

The second group of scientific investigations is aimed at researching journalists' work as data journalism subjects. Within this direction, the professional profile of a journalist is considered, and his "hard" and "soft" skills, methods of software application, and the need for a team of analysts and programmers are studied (Tabary et al., 2016; Appelgren & Nygren, 2014; Royal, 2010; Weber & Rall, 2016; Paraise & Dagiral, 2012; De-Maeyer et al., 2015; Fink & Anderson, 2015; Uskali & Kuutti, 2015; Hermida & Young, 2017).

The third and most significant group of works analyzes content available in media practice. Such studies focus on data collection, analysis, processing, and visualization features. At the same time, scientists pay special attention to solving practical problems related to the typology, quality, quantity, interactivity, and functionality of visual objects in data journalism (Knight, 2015; Nguyen, 2017; Loosen et al., 2020; Hamilton, 2016; Flew et al., 2012; Cohen et al., 2011; Medvedeva, 2020; Lichenko, 2018).

It is worth noting that the views of scientists on the definition of the concept of "data journalism" coincide. For example, H. Hamilton (2016) and S. Sunne (2016) believe that data journalism is collecting, cleaning, organizing, analyzing, visualizing, and publishing data. L. Rinsdorf and R. Boers (2016) consider data journalism as a process (analysis, collection, and processing of information) and a product (the result of which is journalistic material – text and visualization) at the same time. So, scientists identify data visualization in journalism as a critical element of information design, which allows consumers to understand the material. Note that "data journalism" cannot be equated with "data visualization"; visualization exists as an independent phenomenon, but data journalism often uses visualization as a storytelling tool.

"Data Visualization," according to R. Borgo et al. (2013) and W. Loosen et al., (2020), is a visual representation of primarily numerical data (but not only numerical) designed to improve the cognitive processing of information by consumers.

Scientists from all over the world actively research visualization in journalism. E. Burdina considers abstract thinking to be the key to visualization, stressing that it precedes analysis, and therefore, thanks to visual objects, information is absorbed faster (Burdina, 2016). V. Shevchenko (2014) offers a classification of visualization forms, which is a continuation of the opinion of S. McMillan (2006). Among the visualization studies in media practice, we should highlight the work of F. Tandoc and O. Soo-Kwang (2017) examine the content of The Guardian media resource. K. Medvedeva (2020), Yu. Nagorna and N. Poplavska (2022) consider methods of visualizing television and print content using the example of local and national mass media. M. Knight (2015), analyzing news content, claims that journalists often use infographics and maps for visualization. P. Boczkowski (2004), S. McMillan (2006), A. Rudchenko (2017), and M. Engebretsen (2006) are supporters of interactive visualization and consider it a unique aspect of online communication and an essential component of digital journalism, as they see it the potential for active user involvement. At the same time, other researchers analyzing media practice followed the trend of decreasing interactivity (Appelgren, 2017; Stalph, 2017; Young et al., 2018; Domingo, 2008; Burmester et al., 2010; Ojo & Heravi, 2018; Tandoc & Soo-Kwang, 2017).

Despite a large number of studies on information visualization in general, the visualization of objects in data journalism is devoted to a small number of scientific works. The visualization studies in the data journalism system presented in the scientific media discourse relate to analyzing the winners and prize-winners of the Data Journalism Awards. Such intelligence shows that winners will likely use static graphics, maps, and images (Loosen et al., 2020; Ojo & y Heravi, 2018). F. Stalph (2017) suggests that bar charts, line graphs, and maps are appropriate for daily news, but award-winning journalism differs from daily news with interactivity and animation. A. Córdoba-Cabús and M. García-Borrego (2020), analyzing the finalists and winners of the Data Journalism Awards 2019, found that the most popular visualization method among the

winners was infographics, with non-interactive and non-animated visual objects winning.

Therefore, although the field of data journalism research is growing, and the study of visual objects in journalistic materials remains a trend, there is a lack of research in the scientific discourse that analyzes in detail the media practices of visualization in data media. This study aims to fill the existing gap. This research is significant in the context of comparing media practices of Ukrainian and European data media, which will make it possible to determine trends in information visualization of data journalism.

Methodology

The proposed research is comparative. Comparative analysis as a method is used to obtain new information about the similar and different features and properties of the studied objects; besides, as noted by M. Dogan and D. Pelassi (Klass, 1985), a comparative analysis is one of the most fruitful directions of thinking, because it allows revealing implicit relationships and general trends of phenomena. It is worth noting that this method is actively used in journalism. For example, to identify "tabloidization" trends in the USA, Germany, and Great Britain (Esser, 1999); search for practical journalistic innovations based on media practices of five European countries (Meier et al., 2022); analysis of educational strategies in data journalism based on a comparison of educational programs of six European countries (Splendore et al., 2016), etc.

Also, content analysis is one of the main methods used in the research. Content analysis is actively used as a methodological toolkit in various areas of journalism, in particular in data journalism. If the previous content analysis was considered a purely computational technique or a secondary method based only on computational operations, today it is regarded as an independent qualitative-quantitative method, which can be used to carry out the entire cycle of document research from the selection of research units to the interpretation of results (Kostenko & Ivanov, 2003). Thus, content analysis was applied by scientists to analyze the visualization objects of the winners and nominees of the Data Journalism Awards (Córdoba-Cabús & García-Borrego, 2020, Ojo & Heravi, 2018, Córdoba-Cabús, 2020). The authors note that this method is appropriate for researching trends in data journalism.

Two Internet media that position themselves as news portals of data journalism were chosen for analysis. Texty.org.ua is an independent Ukrainian online journal founded in 2010 as a data journalism project that works in traditional journalistic genres - from lengthy reports to short messages. This media is Ukraine's most significant data journalism project and has nominations and awards in the Data Journalism Awards-2017, 2016, and 2012. The European journal chosen for analysis is the European Data Journalism Network (created in 2017). It is a network of independent media organizations and data newsrooms that generate and promote data-driven coverage of European topics in multiple languages. This online media covers the entire news media network in data journalism in Europe, so it is a worthy representative for the analysis.

The representative sample consisted of 100 journalistic materials, 50 belonging to Ukrainian and 50 to European media. A total of 200 visual objects in 100 publications were analyzed.

The following characteristics were taken for analysis: the number, typology, and functions of visual objects, and the visualization ratio. It should be noted that the article proposes an updated and modified methodology of A. Córdoba-Cabús, M. García-Borrego (2020) and F. Stalph (2017). The main stages of the research are presented in Figure 1.
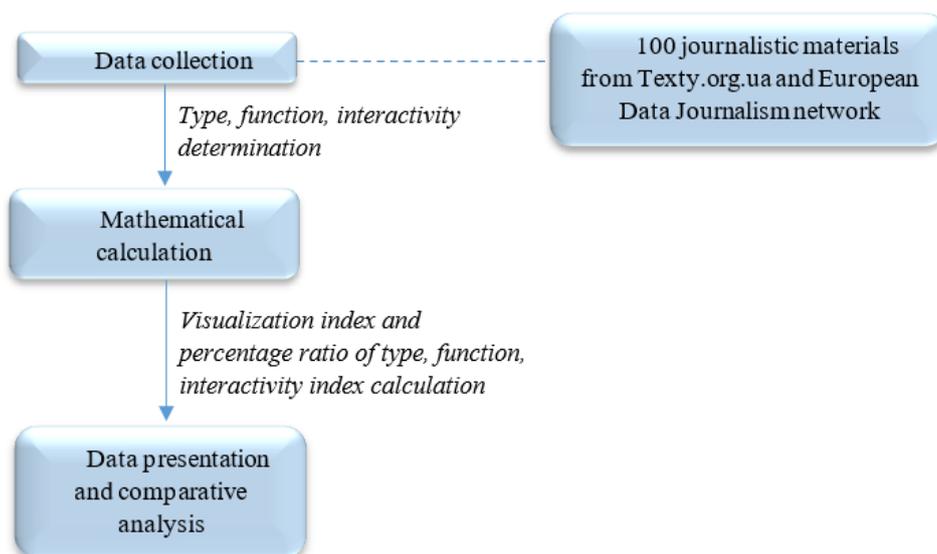
Fig. 1. Visualization research process in Ukrainian and European data media
Source: compiled by the author

Types of visualizations.

C. Salvatierra (2008), A. Córdoba-Cabús and M. García-Borrego (2020) classifying visual objects, propose to distinguish tables and lists, static graphs, interactive graphs, maps, visual resources (photos, videos, illustrations), animations, infographics, and others. In our opinion, this classification deserves attention. However, we believe that it is inappropriate to distinguish static and interactive graphs as separate types. Suppose we differentiate between interactive and static graphs; a similar division must be made in lists, maps, and infographics. We also disagree that illustrations should be classified as visual resources; for example, according to the classification of V. Shevchenko (2014), illustrations, cartoons, and comics are combined into one type, and photos and video resources into another type of visual objects.

We offer a comparative analysis of the following visualization types:

– Tables or lists. This type covers visual objects presented as a table or lists - both interactive and static. It should be noted that in the presence of other elements, apart from the components of the table or list (text not included in the table, icon, pictures, etc.), such a visual object is identified as an infographic.
– Graphs. Graphs can be interactive and static, with legend and axis names. Graphs include dots, pie, bars, and other charts (we do not identify the type of graph during the research).
– Maps. Such objects should provide a geographical representation of information; they can be interactive and static. The maps may have a legend and name.
– Visual resources. This type of visualization includes photos and videos. We also suggest considering stock images as a visual resource but not identify them as an illustration.
– Animation. This type of visualization offers the change of the object without the reader's participation; that is, the image changes automatically, distinguishing animation from interactivity.
– Infographics. This type of visualization offers a combination of several types of visual objects, for example, a variety of a graph, an illustration, and a table.
– Illustration. Images have an artistic component and the vision of the author of the news or event. Such objects are developed directly for the story, unlike visual assets.
– There are no visualizations.
– Other.

Functions of visualizations.

We distinguish whether the visualization was part of the journalistic material, whether it performed a complementary and accompanying function, or whether the material was included in the visual object (the visualization is structured as a story). We also pay attention to the ratio of

text and visual objects: what prevails and whether there are publications with only visual objects or only text in the analyzed journalism materials (Stalph, 2017; Córdoba-Cabús & García-Borrego, 2020).

Interactivity of visualizations.

Interactivity means the ability of the reader to interact with the content. Among the functions of interactivity, based on the analysis of previous studies (Segel & Heer, 2010; Córdoba-Cabús & García-Borrego, 2020), we singled out the following: exploring (possibility to obtain details); selecting (the ability to select the required year, region or hyperlink to obtain information); filtering (helps to find the necessary information to the reader among the entire array of data); narrative (by clicking in the required place, you can continue viewing the publication materials); interaction with games (the reader is invited to play a game, calculate something, guess or remember, take a test or test his memory); personalization (to receive specific information, you are asked to enter your data, for example, height, weight, age); others that cannot be attributed to the previous ones.

Results and Discussion

A total of 100 data journalism materials covering 200 visualization objects were analyzed.

After studying them, we calculated the visualization index - how the number of visual objects correlates with the total number of journalistic materials. It was found that the publications contained an average of two visual objects of different types (M=2), and for Ukrainian media, this indicator was lower - M1 = 1.66 than for European media - M2 = 2.34. So, Texty.org.ua mainly uses one type of visualization for one material, while the European Data Journalism network prefers several types of visualization. We found only one project that does not contain visualization; the news is presented in text format (this material belongs to the editors of Texty.org.ua).

Types of visualizations.

To determine the most common types of visual objects in Ukrainian and European online publications that present data journalism and to identify general trends, we suggest considering the percentage ratio of visualization on their data portals and total statistics for both media. The structural analysis of visualization is presented in Table 1.

Therefore, the most common type of visualization for both data media is visual resources, i.e., photos, stock images, and videos. They occupy 37.35% and 37.61% in Ukrainian and European online media, respectively. Interestingly, the values are quite close; that is, there is a general trend toward using visual resources by editorial offices as the simplest, fastest, and least expensive in terms of the workforce of visual objects. It should be noted that when we are talking about a photo, we do not mean a single photo, it can be a series or a carousel of images, but the type of visualization is the same.

Table 1.
Structural analysis of visualization types

| Type of visualization	Texty.org.ua	Europeandatajournalism.eu	TOTAL
Tables or lists	2.41%	3.42%	3%
Graphics	19.27%	32.47%	27%
Maps	14.46%	12.82%	13.5%
Visual resources	37.35%	37.61%	37.5%
Animation	3.62%	1.71%	2.5%
Infographics	13.25%	10.26%	11.5%
Illustration	4.82%	1.71%	3%
There are no visualizations	1.21%	-	0.5%
Other	3.61%	-	1.5%

Source: Calculated by the author

Also, editorial offices often use graphs. Texty.org.ua graphs account for 19.27% of the total set of visual objects; for the European Data Journalism Network, this share is 32.47% (table 1). Most often, the graphs trace the change of the phenomenon over time or the transformation of the indicator depending on the geographical location (city, country, continent). As you can see, European data media use graphs more often than Ukrainian media, and the frequency of their use is close to visual resources. However, it is worth noting that the charts from Texty.org.ua are more complex, visually more creative. In figure 2 a, b, reviewing the graphs created by the
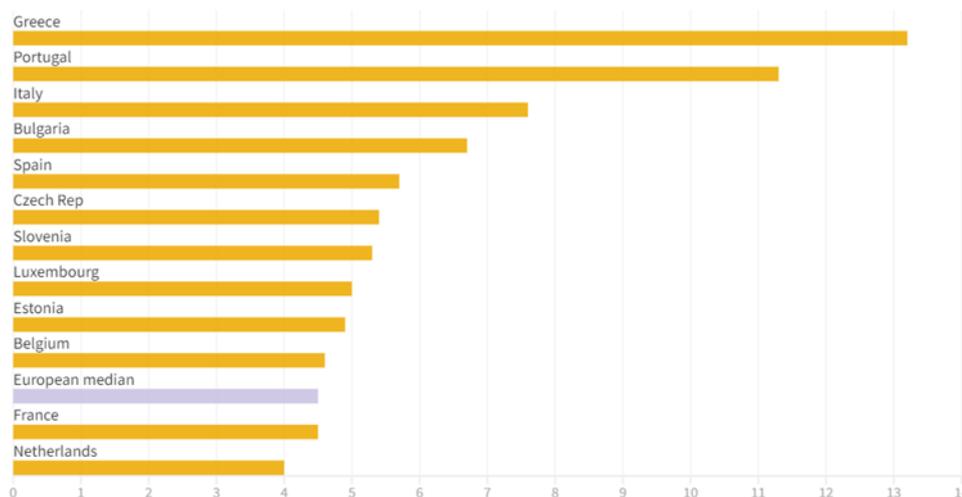
Ukrainian and European editors, respectively, is suggested. As we can see, for the European data space, the trend is to make quick and simple graphs, while for the Ukrainian media, the quality of the graph's presentation is essential. Graphics also take second place in the general structure of types of visual objects - 27%.
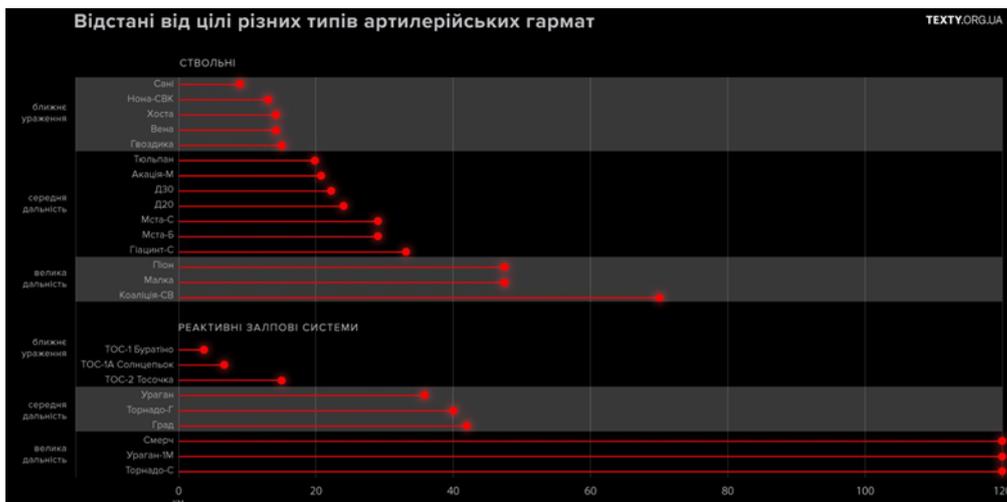
a) Texty.org.ua

b) European Data Journalism network

Fig. 2. Examples of graphs in journalistic materials of analyzed data media
Source: Drozdova et al., 2022a; Morphonios, 2022.

Interactive and static maps occupy third place in the structure of visual objects in analyzed media (Table 1). This type of visualization is more common in Ukrainian data media (14.46%), which can be explained by the specificity of the content. Since there is a war in the country, the maps often depict the territory of Ukraine, where the centers of hostilities and the direction of the front line are marked. An example is the publication "Under attack. What and when Russia shelled in Ukraine", "Open data at war. How many are published in cities and why is it important", "From where and how is Russia shelling Mykolaiv", etc.

About the same share as maps are occupied by infographics (Table 1). This type of visualization is more complicated than the previous ones, as it requires a journalist to analyze carefully, to be able to interpret information effectively, and to have abstract thinking. It should be noted that Texty.org.ua uses infographics more often (13.25%) than the European Data Journalism network (10.26%).

Other visualization types occupy less than 5% of the total structure. However, the use of illustrations is more typical for the Ukrainian media. In contrast, tables and lists are more typical for the European media.

Functions of visual elements.

Visualization is a characteristic, but optional, of data journalism; its role depends on the type of information and emphasis the journalist wants to draw the reader's attention to.

In the analyzed sample, only one journalistic piece consisted only of visualization, and only one consisted exclusively of text. Both projects belong to the editors of Texty.org.ua. If everything is evident with the text, we suggest you review how the media created a story exclusively from visual objects. By clicking on the link with the title of the publication "War video. Chronology", we get to a page presented as a calendar, in which, by selecting the appropriate region and day, you can view videos shot by eyewitnesses and military personnel of that day (Fig. 3).
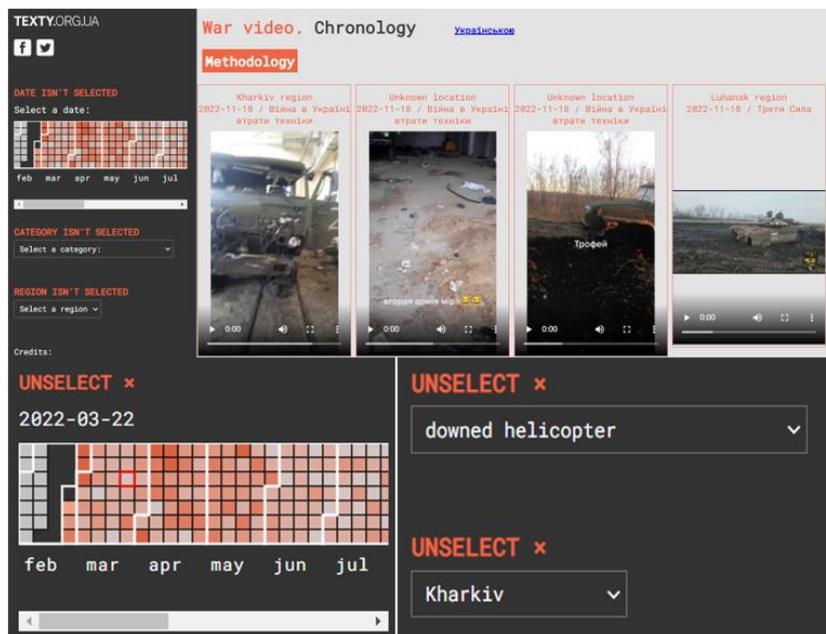

Fig. 3. Texty.org.ua material that uses only visualization
Source: Oksymets et al., 2022.

In general, the publications of the European Data Journalism network are dominated by text (46%); in the second place – are publications in which the visual and text parts are balanced (36%); in the third place – journalistic materials in which the visualization predominate (18%).

The editors focus more on working with the text than designing and visualizing. In Texty.org.ua articles, the situation is different; the distribution according to the analyzed characteristics is uniform (visualization predominates - 32%, text dominates - 30%, balance - 34%) (Fig. 4).
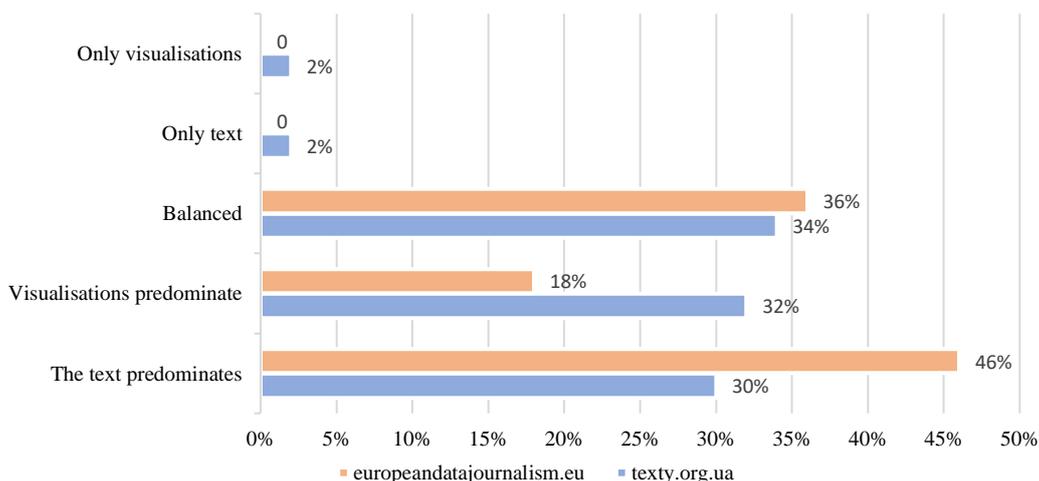
Fig. 4. Structure of the analyzed journalistic materials in the European and Ukrainian data media
Source: Calculated by the author

Figure 5 presents the functions performed by visualization in the journalistic materials of the analyzed media – whether the visualization complements and expands or whether the visualization is built as a separate material. As we can see, for both media, the most frequent is the use of visual objects to supplement the material, and the method in which the visualization is built as a story is not so popular and makes up 14% of the total structure for Texty.org.ua and 2% for European Data Journalism network.
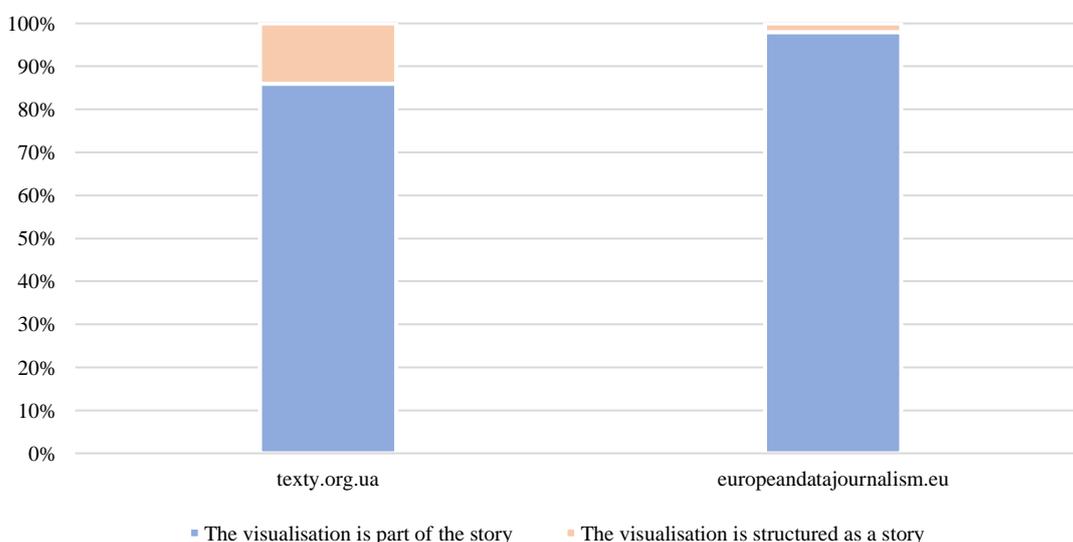

Fig. 5. Functions performed by visualization in materials
Source: Calculated by the author

Interactivity.

199 visual objects were examined for interactivity (one of the analyzed publications does not contain visual objects). The results proved the superiority of static visual objects over interactive ones. For Texty.org.ua, the ratio of static and interactive objects is 66.2% to 33.8%, i.e., static ones prevail almost twice. The indicators for the European Data Journalism network are similar - 62.4% to 37.6%. Therefore,

the results of the analysis of interactivity confirm the conclusions of E. Appelgren (2017), F. Stalph (2017), and M. Young et al. (2018) regarding the general trend of decreasing interactivity in journalistic materials.

In Figure 6, it is proposed to consider the functions that perform interactivity. Thus, 44 interactive European data-media objects and 28 Ukrainian ones were analyzed. As can be seen from Figure 6, Texty.org.ua uses a broader range

of interactivity functions than the European Data Journalism network. Ukrainian media almost does not use filtering; the editorial office often uses selection to demonstrate important information. The selection is similarly the most common feature for the European Data Journalism Network, while narrating, personalization, and interaction with games are not used at all.
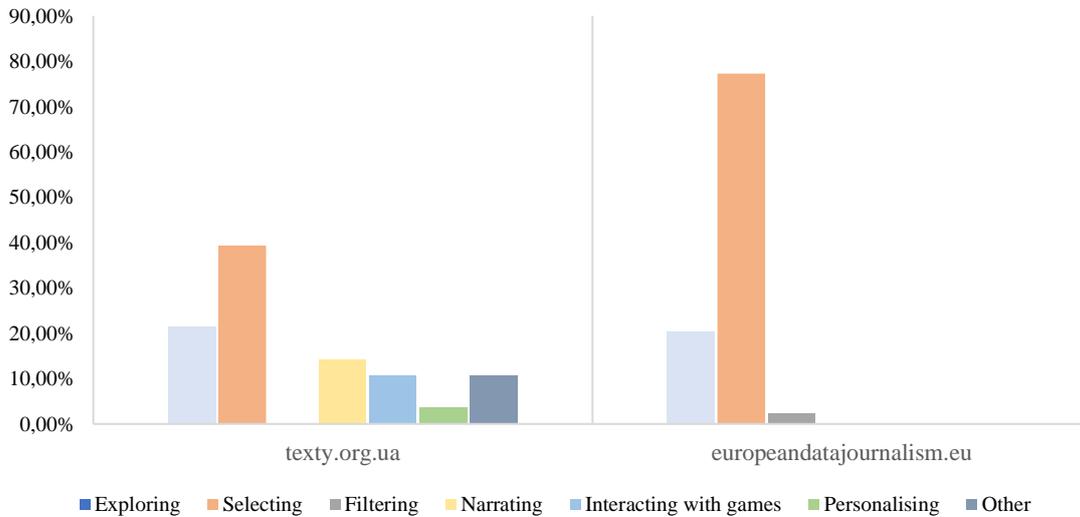

Fig. 6. Interactivity functions
Source: Calculated by the author

Consider innovative features such as interaction with games and personalization for a qualitative analysis of interactivity features. Texty.org.ua actively implements new technologies and trends, using games and personalization. In Figure 7, we offer an example of an interactive game. In the story "Rising prices: The State Statistics Service does not lie. But check how your expenses have increased," the reader needs to remember or guess the cost of a particular product a year ago to check the level of inflation in the country. Figure 8 demonstrates the use of personalization by the Ukrainian media; the reader can compile his consumer basket and calculate its cost depending on the time change. For example, in a similar story of the European Data Journalism network about inflation, "How are EU countries doing against inflation?" graphs with an interactive exploring function are exclusively used (Aude, 2022).

Fig. 7. A fragment of Texty.org.ua material that uses interaction with games
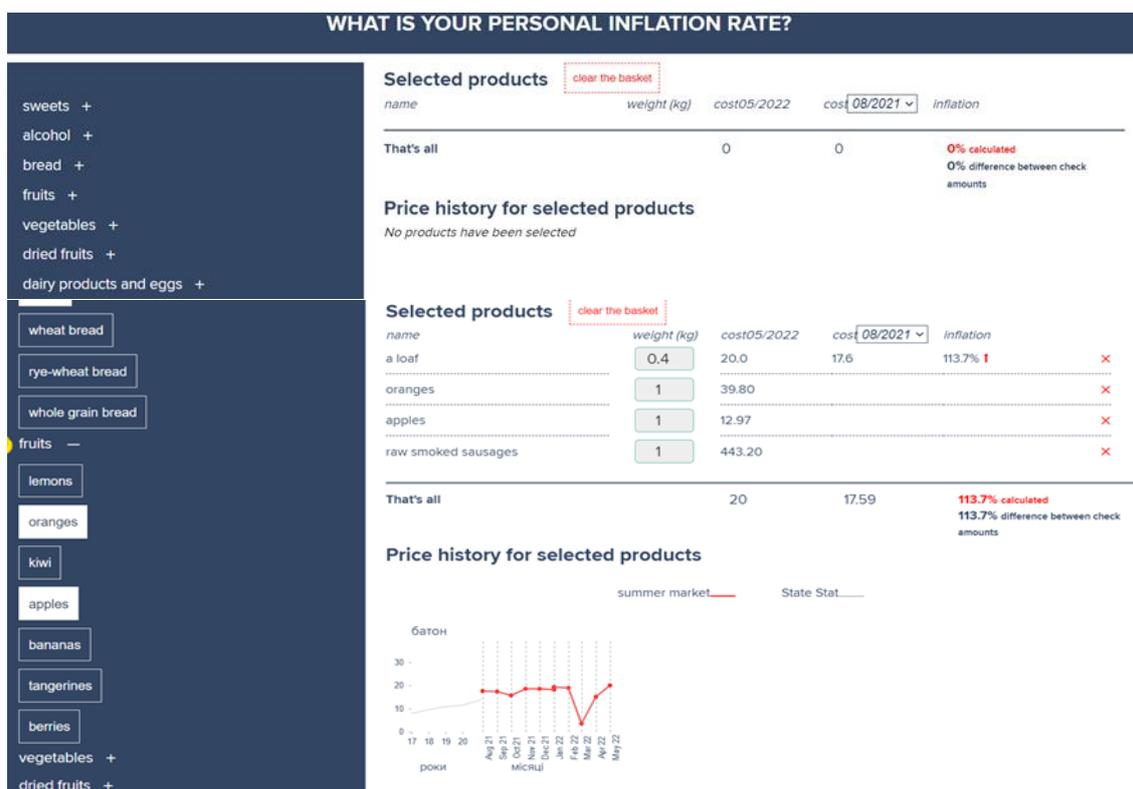Source: Drozdova et al., 2022b.

Fig. 8. Fragment of Texty.org.ua material that uses personalization
Source: Drozdova et al., 2022b.

So, the quantitative and qualitative comparative analysis of interactivity functions demonstrates that the European data media is focused on a clear, rather "dry" presentation of information and does not fully apply the tools of attracting consumers but uses interactivity only to expand or supplement data. Instead, Ukrainian online media demonstrates a creative approach, offering the consumer to actively interact with the content and stay on the page as long as possible.

Conclusions

The active development of digital technologies, the saturation of information containing large volumes of data, and the openness of data characterize the modern world. Mass media play a significant role in the dissemination of large data flows. It is especially true for media specializing in data journalism.

Visualization is a component and the most crucial element in the system of texts belonging to data journalism. Visualization helps to transmit large amounts of data in a compressed form to interest the recipient. Although the media use the same tools to create visual content, the spectrum of visual elements differs.

Convincing in this regard is the experience of using visual language in the media, presenting the media culture of different countries. Therefore, the study's main goal was to determine the visualization features of data journalism in Ukrainian and European media resources to identify common and distinctive features in this segment. The news portals of journalism Texty.org.ua and the European Data Journalism Network were taken for the analysis.

A literature review revealed that the problem raised needs to be studied more. Most of the works focus on analyzing the visual content of well-known newsrooms or exclusively Data Journalism Awards nominees.
The leading research methods were content analysis and comparative analysis.

A review of the above publications showed that Ukrainian and European data journalism is developing following global trends.

Data media use an average of 2 types of visual objects in one material. As you can see, the editors try not to overload the material with visual objects. However, European media still use more visual objects in one material than Ukrainian media.

The most common form of visualization for both editions is visual resources (photos and videos). Since information changes extremely quickly,

this requires rapid publication of information from newsrooms in the online environment. That is why the trend is to use visual resources since they do not require additional time and resources from the journalist, unlike infographics, maps, and diagrams.

Despite the predominance of visual resources in data media, maps, graphs, and infographics occupy an important place in the structure of used visual objects. It should be noted that Ukrainian media uses maps and infographics more often, and tables are scarce.

A comparative analysis of the structure of the materials revealed that the editors of European media pay more attention to work with text, while in Ukrainian data, media journalists focus on design and visualization; they try to put more information in a visual object. Analysis of visualization functions showed a general trend towards using visual objects to reinforce and supplement textual information, and the construction of visualization as a story is instead an exception.

As for interactive visual elements, we are observing a decline in their use. At the same time, the editors do not abandon this characteristic at all but make different accents. Thus, the European Data Journalism network uses two functions of interactivity in journalistic materials - supplementing and expanding information. Texty.org.ua uses a creative approach to interactivity, saturating and coloring its materials with games and personalization. Considering the analysis, predicting a further decrease in interactivity is possible. It will concern either essential interactive functions (choice, research) or the creation of complex interactive projects within the plot (games, personalization).

So, the results indicate two distinct points:

- a different structure of materials: European media focuses on text, Ukrainian emphasizes visualization;
- the media use interactivity differently: Texty.org.ua tries to involve all functions, while the European Data Journalism network uses only 2.

Despite the changing nature of visualization, specific trends can be useful for implementing projects in the digital space. In particular, these results can serve as change indicators for future research and allow practitioners to adapt content according to general trends. In our opinion, the European Data Journalism network should pay

attention to the quality of visual objects because they are often uninteresting and monotonous; as the practice of Texty.org.ua shows, numbers can look stylish and attractive.

For further research, it would be interesting to transfer this study to daily materials in popular global media to test how data visualization is adapted in the environment of media giants.

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