Communicative Behavior and Speech Perception of Social Media Actors: A Neural Network Approach

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Abstract

The paper concerns the analysis of the residents' attitude towards the construction of the chord ring in Moscow, as well as the identification of digital conflictogenic zones and predictive analytics. The material for the study was network data collected during the period from 1.07.2019 00:00 to 31.12.2019 23:59. To interpret the data, neural network text analysis, analysis of lexical associations, content analysis and sentiment analysis were used. As a result, digital conflictogenic zones were identified; users' perception of each facility was characterized; the risks of protests in the virtual and real space during the project implementation were assessed.

Keywords

Perception, Social Media, Neural Network Technology

1. Introduction

The new empirical reality with a multifold increase in the amount of information ensured the dominance of social media, changed the assessment and approaches to data processing. The importance of semantic analysis for large volumes of verbal material has increased, since the focus of attention has shifted from the ways of collecting data to data processing. Advancements in automatic processing of natural language data are increasingly dependent on the use of artificial neural networks. Thus, Microsoft's MT-DNN (Multi-Task Deep Neural Network) is a natural language processing (NLP) model that outperforms Google BERT in nine of eleven benchmark NLP tasks. Google's new Multilingual T5 model trained on a new generic Crawl-based dataset for 101 languages also marks a new milestone in the NLP development [1]. GPT3 (OpenIA), an autoregressive language model with 175 billion parameters, achieves strong performance on many NLP datasets, including translation, question-answering, and cloze tasks, as well as several tasks that require on-the-fly reasoning or domain adaptation, such as unscrambling words, using a novel word in a sentence, or performing 3-digit arithmetic [2].

1.1. Related work

Speech perception in its multilevel processing system has a rich tradition of research [3-7]. During the pandemic, the problems of transformation of perception in a virtual environment [8], perception of stress contrasts in semantic and non-semantic contexts, etc. came to the fore.

The study of the conflict has also acquired particular importance in recent years. This led to the development of a wide range of computational methods used to study the dynamics of conflicts, a variety of computational approaches from text mining and machine learning to agent-based modeling and analysis of social networks [9], and analysis of new personality constructs based on speech data of social networks [10].

Moreover, the digital environment makes it possible to automatically receive large amounts of data in real time and to implement interdisciplinary projects [11-13].

The purpose of this study is to analyze the attitude of Moscow residents towards the construction of the chord ring using digital data, as well as to identify digital conflictgenic zones and to conduct predictive analytics.

1.2. Data

The material for the study was the data of social media, microblogs, blogs, instant messengers, videos, forums and reviews dedicated to the road construction in Moscow (the South-East Chord (SEC); the Southern Beltroad (reconstruction of Verkhnie Polya str. on the segment (section) from St. Maryinsky Park to the Moscow Ring Road), North-East Chord (NEC), North-West Chord (NWC)). Date of collection: 01.07.2019 00:00 - 31.12.2019 23:59 (Figure. 1, Table 1).
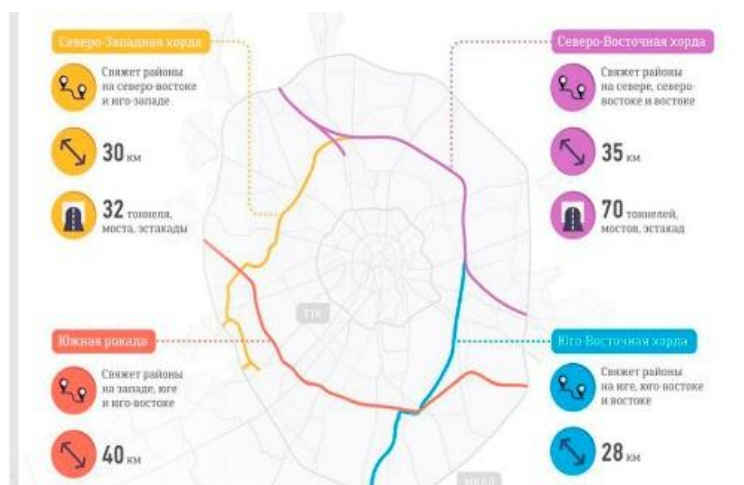

Figure 1: Chord ring of Moscow

Table 1
Quantitative data characteristics

Parameters	North-West Chord	North-East Chord	Southern Beltroad	South-East Chord
Messages	602	1 693	4 280	12 456
Authors	433	1 149	2 464	7 459
Loyalty	0,9	0,9	0,9	0,1
Engagement	7 858	16 006	140 559	144 028
Audience	6 822 650	17 688 221	35 069 215	97 070 580

1.3. Method

The study involved a transdisciplinary approach; also neural network text analysis and analysis of lexical associations, content analysis and sentiment analysis were used.

The data was collected using Brand Analytics algorithms. Content collecting and filtering included bot identification and filtering, identification of posts, comments, reposts (with and without add-ons). Also, digital traces (likes, views) were identified and analyzed.

Content clustering was performed by sentiment, presence and degree of aggression.

The sentiment analysis was performed using the Eureka Engine sentiment module. The technique is based on a statistical algorithm for conditional random fields (CRF) using sentiment dictionaries. Sequences of lexemes are used as input data, after which the algorithm calculates the probabilities of possible sequences of tags and chooses the most probable one.

The degree of aggression was identified on the basis of the analysis of lexical tags of aggression determined expertly. The set l_i of lexical tags that make up the lexical mask $L = \{l_i\}, i = 1..I$, were ranked automatically within the analyzed text corpus by determining their semantic weight r_i in this corpus. The summation of the ranks of lexical tags weighted by the degree of their significance w_i in this domain area assigned by the expert, allows calculating the integral degree of aggression present in the corpus texts: $W = \sum r_i w_i$ [14].

To correctly mark the attitude towards the construction of each facility by Muscovites, indices of stress and well-being were derived. The algorithm for obtaining these indexes consisted of extracting tag lists from the database of users' comments and reposts. One list was formed using the neural network technology, the other – from the results of the work of 3-5 experts. For the social stress index, markers were identified from the negative cluster, for the social well-being index – from the positive and neutral clusters. After these procedures, the resulting lists were combined into a single dictionary with the average weights of the matching markers. Next, the neural network technology was adjusted, taking into account the resulting dictionary, and the indices of social stress and well-being were derived according to the following formula:

$$\sum \% = \frac{\sum RB}{\sum R_{max} B_{max}},$$

where R and B are current, and R_{max} and B_{max} are the maximum values of ranks and weights (in %), respectively [14].

Within this study, digital aggression was considered as an indicator of social conflict [15; 16]. And social well-being was interpreted according to the WHO Wellness Index-5 (Psychiatric Research Unit, WHO Collaborating Center for Mental Health, Frederiksborg General Hospital, DK-3400 Hillerød).

The content analysis was performed in accordance with [17; 18] using the AutoMap text mining tool.

For visual analytics, the Tableu platform was used.

Using a model based on the neural network paradigm of using neural-like elements with temporal summation of signals (the so-called corticomorphic associative memory), the topic structure of the database and the results of summarization were analyzed, which made it possible to extract explicit information. On the other hand, such a network representation of the text made it possible to identify and interpret the semantic network as a set of interrelated concepts. With the help of the semantic network, implicatures and semantic accents were analyzed that were most important for actors, which helped obtain their rating [14].

An important stage in the analysis of the actors' attitude was the construction of associative networks. The Word Association (WA) paradigm analysis has a long and multifaceted history [19-21]. With the help of implicit association tests (IAT), it helped study implicit social cognition, subconscious motivations, attitudes towards the presented stimulus, as well as automatic associations for subjects who prefer not to demonstrate at a conscious level (see, for example, Project Implicit (https://www.projectimplicit.net/). The potential of associations in the analysis of various types of network data has also already shown its effectiveness [22-24]. In this study, the analysis of lexical associations was performed on the material of the clusters identified in the course of the sentiment analysis and analysis of network aggression using neural network technologies [14], which made it

possible to draw conclusions about the preferential perception (attitude) of the users, to identify the most frequent associations that characterize the actors' attitude towards the subject of analysis and to confirm the results of predictive analytics.

The analysis of network aggression, the sentiment analysis and the analysis of lexical associations made it possible to identify and analyze the specifics and dynamics of processes that form digital conflictogenic zones.

2. Results and discussion
2.1. Digital platforms, types of sources and messages

Analysis of the content distribution across digital platforms makes it possible to determine user preferences and features of communication processes associated with the analyzed facilities. So, to discuss the SEC issues and to generate the relative content, the users used the following top resources: VKontakte (98 608 989), Odnoklassniki (38 089 303), YouTube (23 775 381), Facebook (23 098 359) and Twitter (17 994 117); the Beltroad issues were covered mainly on YouTube (24 135 808), as well as on the following network platforms: VKontakte (21 995 278), Instagram (8 728 919), Twitter (6 292 593) and Facebook (4 719 839). VKontakte was the leader in posting the NEC and NWC content (NEC – 10 620 841; NWC – 3 578 719), but the following positions were distributed in different ways: YouTube (5 706 195), Facebook (3 460 758), Instagram (3 369 284), Odnoklassniki (2 024 790) for NEC issues; and Odnoklassniki (1 521 277), Facebook (1 493 690), Instagram (820 960), YouTube (724 602) for NWC issues (Figure 2).
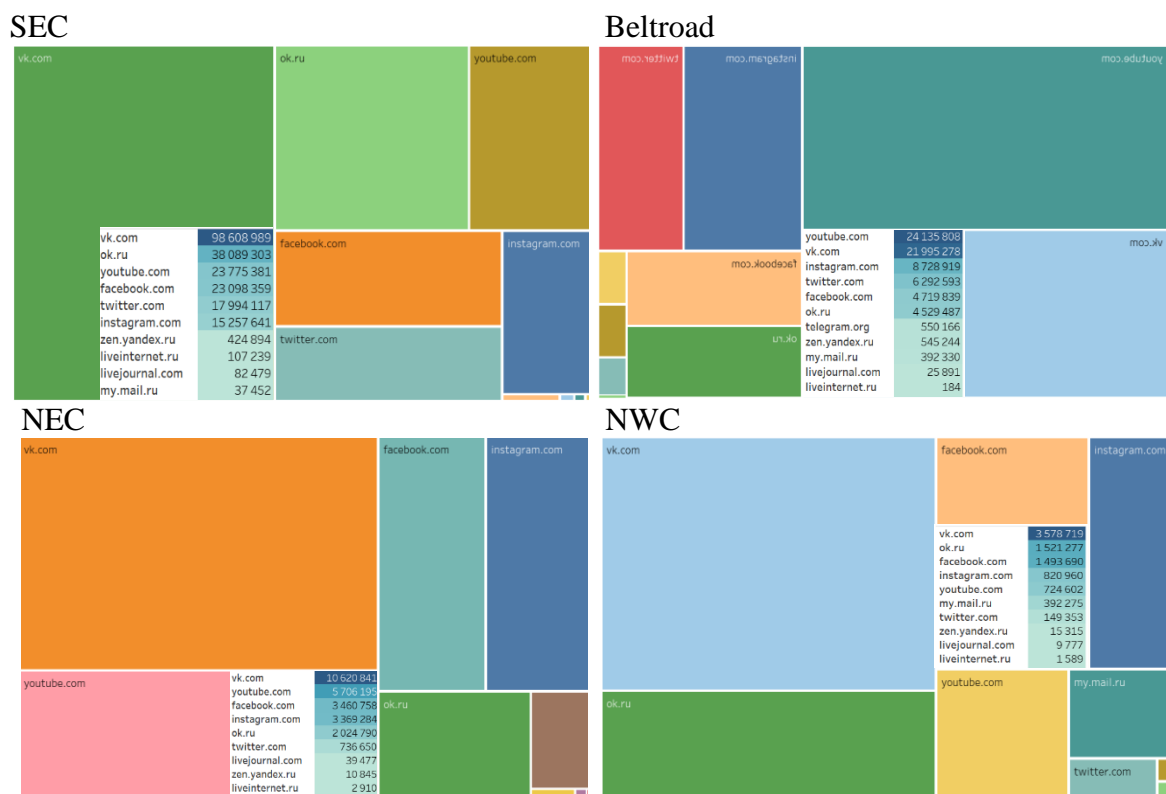

Figure 2: Content distribution across digital platforms

Analysis of the content distribution by types of sources and types of messages suggests that the maximum number of messages devoted to the implementation of the SEC and NEC projects were comments on social networks, which indicates a high degree of interest of the actors and active discussion with the involvement of a wide range of users. Social media posts dominate in the content regarding the Beltroad and NWC (Figure 3).

SEC

	Social media	Videos	Microblogs	Blogs
Comments	100 184 420	14 081 073	7 282 205	4 830
Post	60 989 742	9 694 308	8 923 638	609 782
Repost without add on	9 804 026		1 751 104	
Repost with add on	4 113 556		37 170	

Beltroad

	Social media	Videos	Microblogs	Blogs	messenger
Post	16 779 440	19 885 330	5 045 167	563 884	382 320
Comment	22 104 775	4 250 478	1 003 618	7 435	
Repost without add on	936 835		209 003		167 846
Repost with add on	544 803		34 805		

NEC

	Social media	Videos	Microblogs	Blogs
Comment	12 533 304	55 357	35	3 222
Post	5 940 812	5 650 838	716 900	50 010
Repost with add on	321 301			
Repost without add on	680 256		19 715	

NWC

	Social media	Videos	Microblogs	Blogs
Post	4 482 933	684 397	137 996	24 998
Comment	3 067 361	40 205		1 683
Repost without add on	207 418		11 357	
Repost with add on	49 209			

Figure 3: Rating by types of sources and types of messages

2.2. Key topics
2.2.1. SEC

Figure 4: Core of the semantic network

After the selection of the user-generated content from the consolidated database, the analysis of the semantic network and the topic structure was performed, as well as the content analysis. The results led to the conclusion that the situation around the construction of the South-East Chord is extremely tense. The core of the semantic network composed of nominations with a link weight of 98-100, clearly shows the negative attitude of the users towards the implementation of the project (Figure 4).

In a negative cluster, ***environmental issues*** come to the fore, which cause serious concerns of the actors:

• The danger of an environmental catastrophe caused by the SEC construction, since it will lead to the destruction of the radioactive repository of the polymer plant:

(...) There is a real threat of radioactive contamination due to the SEC construction on the radioactive waste repository of the TVEL plant (...)

- An increase in the incidence of desease among citizens:

(...) Cubic meters of polluting particles from the roads will cover Moscow and its inhabitants and increase the number of cancers and the incidence (...)

- The environmental problems caused by the SEC construction, according to the actors, are mentioned in the all-Russian environmental protest:

(...) Showing civil solidarity with all regions of Russia where there is a peaceful resistance against environmental genocide of indigenous people and local residents (...)

- Among environmental issues, garbage clusters are of utmost importance, as well as the garbage reform:

(...) Environmental problems have become more acute than ever before in the country's history. Landfills are catastrophically overflown, the garbage reform has failed, hazardous incineration plants will be built in the Moscow region and Tatarstan, despite the protests of local residents! (...)

- *Deforestation of green spaces:*

(...) Residents are worried about the ecological situation, since after the felling of trees it will certainly worsen (...)

Socio-political problems are also identified in the context:

- Readiness for active protest actions:

(...) It is better to be active today than radioactive tomorrow. Protest activity is increasing in Moscow (...)

- Strong rejection by the actors of the officials' actions:

(...) it is very difficult to resist this (...) it is against us (...) officials who have gathered from all over Russia because in Moscow there is always the biggest money, as you know, and everyone wants to grab a piece of it, we are the only city activists who resist (...)

- Problems of the SEC construction are combined with the problems of renovation, construction of New Moscow and road construction, which, according to the actors, are performed only to enrich officials:

(...) under the Yuri Mikhalych Luzhkov period, they built over those areas that were free, but when Sergei Semyonovich Sobyanin came, the first project was this new Moscow, which is being actively built up now, and now, in general, the construction complex needs a new territory of Moscow, well, it is quite difficult to find the territory, therefore we have such a program as the renovation (...)

- Users make accusations of lobbying for laws that violate work methods:

(...) Residents of several districts of Moscow are concerned by the plans of city officials by all means to build a bridge (part of the SEC) across the Moskva River connecting the Moskvorechye-Saburovo district and Pechatniki! (...)

- There is a certain consolidation of civil society against construction:

(...) it is very nice to see here the defenders of the Losiny Ostrov, Butovo, Pechatniki, only together, only civil society, and we can resist, we cannot only unite to show them that it is not them who are the masters of the city, but us (...)

- Accusing officials of using dishonest methods to achieve their goals, pitting Muscovites of different social strata against each other:

(...) I want to officially declare, know that the residents of Moscow will pit us against each other, we will be simply pitted against each other, this is a great grief, but why do they do it? because they cannot admit that they are turning a social project into a commercial one and they are looking for the guilty and we will be those guilty (...)

- The belief that the implementation of the project will lead to worsen transport accessibility and a sharp decline in the living standards of Muscovites:

(...) In the long term we get increased incidence of disease, traffic congestion and deterioration of the urban environment. Motorists, come to your senses, the Chord will not solve your problems, but will only aggravate them, reduce the average life expectancy of many districts of Moscow (...).

Professional issues:

- Expertise becomes an important factor in the confrontation between activists and the state structures:

(...) The main argument of the Moscow officials: the burial ground does exist, but there are no radioactive burials on the section where the Chord will pass, they are located 100-150 meters to the west. However, this claim is denied by Greenpeace. Experts put a map of the future chord on this territory and, taking soil samples exactly where the flyover supports will stand, found six sources of pollution with a maximum level of 200 micro-roentgens per hour (a level of up to 50 micro-roentgen / hour is considered safe). (...).

- The actors have trust only in negative information about the project:

(...) The construction of the bridge and the flyover as part of the projects of the South-East Chord and the Southern Beltroad of eight lanes in the immediate vicinity of JSC TVEL may provoke soil sliding, while radiation pollution, together with dust particles, can begin to spread along the surrounding roads in air and throughout Moscow with cars (...)

The **positive and neutral cluster** is made up of official materials that should highlight the advantages of the project, the benefits for residents and the improvement of the transport situation:

(...) The North-West Chord, the Southern Beltroad, the North-East Chord and the South-East Chord practically create the Fourth Transport Ring in its other edition (...).

- Improvement of transport accessibility, development of the city transport system:

(...) As part of the SEC construction, multi-level transport interchanges will be built through the roads of the Kursk, Kazan and Gorkovsky directions of the Moscow Railway (MZhD), as well as on the section from Graivoronovskaya Street to Polbina Street and on the section from Polbina Street to Kuryanovsky Boulevard (...)

2.2.2. Southern Beltroad

Figure 4: Core of the semantic network

The content analysis indicates a tense situation around the construction of the beltroad. The level of aggression and social stress is quite high, intergroup and intragroup communications are characterized by a high degree of conflict potential.

Ecological issues:

- Environmental problems of the Southern Beltroad construction is closely related to the SEC. The actors put forward accusations of deliberately causing harm to the residents' health and of sabotage that will lead to an environmental disaster:

(...) problems with the radioactive landfill near the Moscow Polymetals Plant and the current situation with the construction of the bridge within the Southern Beltroad and South-East Chord projects (...)

Socio-political problems:

- Protest against the construction of the Southern Beltroad:

(…) We, residents of the city of Moscow, demand to stop the projects of the Southern Beltroad and the South-Eastern Chord&#33 (…).

- Actors' readiness for active actions, meetings:

(…) On Sunday, a rally will be held in Moscow against the construction of the South-East Chord and the Southern Beltroad. We start a fundraising campaign for notification of the rally and printing posters (…)

- Allegations of violation of regulations and laws:

(…) We demand to check the SEC and SB construction project regarding the Pechatniki-Kantemirovskaya street – Bekhtereva for compliance with the environmental legislation of the Russian Federation, urban planning, and sanitary and hygienic standards (…)

- Allegations of falsification during public hearings:

(…) check for violation of the procedure, forgery and falsification of the results during public hearings on the SEC and SB construction in the Tsaritsyno and Moskvorechye-Saburovo districts, the legality of the amendment to the Moscow City Planning Code without holding hearings on this issue (…).

- Appeals from residents and attempts to solve problems through a legitimate discussion with government agencies have not been effectively resolved:

(…) Residents of Moscow apply to law enforcement agencies regarding violation of the law, but the result is either ping-pong between the RF IC and the Prosecutor's Office, but it is also possible that the appeal, where illegal actions of the executive power are described, may end up in the executive power itself, for example, in Moskomarkhitektura (…).

- Destruction of the historical architectural heritage of the city and personal property of citizens:

(…) well, a part of the kuskovo was cut down there and only the fact that we lived for six months in tents not letting the park be cut down, only thanks to this they limited themselves to only 12 hectares; this is a historical monument park, kuskovo, the temple built in 1644 is being destroyed due to the fact that this chord passes close to it; the garages were demolished (…).

- Deterioration of the residents' living standards of as a result of the construction:

(…) means that residents of Kantemirovskaya, Bekhtereva, Kaspiyskaya streets and Saburovo district can say goodbye to peace and comfort under their windows (…).

Professional and legal issues:

- Lack of professional expertise:

(…) Please show documents confirming the conduct of examinations and surveys confirming the absence of radioactive waste and excess radiation background in the area and on the territory of the construction along the main course of the South-East Chord along the territory of the Moscow Polymetal Plant and the railway station Moskvorechye (…).

- Accusation of receiving false expert examinations:

(…) SNIPs are violated; for this, one must be put in jail (…) the expert is criminally responsible (…)

- Alternative conclusions with negative project characteristics are taken as objective and truthful. The presence or absence of professional evidence, sources, and the status of the author of the conclusion casts a small shadow in this case:

(…) In the area of the South-East Chord construction, the radiation level is 4 times exceeded – ecologists (…).

- Requirements to prosecute design and construction organizations that violate standards and legislation:

(…) on the construction of (…) the Southern Beltroad and the South-East Chord passing through the land plot on which the disposal of radioactive waste of JSC "Moscow Polymetal Plant" is located without obtaining a building permit, without a warrant for construction and digging works, without any state environmental and radiation expertise (…)

The **positive and neutral cluster** is made up of official materials containing positive assessments of the project, information on the progress of construction, the benefits that residents will obtain, and the improvement in the transport situation:

(…) Recently, another section of the Southern Beltroad has opened – from Balaklavsky to Proletarsky Avenue (…).

2.2.3. NEC

Figure 5: Core of the semantic network

In the negative cluster of the content dedicated to the NEC construction, **environmental issues** also come to the fore (Figure 5):

- Risk of destruction of the Lyubertsy sewer collector:

(…) first of all I would like to remind you of the north-east chord, which brought so many problems on just one section from the enthusiasts highway to the Moscow Ring Road, the most important is that it passes over the Lyubertsy sewer collector, and this is prohibited by all laws and will result in a disaster, sooner or later (…).

- Danger of technogenic and ecological disaster:

(…) construction leads either to social tension and the danger of a social explosion, or poses the danger that a man-made and ecological disaster will occur (…)

- Danger of radioactive contamination:

(…) How sure are you that all this radiation, which, perhaps, does not particularly disturb anyone, while it is left alone, will not get into the river, when all other areas will suffer from this? (…)

- The construction poses a danger to the life of citizens:

(…) it is as simple: no one wants to control anything, and such things that are happening now, especially this hysterical construction expansion, many moments just pose a danger to the life of citizens (…).

- Threat of destruction of parks and squares:

(…) In the historical forest park Kuskovo (Veshnyaki district, EAD, Moscow) in 2016, 12 hectares of forest were cut down for the construction of a North-East Chord section (…)

Socio-political problems:

- Threat of destruction of architectural monuments:

(…) The construction of this small section also brought many more problems: a part of the park was cut down in kuskovo, the temple of 1644 is being destroyed (…).

- The danger of social explosion:

(…) there is also construction that does not pose such obvious physical danger, but the danger of a social explosion (…).

- Lowering the living standards of local residents:

(...) Highways are being widely built in Moscow – the South-East Chord, the North-East Chord, etc. Some of these highways will pass right through the dormitory suburbs of Moscow (...)

- Deterioration of transport links within the area:

That's it, cancel the construction of the North-East Chord, pedestrians have nowhere to walk!

- The content is characterized by active actors who are ready to take actions:

(...) To the President of the Russian Federation, Speaker of the State Duma, Mayor of Moscow, Moscow City Duma deputies: Lay a tunnel for the North-East Chord in Losiny Ostrov before it's too late (...).

- Integration of issues associated with the construction of similar facilities:

(...) The planning of the South-East Chord construction caused another active resistance from Moscow residents after the events with the North-East Chord, since the threat of strong radiation during the construction was confirmed by independent observers and experts (...).

Professional and legal issues:

- Violation of the General Plan and urban planning standards:

(...) did not give a damn about the General Plan and moved the North-East Chord from Ryazanka, where it did not interfere with anyone and did not threaten anything, to Veshnyaki, where they had to chop down Kuskovo and practically devote the 400-year-old church to destruction and put Moscow on the brink of disaster due to the fact that the chord passes OVER the sew collector (...)

Messages that try to emphasize the positive aspects associated with intentions to improve the transport situation make up the **positive and neutral cluster**:

(...) For example, the Businovskaya interchange provided a convenient exit from the city along the North-East Chord not only to the Moscow Ring Road, but also to the M11 Moscow – St. Petersburg highway (...)

2.2.4. NWC
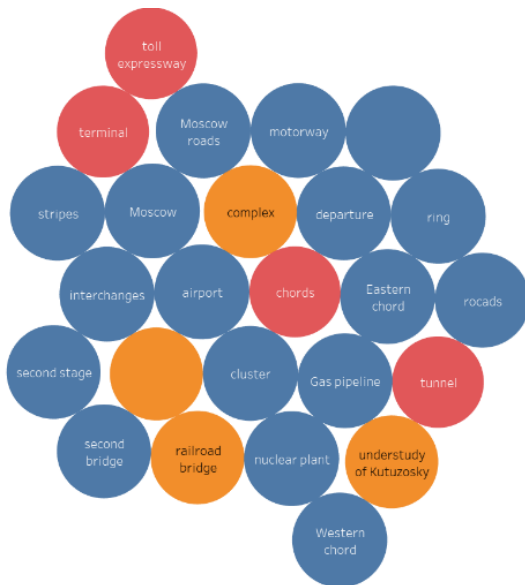
Figure 6: Core of the semantic network

The key topics of the content represent the official versions of the construction and are related to similar projects; they represent the North-West Chord as part of a new transport project (Figure 6):

(...) The new transport framework that will have been built in Moscow by 2023, will be based on the North-East, South-East and North-West Chords, as well as the Southern Beltroad (...).

The negative connotation in the users' perception is reflected in a small number of messages and is associated with the following claims:

- Deterioration of the ecological situation:

(...) How will people live in hotspot construction areas? how will they breathe? The Department of Transport and Development of Road and Transport Infrastructure in Moscow does not seem to care (...)

- Decrease of the living standards of local residents:

(...) In Moscow, the North-West Chord is now being built through a residential area – right under the windows of buildings, with trees cut down (...)

- Deterioration of transport accessibility within the area:

(...) Oddly enough: it was possible to drive 80 km per hour along Kalininsky Prospekt in 1973, but along the NORTH-WEST CHORD in 2017 there are no underground passages and ONLY 60 KM PER HOUR is allowed (...)

- Integration with the problems of construction of similar facilities, the SEC first of all:

(...) will lead to the possibility of radioactive waste contamination of a large territory of Moscow, where several hundred thousand residents live (...)

2.3. Associative network

The users' perception is reflected most expressly in the data obtained using associative search and analysis of lexical associations. The stimuli were nominations of facilities and nominations with the maximum link weight in the sematic core of the corresponding data set (Figures 7 - 14).

2.3.1. SEC
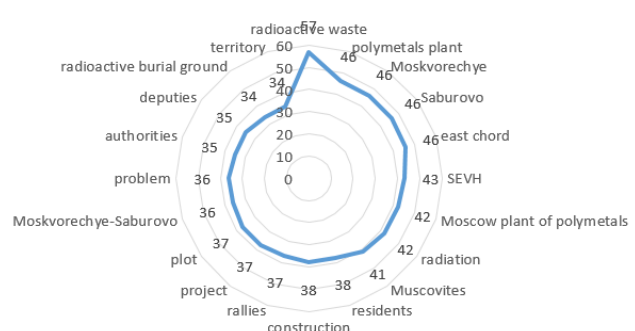
Figure 7: Stimulus *Southeast Chord* (10/54674)   **Figure 8:** Stimulus *waste disposal* (10/31755)

Contexts with responses:

- *(...) He called (...) to stop the demolition of garages without payment of compensation, to stop the construction of the South-East Chord through the radioactive waste disposal site (...)*
- *(...) and here is the problem with garbage, this is a new stalingrad, here is a new Chernobyl; until now Chernobyl has not happened, but if the chord is built through this unowned waste disposal site – and this is not just an exercise in semantics, – this is indeed a radiation hazard, all of us here can be exposed to this; what to do with these 60,000 tons, that's a good question (...)*

2.3.2. Beltroad
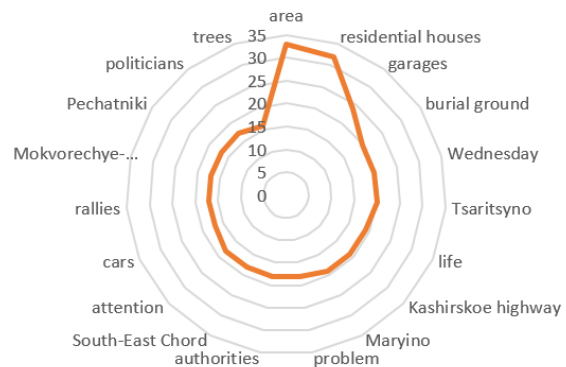
Figure 9: Stimulus *Southern Beltroad* (10/11046) **Figure 10:** Stimulus *under the windows of buildings* (10/1867)

Contexts with responses:

- *(...) represent the district of Moskvorechye-Saburovo and Tsaritsyno (...) the areas densely populated, with many children, they were green before the urban development plans for our districts started a year ago, and we all gathered to talk about these problems that are hanging over us; this is radiation; these are 2 highways – the southern beltroad, the south-east chord and renovation that will massively affect the Tsaritsyno area and directly affect the Moskvorechye-Saburovo area (...)*

- *(...) I will speak as a resident of this area, I have lived here for a very long time and I still remember it green, we had a lot of trees, our ecology is bad, but they protected us from the road and from cars and from any negativity. Our building 41 is the first on the street and is surrounded by the railway, Kashirskoye Highway, a sump plus a couple of other burial grounds; it is very scary, since a lot of people in our building have died from cancer recently (...)*

2.3.3. NEC
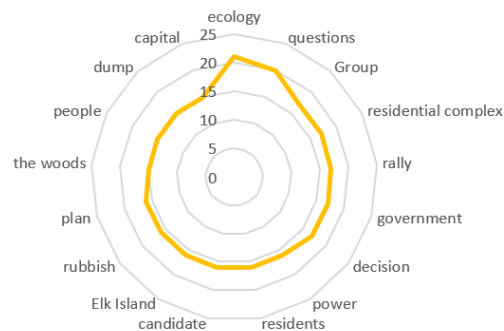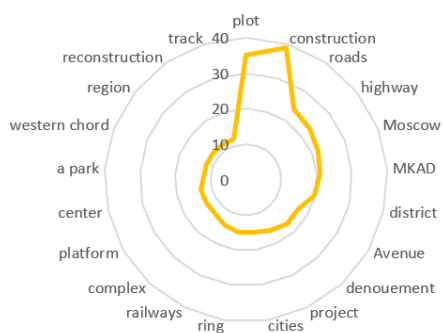
Figure 11: Stimulus *North-East Chord* (10/5764)   **Figure 12:** Stimulus *problems*   (10/1930)

Contexts with responses:

- *(...) They want to cut down thousands of trees in Losiny Ostrov for the sake of new roads, shopping centers and residential complexes. Part of the national park in the north-east of Moscow is planned to be cut down for the construction of the eight-lane back-up of Shchelkovskoye highway, the six-lane North-East Chord, the Fairytale Forest residential complex and a shopping center (...)*

- *(...) There were a number of useful speeches from our deputies: in addition to my speech on the chord, Yevgeny Stupin spoke out on the garbage cluster and attempts to ban the rally, Helen*

Yanchuk – on fraudulent electronic voting, Viktor Maksximov – on deprivation of paternal rights for participation in rallies, Oleg Sheremetev – on the problems of the North-East Chord and related issues, Sergey Savostyanov – (...)
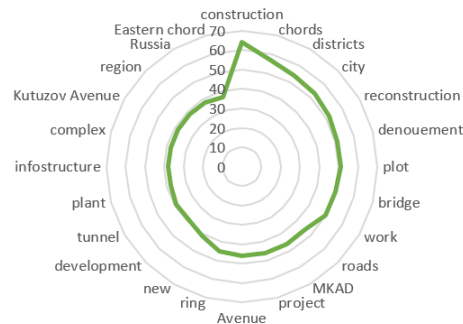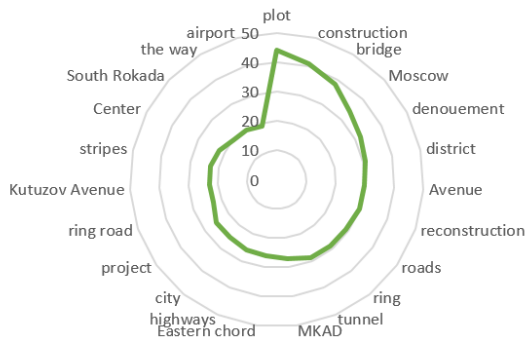
2.3.4. NWC

Figure 13: Stimulus *North-West Chord* (10/2934)   **Figure 14:** Stimulus *Moscow* (10/3151)

Contexts with responses:
- *(...) 19 flyovers and four bridges with a total length of more than eight kilometers appeared in Moscow during the construction of the North-West Chord (...)*
- *(...) According to insiders who live on the roads.ru forum, the junction of the Moscow Ring Road and General Dorokhov Street (the Southern backup of Kutuzovsky Prospekt) will partially open in the very next few days (...)*

2.4.   Digital conflictogenic zones

Digital conflictogenic zones were identified taking into account the dynamics of the actors' activity, messages, analysis of the negative cluster and the level of network aggression. The largest conflictogenic zone was identified in the data set dedicated to the SEC construction, with a high level of aggression and social stress approaching a critical point, the achievement of which could have irreversible consequences. It should be noted that the content with the absence of social tension consists mainly of official messages, and not only they do not arouse much interest or any positive reaction from the users, but, on the contrary, they receive abhorrence. At the same time, the user-generated content is distinguished by negative evaluativeness and aggression (Figures 15 - 16).
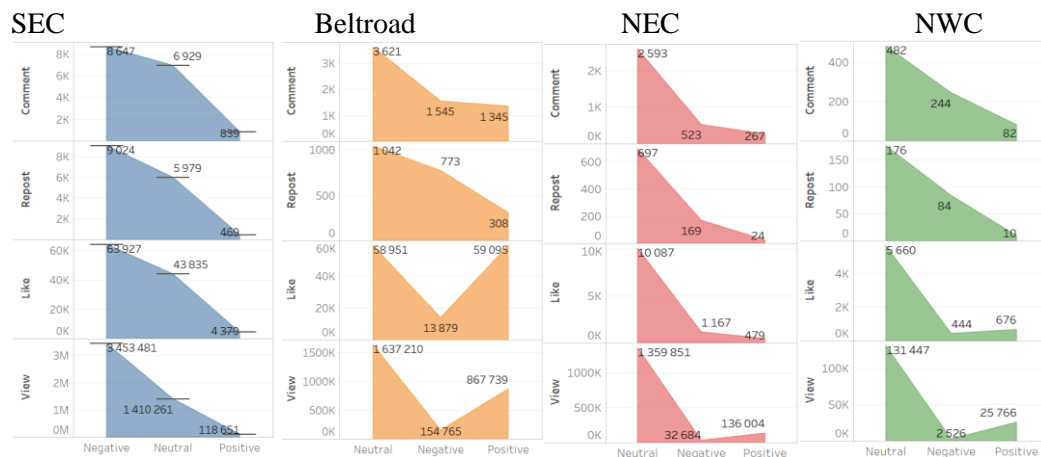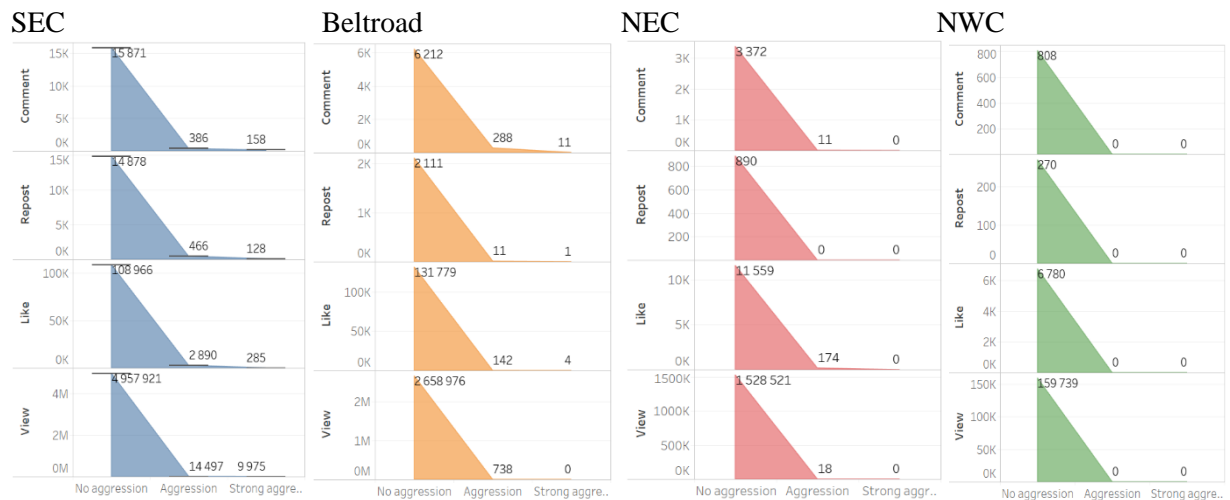

Figure 15: Sentiment (neutral, negative, positive) in comments, reposts and digital traces (likes, views)**.**

| SEC | Beltroad | NEC | NWC |

Figure 16: Aggression (absence, presence, strong) in comments, reposts and digital traces (likes, views).

2.4.1. Social stress and well-being indices

The quantitative expression of the residents' attitude towards the implementation of urban development projects was evaluated using the social stress and well-being indices. The social stress and well-being indices were calculated by the ratio of the weights of markers and ranks of notions in the corresponding content. The measurements were taken using the database of comments and shares (reposts) dedicated to the corresponding facility. It should be noted that active actors generate a large amount of negative content dedicated to the SEC construction and participate in online and offline protest activities. A fairly high Social Approval Index arises from official information and messages from actors affiliated with stakeholders (city authorities, construction organizations). However, the content with positive sentiment evaluation not only does not convince opponents of the projects, but, on the contrary, causes more bitterness and deepens the conflict (Figure 17).
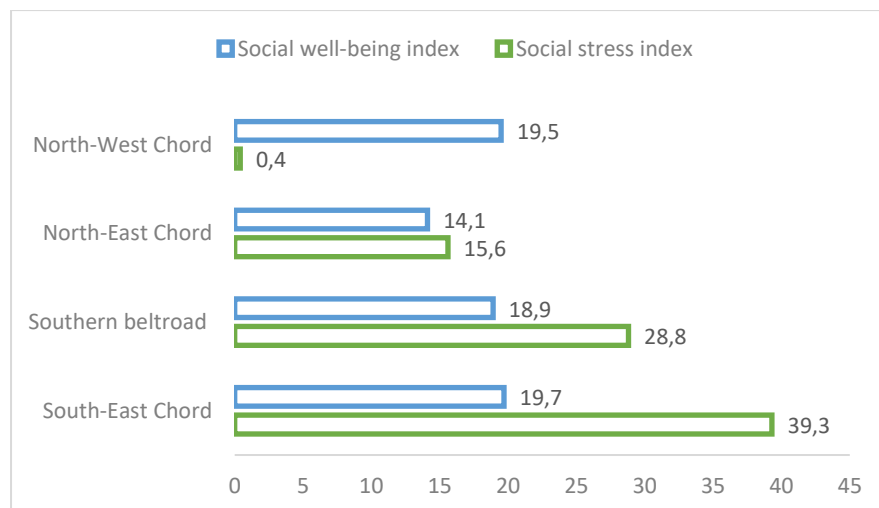
Figure 17: Social stress and well-being indices

3. Conclusion

The analysis of the residents' attitude towards the implementation of the Moscow chord ring project based on network data, as well as the study of digital conflictogenic zones and the predictive analytics results led to the following conclusions:

• The actors' attitude towards the implementation of the South-East Chord project is extremely negative, characterized by the presence of vast digital conflictogenic zones, a high level of social stress and network aggression. Further implementation of the project will be accompanied by active protests in virtual and real spaces. Only force majeure circumstances, such as a pandemic, can make significant adjustments.

• The facilities of the Southern beltroad (reconstruction of Verkhniye Polya street on the section from Maryinsky Park street to the Moscow Ring Road) and the North-East Chord are evaluated with an average level of negative reaction, are distinguished by the presence of digital conflictogenic zones and characterized by an average level of social stress and network aggression. Meanwhile, it can be predicted that protest activity will develop mainly within the virtual communications.

• The content dedicated to the North-West Chord reflects a high degree of the residents' positive perception, does not contain digital conflictogenic zones or signs of social stress and network aggression.

It is important to note the synergy of problems associated with the construction of similar facilities: in the users' perception, construction facilities causing conflicts with residents are combined with the problems of other urban planning projects in Moscow and the Moscow region, as well as with the renovation issue. The integrated nature of the users' claims, the transfer of conflict situations from the construction of similar facilities in Moscow and the Moscow region to the "all-Russian" context (for example, the Shiyes problems, garbage clusters) emphasizes the growing importance of environmental issues for Russian society.

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