

# Analytical Approaches to News Content Processing during the War in Ukraine in Opposing Geopolitical Alliances Mass Media

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## Abstract

The paper describes techniques for data analysis, and the news content of mass media is examined. Particularities of representation of controversial information about actuals in Ukraine from opposing geopolitical alliances are presented. Narration analysis about war actuals in Ukraine in foreign mass media is performed. Techniques for the Sentiment analysis of controversial news content that is able to be treated differently by opposite parts of the audience are proposed. Basic approaches to Emotional colouring assessment of news content are determined. Development of purpose-oriented detection methods assigned for automated news text processing by decision-making functionaries in the domain of the information policy.

## Keywords

Data analysis, information support, information environment, monitoring, emotions analysis, assessment, text nature.

## 1. Introduction

Hybrid approach features contemporary warfare, with a vital role of information component. Russian war against Ukraine is not an exception in this case. A recent study of the social and political news content of mass media on the Russian war in Ukraine reveals controversial information concerning related facts. The notion of controversial describes events that could be seen by different audiences as ambiguous and even opposite, and their perception depends much on the audience's points of view on topics presented in mass media news.

A controversial piece of information entails a dual treatment of facts. It depends on the vision of a particular recipient and their entity, which forms a particular audience. And the information of the same kind entails simultaneously two opposite kinds of perception and attitude, with related treatment for each of them (i.e., dual treatment). Dual treatment of different audiences is inherent to controversial news content, such as news on russia war against Ukraine, and needs to be analyzed and assessed in a proper way by professional analysts that must provide a clear vision of events and the whole situation.

This stipulates the practical applicability of the development of information and analytic efforts. That is, to evaluate the newly incoming information impartially and to train the information processing capabilities of the analytics experts engaged.

These capabilities include skills for the allocation of information and seeing priorities. That is enforced by using special information processing techniques that provide primary treatment and fundamental analysis of the information workflow.

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For this purpose, analytics' professional skills envision one of the key competencies. They are: the analyst's awareness of the particular situation and the holistic vision of the environment [1], which includes a proper vision of events and an adequate perception of controversial information that provokes a dual treatment from the point of view of recipients related to different audiences. This, correspondingly, stipulates a proper response of the analyst to news content previously recognized and assessed by means of natural language processing techniques.

The information workflow that mass media disseminate needs regulation and analysis. Uncertainty conditions and the process of decision-making under intense information pressure are the significant factors that influence the analyst's work.

Thus, in today's dynamic world, getting and storing the information is no longer a problem. It is a far more significant problem to handle [1].

To form an impartial vision of the situation the study of international news sources is advisable. It facilitates forming of an objective notion of events. For analytics personnel, mastery of English is needed for the purpose to prepare analytical materials based on sources of the type abovementioned. In the meantime, mastering English perfectly is a problem for most of Ukrainian personnel engaged in research and analytics owing to they are not native speakers. So, this slows down the process of elaboration of reference materials and other analytical procedures for analytics to perform their tasks. This provokes an additional overload combined with significant information workflow on a particular subject. And hampers also the process of preparation and presentation of content assigned for decision-making processes. This stipulates the choice of English-language mass media news. And procedures for the development of our techniques for news content analysis which are used for NLP processing.

This way, the development of information processing skills is essential for the adequate vision of events necessary to ensure the effective functioning of a system, both informational and social.

**The goal of this research** is to propose the tools for all information processing phases, from topical retrieval and selection of information to news content's main characteristics definition and their representation in the obvious and available form to be perceived by an analyst.

Besides, this research envisions the following:

- to enhance analytical approaches to news content processing during the russian war in Ukraine. That is practical with preliminary narrative analysis in the information environment of states – supporters of counterparts in the russian war against Ukraine. Where the assessment of news text emotional colouring is worth attention when such features of news texts as dual treatment by the audience are considered;
- to define procedures for emotion detection and assessment of the nature of news text (i.e., emotional colouring) by means of Natural Language Processing (NLP) tools.

With this in view, the research theses presented herein state the means of formal description of mass media texts study, particularly their emotional characteristics recognition and their general intensity assessment.

The main text characteristics to be the subject of formal description are:

- the components that form the emotional colouring of the news text;
- the factors that condition the power of the text's informational impact;
- a proper signification of dual-treatment information.

It is important to define the main characteristics of news content to handle it properly. They are:

- a narrative's presence in the news on a certain subject;
- controversy points revealed in these news narrations;
- emotional colouring inherent to these narrations;
- dual treatment of facts inside news, i.e., facts (notions, events, and persons) that could be treated differently, depending on the target audience and its personal preferences.

As a result, processing such ambiguous information is a specific skill for the analyst, as is prescribing appropriate treatment. Which entails the use of Natural language processing methods capable of elaborating on the information of this type.

## 2. Related works

The analysis of information of the character mentioned above is a particular skill of its treatment with corresponding perception acquirements and software available for processing.

The study on the problem mentioned above and the research on text content and emotional impact are outlined in [2]. Analysis of verbal expression types inherent to the Internet and means of their marking for recognition is studied in [3]. Techniques for multi-domain sentiment analysis and learning concept polarity are developed in [4]. The aspects of data processing by different Sentiment analysis methods and their results classification with the distribution of their polarities by ratings are stated in [5]. Features for classification improvement with their optimization to evaluate emotional attitude are developed in [6]. In [7], a comparison of three approaches to sentiment analysis undertaken to collate the sentiment and emotion present in tweet text is presented. A review of sentiment analysis, various emotion models with an understanding of levels, and the process of sentiment analysis and emotion detection from a text are described in [8]. The research on the emotional intensity of the students' Internet audience is stated in [9], with attention paid to the shortcomings of the topic features and word selection. And tendency in the sentiment analysis of the students' Internet public opinion. Emotional component study in narrations analysis of mass media is demonstrated in [10] where new approaches in narrations study are mentioned and interconnections in the information domain are defined. Problems of data processing as a part of narration analysis and flexible methodical approaches for its development are described in [10].

New objects of attention are introduced in [11], where Narration research envisions the study of not only text but also other narration structures – memes. Which gives way to observing scenario development in political, social, and psychological aspects.

The analysis of the research above, where narration analysis and the impact of controversy aspects are studied, lacks an all-round analysis of emotions nature in verbal structures, the interdependency of components that form emotional impact, and their characteristics for practical use.

Their vital component is data analysis procedures with a set of tools like content analysis techniques. Each comes with a set of capabilities that enable standard content-analysis procedures.

To provide main narrations from news texts, content analysis is the principal means. It enables the mining of the basic characteristics of content for further analytical study.

The principal content analysis procedures include [12]:

- manual content analysis;
- computer-assisted text analysis;
- dictionary-based text analysis.

These types of analysis enable monitoring of the information environment, both manual and automated, depending on particularities and means disposed. This is practical for current events, both global and local inside Ukraine. Information environment monitoring envisions permanent tracking of key events that entail the forming of a particular situation and further trends. The techniques abovementioned do not correspond properly to occasional urgency and information overload. That stipulates the adequate approaches that provide techniques for continuous tracking of information workflow with proper conclusions and output results. Among them are automated mass media news processing regarding emotions features of the input information, and narration analysis, which provide a notion of the current situation and subsequent trends.

All the methods abovementioned provide data processing through text analysis, including Manual content analysis and Computer-assisted text analysis. With this, their use is one part of information processing and the need for a holistic vision of this process envisions techniques that provide multilateral analysis of news content. This regards their ambiguity and versatile perception of different audiences.

News content analysis of mass media of states engaged in war and supporting counterparts of war, either belligerents or their supporters, represents events that are opposed by their content and rhetoric.

Narration is a description of events from a certain point of view [13]. Events presented in Narrations are not ontological and they are formed in the process of description, and interpreted immediately [14]. They reflect cause-and-effect relations, that show events and their origins. News content of the information environment needs particular attention in war time because the information workflow circulating there is formed both by native and adversary mass media and by confronting geopolitical communities. All this stipulates that Narration development forming the news content of the environment abovementioned is vital and needs incessant supervision and control.

With this, information support of global processes, including Ukrainian war counterparts (i.e. russian invasion into Ukraine from February 2022 till now) is to be an object of monitoring, with an unceasing study of information support to each counterpart from their allies and the subsequent analysis of their possible controversy, discrepancies that provoke a dual-treatment of audience.

### 3. Proposed technique. Methods and materials

#### 3.1. Narrations analysis as a means to define main features

The particularities of information of actuals in Ukraine from opposing geopolitical alliances were selected as research material. An intensive emotional colouring features them, so it makes the representation of these particularities visual.

Syntactic structures as a part of a sentence are the subject of formal description. They are the main text characteristics that demonstrate the emotional colouring of the news text. The analysis of syntactic structures in the international Mass media news concerning russian war against Ukraine shows the main narrations of counterparts. They originate from Western news reviews and manipulative rhetoric of russian public diplomacy propaganda. To see the example of narrations please check the Table 1, the Table 2.

**Table1**

Main narrations of russian public diplomacy in the information environment of “Great Seven” states

States with an information environment to be an object of russian information impact	Main narrations contents
Great Britain	Reference to colonial past of Great Britain. Denigration of Ukrainian government on the international level by mean of allegations of “Kyiv regime” in nationalism.
Germany	Mostly related to arms supply to Ukraine, which threatens to destroy historical reconciliation between russians and Germans. Energy blackmail towards Germany, i.e. refusing from import russian energy supply would cause losses to German industry and economy.
The USA	Discredit the USA policy of active support to Ukraine in the war: i.e. the USA produces arms for Nazi terroristic groups that kill people from Eastern and Southern Ukraine.
Canada	Justification of russians’ war crimes including actions on the occupied territories of Ukraine (Bucha etc.).
France	Manipulative efforts to stream discontent towards Western countries in general, not French people. Arms supply from Western countries in particular protract war in Ukraine and hamper to bring peace.
Italy	Manipulation by public opinion with energy blackmail accents, critics to arms supply for Ukraine.
Japan	Narrations of public diplomacy concern mostly nuclear terrorism, and accuse Ukrainian army and government of its provocation. With historical reference to Japanese Hiroshima and Nagasaki suffered from the nuclear bomb explosion. And simultaneous allegations of Ukraine, the USA, and NATO for crimes committed.

Research of narrations on this subject shows that mass media of belligerents translate narrations that are controversial in their content and rhetoric. And form a kind of “alternative reality” for target audiences of represented states.

The tendency to contradictions in narration contents of Western (the USA and Western Europe) and Eastern (China, Iran) mass media is revealed. And their promotion of the most resonance topics with information support of actuals which are broadcasted by states – war counterparts.

As for information policy towards russia, analysis of leading mass media of the European Union and the USA showed mostly their loyalty to critics of russians actions towards Ukraine, and support of Ukraine in its war against the russian invasion [15].

With this, West and East controversies as for Ukrainian war infiltrate into their information environment that reflects precisely their support of war counterparts.

We demonstrate such controversial narrations inherent to mass media of counterparts' allies which origin from the regions abovementioned in the following list, please check the Table 2. It is well seen that they present the same subject but contradict each other. That corresponds to the position kept by each of the counterpart's ally. These divergences are noteworthy; they contribute to new data extraction to regulate it in further prospects for machine learning procedures [15].

**Table 2**

Narration of controversial topics of russian war in Ukraine, in official mass media of the West and the East

The social resonance topics	
Nuclear blackmail	
Western mass media (the USA, Germany, France)	Eastern mass media (China, Iran)
Russian army occupation of Enerhodar nuclear station (near the town of Zaporizhzhya location) and provocations of nuclear threat.	Russia`s efforts to provide security in the vicinity of Zaporizhzhya nuclear station, and accuses Ukraine of the station territory shelling.
Russian government backers continue to threaten to use a nuclear weapon in Ukraine.	Protection of liberated Ukrainian territories from Ukrainians — is the main cause of the possible use of a nuclear weapon by russia.
Accusation of radioactive ammunition explosion on Ukrainian territory	
Russians defamation of Ukrainian use of “a dirty bomb”. And resolute denouncement of these accusations by both the NATO countries and Ukrainian officials. With an accent on russians part attempts to justify the rise of tensions in this war.	The russian ministry of Defence declarations about Ukrainians’ plans of using “a dirty bomb”.
West sanctions policy toward russia	
Sanctions policy intensifies, and the next package of sanctions is coordinated with the USA and the majority of the EU states. With the further rise of pressure towards russia.	The economy of European states suffers from the sanctions abovementioned, with no economic losses for russia. Citations of russian policymakers about the deep harm of Western sanctions for the EU states. They get doomed to hunger, cold, and isolation by means of the USA’s efforts.

From the topics above controversial treatment of news content is apparent. It provokes polarized reactions of audiences backing different belligerents correspondingly. As a consequence, this characteristic is worthy to be tracked in the process of automatic procedure of text analysis by the NLP technique. To provide an adequate assessment of news content that describes the same events from opposite parts and presents controversial points of view. This enables the prospect to reveal critical content for analytics, including distortion of facts. That as a result forms the further attitude of the audience and consequences related.

### 3.2. Conceptual approach to the analysis of the natural language text information

We see a Natural language text as an interaction of three independent systems:

- linguistic system;
- the system about the surrounding environment;
- the pragmatic system, i.e. what kind of problems we resolve when analysing the text.

This approach provides realization of the principle of separate representation of linguistic support, information support, and support with software. Modular, in its turn, makes it possible to set up the system quickly for new applied tasks related to processing of the text information. The systems that is able to realise models for English, Russian, and Ukrainian was developed by our efforts on the basis of separate modular configuration earlier. It was approved and demonstrated good results in the following applied tasks: information retrieval and sampling, automated forming of key retrieval notions, machine translation, and automated forming of analytical references through the specified information array.

### **3.2.1. The architecture for the proposed information and analytical system for recognition of Emotional colouring of the text information**

The proposed system is performed in a standard structure and composes linguistic support, information support, and software that are sustained by corresponding prototypes. To resolve an assigned applied problem, the model of the input language (English, in this case), the knowledge domain model, and the user model are obligatory.

**The user model** defines the type of applied problem to be resolved and impacts substantially the selection of the knowledge domain models configuration and the linguistic model.

The user model includes a representation of knowledge of users goals, i.e. what answers are needed to be obtained by a user from the analyzed information array, and the form of representation of ready data. This means what format results of information array processing should be presented in.

As a part of this model, a developed analytics approach is applicable to determine key text characteristics by use of the technique of Emotion colouring assessment. That envisions emotions detection with their thorough analysis, which includes measuring of emotional colouring of news texts and estimation of the intensity of news workflow impact.

To depict this graphically, the tools of Exploratory data analysis (EDA) were used, to make detailed text characteristics be seen by cursory acquaintance with results. EDA is a fundamental early step after data collection and pre-processing, where the data is simply visualized, plotted, and manipulated, with no assumptions, to help assess the quality of the data and build models. "Most EDA techniques are graphical with a few quantitative techniques. The reason for the heavy reliance on graphics is that by its very nature, the main role of EDA is to explore, and graphics gives the analysts unparalleled power to do so while being ready to gain insight into the data [16].

This type of demonstration is employed to signify visualization means of the emotional colour of news text. Unlike the content-analysis technique, the presented approach is a practical employment of the developed sentiment-analysis method, which shows particular emotions transferred through the text's linguistic units, inherent to the news text.

The following example shows a text that war counterparts might perceive differently, with an opposite attitude to key facts that are described. And correspondingly, with an opportune dual treatment inherent to key phrases [17]. The following text is processed by means of the prototype for the text nature assessment with analysis of emotional colouring. The recent actuals of the russian war against Ukraine are demonstrated.

For this purpose, the procedure of assessment of the emotional colouring of the text is essential. It reveals not only positive and negative perceptions of the text, but also emotions that form its nature and impact the following consequences in the audience's behaviour. And the way of visual representation of content peculiarities and a general dynamic of a text. To realize this task, the next procedure is proposed.

The assessment of basic characteristics of emotions, which forms their intensity [18]. For this purpose, the technique of Semantic differential is used, by means of expert analysis processing. And their subsequent allocation by the intensity in the range from -8 to +8 that provides a vast scope of emotional colours to be evaluated.

A list of emotions is evaluated by experts according to their scales-factors set.

The procedure composes the following:

- the collection of expert judgments for the list of emotions;
- working out of expert's questionnaires, calculation of the average for each emotion from the list and as a result – the average for each emotion from all experts' assessments.

The values obtained are the basis for attribution of own weighting ratio to each emotion for the subsequent evaluation of the news text, particularly its emotional colouring. To see the results, please check the Table 3. It demonstrates results where emotions are marked with corresponding rates according to their degree of exposure, arranged by alphanumerical code, and allocated by their basic characteristics. The emotional nature of a text is a result of this evaluation procedure.

**Table 3**  
Allocation of Emotions intensity characteristics

No	Alpha code of emotion	Emotion	Degree of exposure
1.	AQ	Calming	1
2.	AS	Sadness	-1
3.	AD	Distrust	-2
4.	T	Calming down	2
5.	I	Confidence	2
6.	AV	Regret	-3
7.	AJ	Irritation	-3
8.	S	Envy	-4
9.	R	Satisfaction	4
10.	V	Malevolence	-5
11.	U	Astonishment	5
12.	AT	Approval	5
13.	AK	Disappointment	-5
14.	AU	Anxiety	-6
15.	ZA	Hope	6
16.	AF	Hatred	-7
17.	AI	Joy	7
18.	AR	Fear	-8
19.	O	Euphoria	8

To define emotional colouring and a text's nature in general, a set of basic rules [18] is practical. They are:

- the rules with regulations for emotions wordforms interaction;
- the classification with a set of procedures for text nature assessment. Which includes an appropriation of the alphanumerical code for syntactic and semantic categories and rules.

To see the classification for emotional identification by wordforms that transmit them, please check the Table 4. It includes both the above-mentioned and numerical codes of sentence syntactic and semantic categories and rules. And their use defines the Emotional colouring of the text correctly and more precisely. With the use of partition of sentence components by a syntactic structure for an adequate apprehension.

**Table 4**  
Numerical codes of sentence semantic categories and lexical-semantic rules

Code	Sentence semantic category
60*	Object of emotion
61*	Matter of emotion
62*	Subject of emotion
63*	Cause of emotion
64*	Source of information

70*	Influence on emotion modulus
71*	Signs of emotion interaction
72*	Merger of signs of emotions
73*	Summarizing
74*	Factor of information impact intensity

Models for emotions detection in the text include 2 stages [18], which are:

- filtering and finding words that contain emotions;
- transformation of words into embedding (vector space) and search of the closest of them by cosine similarity using of ElasticSearch technique.

They employ an Unsupervised machine learning technique that is practical because of the following advantages.

They are more applicable to analyze real-world problems due to the vague prospect of seeing what the outcomes should be and determining how accurate they are. Unsupervised machine learning purports to uncover previously unknown patterns in data that corresponds to the task of unknown text processing.

Besides, helpful unsupervised ML techniques use intakes the following:

- clustering, which allows splitting the dataset into groups automatically, according to similarity. Often, however, cluster analysis overestimates the similarity between groups and doesn't treat data points as individuals;
- association mining that identifies sets of items that frequently occur together in a dataset;
- latent variable models that are commonly used for data pre-processing, such as reducing the number of features in a dataset (dimensionality reduction) or decomposing the dataset into multiple components [18].

The model for ready data representation form selection is oriented to a final user of the system (an information politics analyst, in this case). And the following requirements for the system are to be fulfilled:

- to answer all questions interested (within the task posed);
- to be brief and visual;
- to take into account the user characteristics.

The 1-st requirement (completeness of the content) is fulfilled when the statistical model is input, it provides an assessment of the entire situation. The model includes a general quantity of sources processed, the quantity of positive, negative, and neutral (by emotional characteristics) among them (the total and separately by each source). It is possible for the user to assess the situation features degree and to reveal ambiguous sources.

Requirements 2 and 3 are fulfilled by text parts with a bright emotional colouring delivery on the screen. And their colouring by a corresponding colour. This contributes to taking into account individual user's characteristics. Because analysts perform different tasks, and are engaged in their object domain. Simultaneously, the information workflow is entire and multilingual, and the knowledge of English for analysts is not perfect-frequently because they are not native speakers. So, it is unreal for them in many cases to perceive and assess the emotional component of news at a glance.

### 3.2.2. Linguistic models for the proposed system

The following linguistic models are applicable for the system to be practical. They are the Model of the object domain and the Input language model.

The Model of the object domain is assigned for a thematic sampling of sentences necessary for the analysis. Which is the feature of the first task.

As a vital component of this procedure, texts undergo checking for their correspondence with the assigned subject. Vocabulary  $V_l$  is used for this purpose.

Taking into account the narrow topical domain for retrieval – the russian war against Ukraine, there must be maximum of 1000 articles in the keywords vocabulary. They are the names of states of the war counterparts, the NATO states, the last names of functionaries of the states related, ministries, and institutions related to war names. For example, russia, Ukraine, the USA, Zelensky, the Ministry of Defence, etc.

The pattern is considered to be suitable if it coincides totally or mainly with text wordform. For example, one vocabulary article “Ukraine” must correspond to wordforms “Ukraine and Ukraine’s” and vocabulary article “Russia” – to wordforms *Russian, anti-Russian, Russia*. Rules of vowels and consonants interchange are obligatory to be accounted for Russian and Ukrainian. The program will select the sentences that contain keywords with  $V_1$ .

The vocabulary is related to this procedure. It contains is the normed form the following:

- words (words combinations) with emotional colouring;
- words (words combinations) that enhance or suppress the emotional colouring of words (word combinations) of the first group;
- words (word combinations) that are neutral and they change correspondingly their emotional colouring to an opposite one.

The Vocabulary  $V_2$  is used for the second task resolution.

Vocabulary article contains the field of the particular notion (word or word combination) and the field for the title of emotions induced by that notion. Table 3 prescribes the basic emotions extracted from psychology groundwork results that signify the basic human reactions of psychics [18].

The third task is to set emotional recognition proceedings to the particular target audience.

For this purpose, the basic requirements include the analytical pre-training with human efforts engagement, which provides the needed knowledge of the target audiences from the both sides, i.e. counterparts. That includes efforts of analytics and other professionals related [19], [20].

1. The next statement that describes interconnection is “content – audience’s attitude” (1):

$$\alpha \geq \sigma \geq \zeta, \quad (1)$$

where  $\sigma$  is a sense transmitted by particular news,  $\alpha$  is a positive perception of a particular news content by a target audience,  $\zeta$  is a negative perception of a particular news content by a target audience.

The factors  $\alpha$  and  $\zeta$  mean the subjective assessment of emotional colouring of a certain news content. Which is presented by a wordform with positive or negative emotional colouring.

If  $\alpha = 0$ , the wordform is not an object of interest for evaluation of emotional colouring.

2. The following (2) – (5) signifies emotional colouring of the phrase with dual character:

$$k(S_i) = k(w_i) + k(w_j) > 0, \text{ if } w_i, w_j \in \alpha \quad (2)$$

$$k(S_i) = k(w_i) + k(w_j) < 0, \text{ if } w_i, w_j \in \zeta \quad (3)$$

$$\alpha \in A, \quad (4)$$

$$\zeta \in Z, \quad (5)$$

where  $k$  is a weighting ratio;  $w_i, w_j$  are wordforms with emotional colouring;  $S_i$  is a syntactic structure with emotional coloring. Correspondingly,  $\alpha$  is a positive perception of a particular news content by a target audience,  $\zeta$  – is a negative perception of a particular news content by a target audience. As a consequence,  $A$  is a target audience of the one opposite part, and  $Z$  – is a target audience of another opposite part.

The Input language model is oriented exclusively on the text information. The linguistic support of the applied task means morphological, syntactic, and semantic analysis.

Morphological analysis is applied for recognition of the lexical-grammatical characteristics text wordforms. They are part of speech and with corresponding lexical-grammar categories (gender, number, case, animated, time, person, degree of congruence, reflexivity). Wordforms recognition is based on the quasi-inflections vocabulary. The advantage of quasi-inflections vocabulary is that it is not linked up to the vocabulary of the knowledge area, and recognition validity is the same as the one when the wordforms vocabulary is used, with simultaneous less volume of the vocabulary which hundredfold less. Besides, this type of vocabulary is applicable for the recognition of new words when they correspond to word-formation rules for the input language. That is helpful for morphological synthesis, i.e. generation of all wordforms of vocabulary (standardized) words. This gives way to synthesise automatically search profiles according to assigned vocabulary representation (that includes alternation of vowels, consonants, unstable, etc.).

The syntactic analysis composes the input data that are the output data of morphological analysis. A sentence is a unit of syntactic analysis. The first phase forms syntax-related phrases, and the syntactic rules are set for them. The second phase defines parts of a sentence in categories of syntax: subject and predicate are the first, and object and adverbial modifier are the second.

Semantic analysis is restricted for this applied task, this means that we do not define semantic meanings of words, we track words that function as emotion carriers: a matter of emotion, subject of emotion, and cause of emotion.

## 4. Experiment

The technique of emotion colouring assessment is part of a developed analytics approach to determine key text characteristics. That envisions emotions detection with their thorough analysis, which includes measuring of Emotional colouring of news texts and estimation of the intensity of news workflow impact.

To depict this graphically, the tools of Exploratory Data Analysis (EDA) were used, in order to make detailed text characteristics be seen by cursory acquaintance with results. EDA is a fundamental early step after data collection and pre-processing, where the data is simply visualized, plotted, and manipulated, with no assumptions, to help assess the quality of the data and build models. Most EDA techniques are graphical in nature with a few quantitative techniques. The reason for the heavy reliance on graphics is that by its very nature, the main role of EDA is to explore, and graphics gives the analysts unparalleled power to do so, while being ready to gain insight into the data [16].

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EU High Representative for Foreign Affairs and  
 attacking again Kyiv, Kharkiv, Zaporizhzhia, Lvi  
 itself until it prevails," he wrote. According to  
 Russian military launched a massive missile att  
 by Russia.



**Figure 1:** The emotional colouring assessment of text with dual-treatment of key phrases



**Figure 2:** The colours for emotions visualization results in mass media news text emotional colouring assessment

Emotional colouring inside of the news text is marked by the colour appropriate to the particular emotion. An example is in Figure 1, which shows the diagram of the correlation of emotions that are inherent to the particular news text.

On the graph above-seen the axis X corresponds to the progress of the text and the number of figures is equal to the number of sentences that form each piece of news. The axis Y signifies the intensity of emotional colouring for news text, with compliance of its degrees with neutral colouring (as for 0 marks) and positive or negative Emotional colouring for fields below and above 0 marks, in the corresponding positive or negative fields.

These approaches provide the analyst with the information that is processed according to the information needs of a situation.

The results obtained from the text analysis are an essential component of the overall information workflow that is important to be structured and analysed.

The study of the nature of the information environment is an important component of analytics. This competence enables both an expert and average human being to understand informational processes around, react to events properly, and to oppose mentally as appropriate when faced with, and analytics results. As a consequence, appropriate recommendations are exposed for practical use [1].

The abundance of information, both true and false, makes us look for ways of sifting and refining it. Getting rid of excessive information and catching the gist are the stages of a process called text annotation including text analysis, text transformation, and text production. All this concerns a proper exposition of news related. This approach is practical for both human efforts in text statement, and Natural language processing means use as a part of information analysis, mass media news processing.

So, the techniques abovementioned provide information workflow processed in the right way. The proper information handling for the analyst after extracting adequate news prescribes the following:

Establish the topic, the main idea, and the thesis statement of the text;

Draft an outline of the text;

For further analytics groundwork, the analyst should discover new ways of peer-reviewing the annotated texts [1].

Impartiality for an analyst means to percept all the incoming information without emotional involvement, matching and verifying facts from different sources, and relying on one's own expertise.

Taking into consideration the massive spread of information via different resources, it is worthy to track news flow through many resources, by using corresponding techniques in monitoring tools that mark attention-worthy news. A proper selection of features provides this and is able to compose potentially an impression on the audience, both a key and a probable to be able to persuade, and persuaded to a particular point of view with consequences. And another option for these tools is information tracking by versatile characteristics, related signatures for functions and subsequent ranging [1].

All this benefits a timely awareness about information support that is allocated by allies for counterparts, which enables them to make corresponding conclusions from the news workflow analysed.

## 5. Discussions

Research in the domain of text processing for emotional-colouring assessment is in a pre-design stage. Our main goal was to present a conceptual approach and techniques for problem resolution. The essence of which is the following: comprehension and perception of the text message are beyond the language mastery solely. It is integrated with the person's knowledge, objects, spirit, frame of mind, motives, etc. for the moment of reading. Moreover, it is a text object which we are able to recognize. Comprehension and perception of the text message exceed the limits of the semantic system and reach the pragmatic domain. As a consequence, the modular organization is expedient. The linguistic models, knowledge domain, and user patterns exist independently. They interact on the stage of the decision of a particular application. The linguistic model is the most stable, changes as a rule are related to vocabulary. So we managed to perform it in English, Russian, and Ukrainian. Models of a knowledge domain and a user are dynamic, so they are filled according to a particular task.

## 6. Acknowledgements

We are grateful to our Ukrainian armed forces and all warriors who defend our country from Russian invaders. We would like to express our word of appreciation to all who help to repulse Russian aggression in the operational area and beyond. Thanks to them, the majority of Ukrainian educational facilities and scientific schools can function these days, and research and development activity keeps on. We wish them resilience, God's protection, and return to their families as winners.

## 7. Conclusions

So, tools for automatized sentiment analysis of English news content of this kind are proposed in this paper.

The results of this research present the essential characteristics of mass media actuals that are subject to be processed in a proper way by means of NLP and then by a professional analyst. And these are the elements for techniques for the sentiment analysis of controversial news content that is able to be treated differently by opposite parts of the audience. The new global information environment entails inevitable changes in analysts' professional activity in information processing. This means that the development of information processing skills is essential for an adequate vision of events to ensure the effective functioning of a system, both informational and social.

Awareness of the main characteristics of news content and their adequate processing enables the appropriate handling of information. The main of them are:

- importance of narrations seen in the news content by an analyst to catch probable consequences in particular situations;
- mastery of the use of software assigned for NLP processing to mine actuals' characteristics — Emotional colouring, the intensity of news content, etc.;
- presence of information with dual treatment inside of news, i.e. facts and persons that could be treated differently, depending on the target audience and its preference.

So the analysis of such kind of information demands the use of means where corresponding NLP techniques provide needed procedures.

The main approaches to process it properly envision the following:

- the use of Content-analysis methods to draw basic narrations that define news content;
- narration analysis, with attention to Emotional colouring of narrations transmitted to news audiences, so they should be an object of a thorough analysis by means of NLP processing. These means are based on Models for emotion detection with the Elastic search technique and a set of basic rules, that are helpful for the assessment of emotional colouring by means of particular news and of the whole information workflow;
- recognition of Controversies inside of news content that entail it's Dual Treatment for counterparts. That is an essential characteristic to be noteworthy in the procedure of automated analysis of the news content concerning the russian war against Ukraine.

To assess emotional colouring properly, interconnection Content – Audience attitude is defined. With a set of interrelations and patterns related.

To make main text characteristics results of NLP processing means to be seen by an analyst at a cursory glance, the tools of Exploratory Data Analysis (EDA) are used. That demonstrates the features abovementioned visually, that makes possible to recognize the Emotional coloring of news text, and its proper assessment regarding the controversy and corresponding dual treatment by counterparts' audiences.

Information workflow disseminated by mass media needs regulation and analysis, and uncertainty conditions and the process of decision-making under strong information pressure are the significant factors that influence the work of the analyst.

The massive spread of actuals via different mass media sources stipulates their tracking through different channels, with using corresponding techniques in monitoring tools that mark attention-worth news. A proper selection of features provides this and makes feasible a probable impression on an audience to impose a particular point of view with some consequences.

The use of the procedures above listed is practical to observe the information environment thoroughly that helps to survey the succession of events and probable development of the situation in the prospect.

The architecture of the automated information system presented in this paper realizes the concept of the modular organization of all kinds of support for the system. This enables a prompt tuning of the system both to a new knowledge domain and the other applied problem.

The proposed approach provides a significant advantage for the user (the professional analyst in the information politics domain for the application described). It is the following: results of processing are presented in a form easily perceived and comprehensive for the user with a different knowledge of English. The level of which is either intermediate or advanced.

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