Ukrainian Catholic University

Bachelor Thesis

The United Nations - Russia’s opponents and allies, according to a voting data about resolutions

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Declaration of Authorship

I, Ihor TITOV, declare that this thesis titled, “The United Nations - Russia’s opponents and allies, according to a voting data about resolutions” and the work presented in it are my own. I confirm that:

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“A lie gets halfway around the world before the truth has a chance to get its pants on”

Winston Churchill

UKRAINIAN CATHOLIC UNIVERSITY

Faculty of Applied Sciences

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The United Nations - Russia's opponents and allies, according to a voting data about resolutions

by Ihor TITOV

Abstract

The project collects and uses data on the country's voting in the UN since 1991 to identify countries that support the foreign policy of the Russian Federation. Data visualization is also used as a means of presenting the results of data analysis

Here the link to GitHub with code:
Project GitHub

Acknowledgements

I would like to thank my supervisor Andriy GAZIN of the Faculty of Applied Sciences at Ukrainian Catholic University for always giving good advice and guiding my work in the right direction.

I also wanted to thank the Ukrainian Catholic University for making me who I am in these stormy and difficult times during four years.

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List of Abbreviations

ETL	**E**xtract **L**oad **T**ransform
UN	**U**nited **N**ations
GA	**G**eneral **A**ssembly
SC	**S**ecurity **C**ouncil
CSV	**C**oma **S**eparated **V**alue
HTML	**H**yper **T**ext **M**ark **L**anguage
JSON	**J**ava **S**cipt **O**bject **N**otation
API	**A**pplication **P**rogramming **I**nterface

Dedicated to my parents whose hard work give me the opportunity to be in this University, to my friends who are always with me and support me anytime, to my girlfriend who is my source of energy

Chapter 1

Introduction

In the age of the Internet, ordinary people have access to unprecedented amounts of information. It is easy to manipulate and mislead thousands of people. This is especially true of the political sphere of our lives. Everyone is involved in it in one way or another. In this area, there is the most manipulation and lies.

This year, Ukrainians also faced a full-scale invasion by Russian troops. This was preceded by a powerful Russian propaganda campaign both in Russia and Ukraine. But there is a UN in the world, and one of its main tasks of which is to ensure global peace and stability in the world. When voting for the exclusion of the Russian Federation from the Human Rights Council, some countries abstained or voted against it.

This was the main motivation to look at the activities of the UN from 1991 to 2022, from the beginning of Russia to the present day. By working directly with UN resources, we can look at raw data, without any lies, manipulation, or propaganda, and draw our subjective conclusions. Also, such visualizations may in the future help political scientists analyze certain trends. IT helps different industries to move forward and transfers manual labor to machines. And in today's realities, it is important to know who is our ally and who supports our enemy and to see trends in the geopolitical course of different countries. It will also be important to be able to trace the course of different countries in other hot spots on our planet such as Syria, Palestine, Afghanistan, and others. Separate attention will focus on the UN SC because that is where the most acute conflicts are resolved and there are satellite countries that have the right to veto.

Having collected and visualized this data, this project will give information both for professional further analysis and for simple research to expand your horizons in the world.

Chapter 2

Related Works

2.1 Data Visualisation - General Look

Data visualization is a way of communicating between raw data and users. The main goal is the ability to visualize large data and thus transmit information about it to people. On the one hand, look at huge data set and try to see some patterns or extreme cases, and on the other hand, look at the visualization and see them. People are arranged so that it is easier for them to analyze the picture and see the patterns there than to see the naked data in the form of even the same pandas data frame

Data visualization should work on human perception to best convey information to the user. It is important to note that data visualization is needed by a person, not a program. After all, in today's world, programs can work productively with data and process images, but data analytics is still important to analyze by specialists. Andy Kirk in his book on data visualization[6] notes that there are three stages to understanding data and that to achieve optimal visualization you need to follow them. It separates perception, interpreting, and comprehending. First, the user, looking at the visualization, asks what exactly he now sees in front of him. What exactly does this visualization show, what are the features of the data, in what form it is shown, and in general what kind of data it is. This is the first level of understanding - namely perception. Then comes interpreting - that is, the user begins to look in more detail at the visualization and look for some characteristic patterns of this data, it is possible to notice some unexpected extreme cases in the data, and so on. Comprehending is about what I learned from this visualization and what I should do after it.

We apply these three stages of understanding to a specific project. Perception - in this context, the answer will be data on voting for the UN, data on their interaction with the Russian Federation at various levels and data on countries with veto power. Interpreting is the dynamics of voting for and against Russia in terms of time or their general dynamics since 1991 or the dynamics of voting on specific topics at the UN. Comprehending is just getting acquainted with Russia's main allies and opponents, topics where Russia has mostly used the right of veto or the interesting dynamics of changing the positions of certain countries over time.

Data visualizations can be incorrect and do not carry any information to the user and therefore be meaningless. Claus O. Wilke notes[22] that erroneous visualizations can be divided into three types: ugly, bad, or wrong.

- **Ugly** - are those visualizations that are correct in terms of conveying information, but they are aesthetically unreadable. For example, unreadable fonts, a bad color palette, a grid that closes the main information, and so on. At first glance, it may seem like a trifle, and we should not forget the purpose and definition of data visualization - to present raw data to users. If the user does not receive information from the visualization due to its poor appearance, then the task has failed and this is incorrect.

- **Bad** - this is when the visualization is designed with too many details that prevent it from being perceived by the user. For example, we have a bar chart and for each column there is a separate axis with different marks. This prevents us from focusing and understanding what this visualization wants to convey or tell us.

- **Wrong** - mathematically incorrect visualizations. For example, axes or units of measurement not used correctly are not displayed. This destroys any possibility of interpreting such visualization in any way.

Thus, understanding why data visualization exists and its main functions will provide a better understanding of the purpose of the project and its overall value. Visualization will be high quality when it copes with its main function - to be a communicator between the user and the data and to do this you need to understand what questions visualizations have to answer and consider and know about unsuccessful visualization options that lose their value for further work.

2.2 Data Representations

Data visualization has many different presentation options. Let's look at some of them in more detail.They will be used in the project as a basis for more complex interactive visualizations. All of them taken from the altair example gallery [1]

Bar Chart - this is one of the basic options for presenting data. With the help of the length of the columns and is the representation of the difference between other data. It is important to note that in this type of visualization it is very important to follow the correct proportions to correctly convey the difference between different data grouped by category. Can also be used to transmit changes over a while. In general, a lot of functional representation. Alternatively, a cluster bar chart or dot chart can be used. An example of such representation is below:

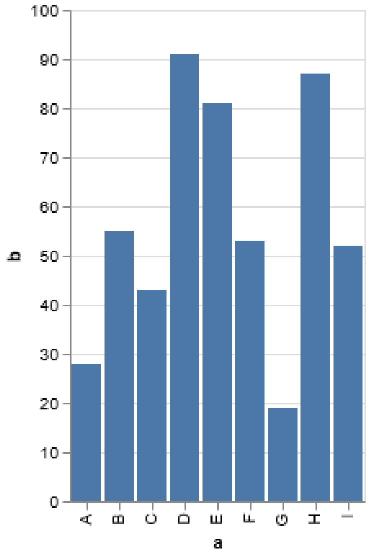


FIGURE 2.1: Bar Chart example(taken from altair example gallery)

Dot Plot - Another classic way of representing data as opposed to a bar chart is the dot chart. With the help of points on the graph, certain values are known. The visual difference can reach the example of the colors of the points, the distance of the points from each other or the size of the point itself. This seemingly primitive way of presenting data can be of great value in terms of visualization. An example of such representation is below:

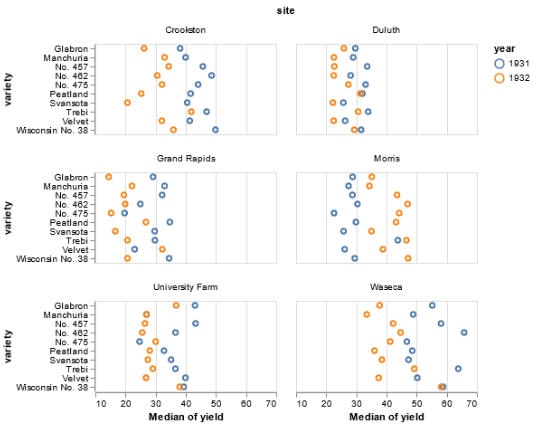


FIGURE 2.2: Dot Plot example(taken from altair example gallery)

Heat Map - used to show the dependence of an indicator through the prism of two different categories. With the help of color visually formed the impression of which two categories together have the largest or smallest certain ostentatious and vice versa. Contrasting colors can be sorted or used to improve the perception of values. An example of such representation is below:

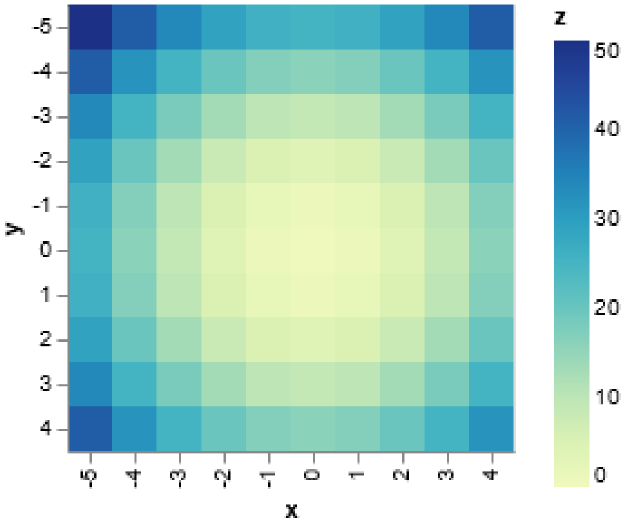


FIGURE 2.3: Heat Map example(taken from altair example gallery)

Area Chart - uses the visual area to reflect the change of a certain indicator for example over the years. It helps to see inaccurately but visually when abrupt changes in performance occur. An example of such representation is below:

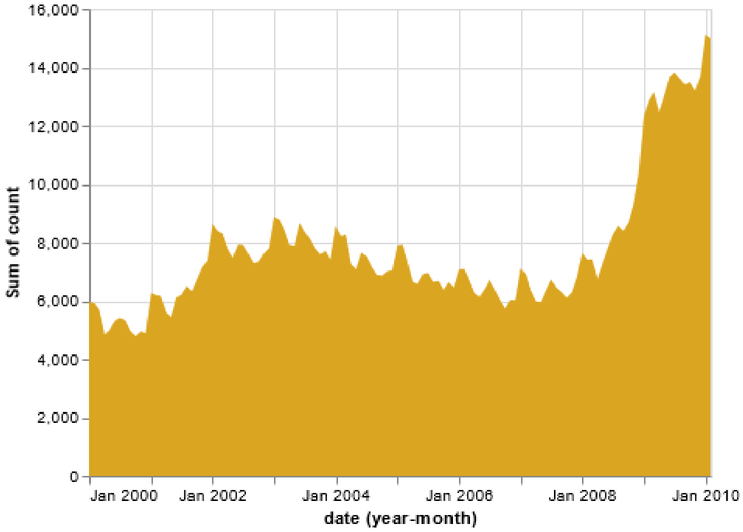


FIGURE 2.4: Area Chart example(taken from altair example gallery)

Map - geographic features are a separate category for data visualization. Visualization of maps of geographical features allows you to show in more detail some relationships between data and different countries or regions using points, colors or other attributes of visualizations

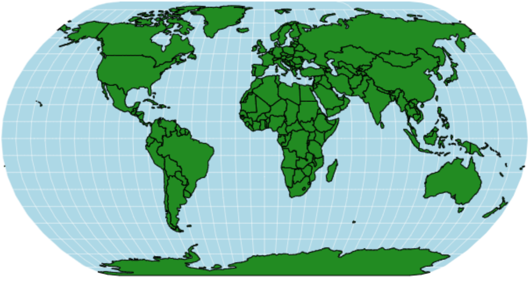


FIGURE 2.5: Map example(taken from altair example gallery)

There are also many examples of interactivity charts, which give the user a more detailed opportunity to look at some parts of the chart or sort it into different categories and so on.

The first and basic mechanism in Altair is the use of selectors and conditions for interactive plots.

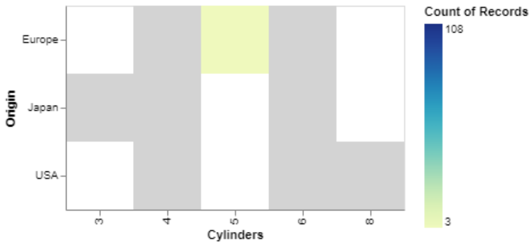
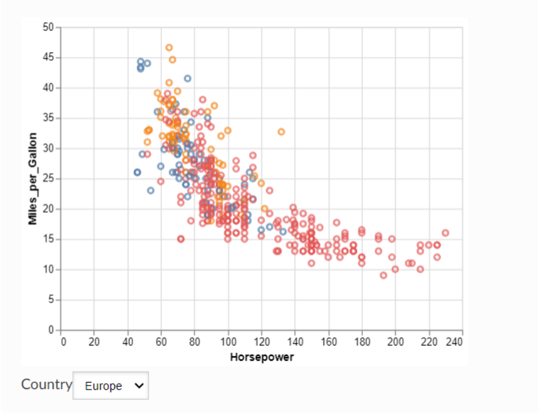


FIGURE 2.6: Interactive heat map example(taken from altair example gallery)

This visualization shows a variant of the interactive heat map. Using the selector, we fix the sector we need on the hit map. And with the help of the condition we indicate that when a certain sector is absorbed, it should be assigned a certain color and all other countries - another, which will contrast with the selected element. With the help of the condition you can change not only the color but also the shape or size of the selected element and many other parameters. This is already at the discretion of the developer.

Altair also provides its own built-in visualization tools. One of them is binding select, which allows you to select data from different categories, which allows the user to view the results of visualizations for more detailed categories

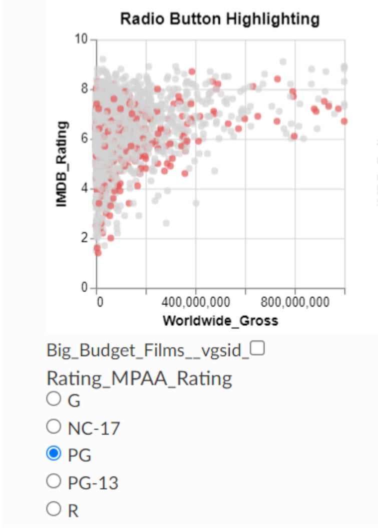


Country Europe

FIGURE 2.7: Binding select example(taken from altair example gallery)

Under the visualization itself, a window appears with the ability to select a certain category, after selecting the plot is rebuilt and before us is a new visualization, which is tied to a certain category.

Another variation on a similar visualization is the radio button select. It works on the same principle as the previous visualization, with the difference that all categories are immediately visible and it remains only to choose the one that interests the user.



Big_Budget_Films__vgsid_ ☐
Rating_MPAA_Rating
○ G
○ NC-17
● PG
○ PG-13
○ R

FIGURE 2.8: Radio button select example(taken from altair example gallery)

Altair also allows you to build complex visualizations that consist of two or more simple graphs for that. Interactive communication is also often established between them. That is, the selection of an element on one visualization is displayed on another visualization. In the example below, selecting a specific point on the left will draw the corresponding line on the graph on the right.

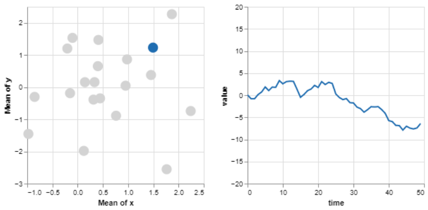


FIGURE 2.9: Complex interactive example(taken from altair example gallery)

These were examples of simple and basic visualizations that will be the foundation for further work and visualization in the project will contain these simple methods of data presentation. Different variations of interactivity in the visualization itself and between several graphs within one complex visualization were also shown. This basic representation allows you to take a closer look at project visualizations and decompose complex graphs into simple and basic elements.

2.3 Data Visualisation Tools - General Look on Alternative Tools

The Altair is a Python library that is used as a core for visualizations in the work. It is based on Vega and Vega-Lite which is the wrapper over the JavaScript library and is also integrated with another well-known Python library - Pandas. Also, Altair is quite intuitive and easy to master. But there are many other tools for data visualization and let's take a look at them.

Matplotlib - this is another very common Python library for data visualization. At its core is MATLAB, so those who have worked with it will find it easy to master this library. The main advantage and strength of the matplotlib, as opposed to the same Altair, is that it interacts with MATLAB at a fairly low level and this allows you to make graphs or charts as customized as possible, which opens a wide range for different visualizations. Also, its advantage is that it allows you to make primitive animations of graphics. As a disadvantage, we can highlight the low flexibility in working with data. As it was said, Altair is integrated with Panda and this allows its users to work very easily with different data. In this regard, Matplotlib burns out and when working with more complex data sets with a heavier structure, it becomes quite difficult to use it. The example below will show how much matplotlib is customizable[7]:

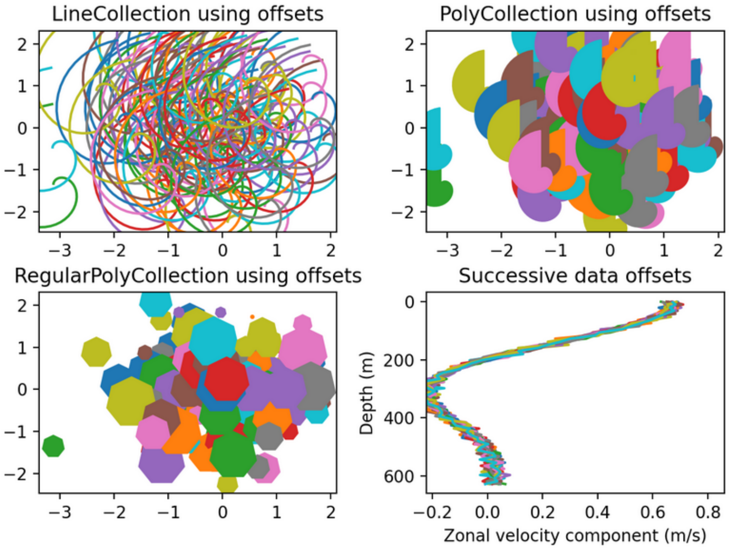
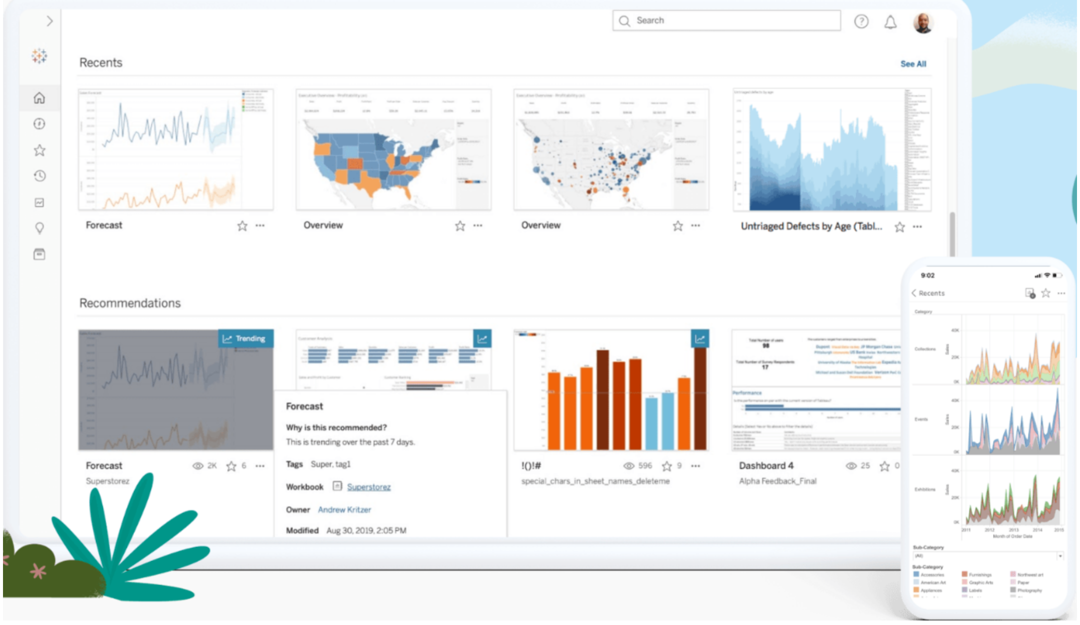


FIGURE 2.10: Matplotlib plot example(taken from matplotlib example gallery)

Tableau - in contrast to Matplotlib and Altair, this is a platform not a library that helps to work with large amounts of data and visualize them. This is Business Intelligence Industry's platform. It is integrated with Python and R and also allows direct connection to databases. It is quite convenient and sharpened just for data visualization. But among the disadvantages is that it is paid software and that it allows you to do only those visualizations that allow the platform. Example of Tableau interface below:[16]



Forecast

Why is this recommended?

This is trending over the past 7 days.

Tags Super, tag1

Workbook Superstorez

Owner Andrew Kritzer

Modified Aug 30, 2019, 2:05 PM

FIGURE 2.11: Example of Tableau interface(taken from their web site)

Seaborn - this is another python library for data visualization. In essence, this is just a wrapper on top of the already known matplotlib. Its purpose is to neutralize the shortcomings of matlotlib. The main disadvantage is the difficulty in working with complex data and for this reason, this wrapper was created. Example of visualization using seaborn below:[14]

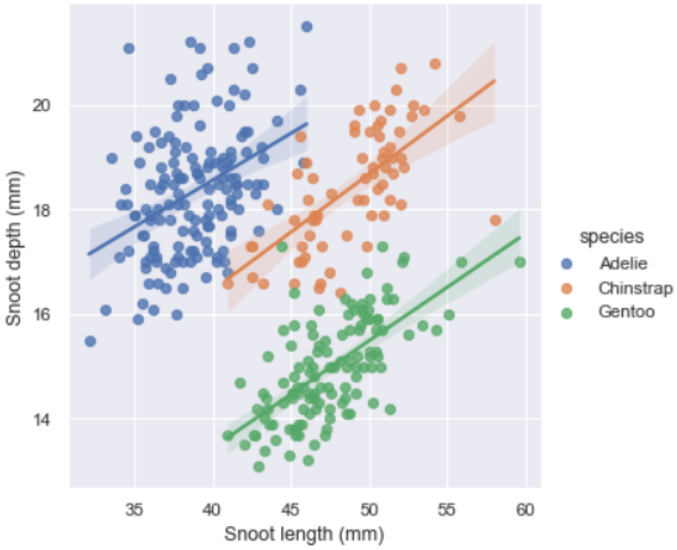


FIGURE 2.12: Seaborn plot example(taken from seaborn example gallery)

The choice fell on Altair primarily because it is well integrated with the panda and therefore does not require additional calculations to transfer data as in the same matplotlib or seaborne. These libraries are strong because of their high customization, but for this project the tools provided by Altair are more than enough to work with. If we compare with the Tableau, the integration of the project into one programming language plays a role here, as it consists not only of data visualizations, but also their downloading and processing. Also Python in general is much more convenient for pre-processing data to transfer in the visualization[18] [23] [17]

Chapter 3

United Nations Extract Transform and Load Data

3.1 Theoretical Technical Background

First of all, it is worth explaining some theoretical aspects of the next section. The project will use code parallelization. It is needed for the optimization of the code. The first step in using parallelism is to break the source tasks into subtasks that will be performed in parallel. Every tasks can be divided according to how well they are parallelized

- **Fine-grained parallelism** - subtasks should be exchanged very often
- **Coarse-grained parallelism** - exchange is relatively rare
- **Embarrassing parallelism** - tasks do not require the exchange of information with each other

[3] In case of project there will be a problem such as Embarrassing parallelism. After all, there will be no data exchange between processes. Each of them will receive their subtask and work with it, putting the final result in a list that is located in shared memory.

ETL or extract, load transform data. It is a concept created over a process to work with data.In book "The Data Warehouse ETL Toolkit: Practical Techniques for Extracting, Cleaning, Conforming, and Delivering Data" authors gives such definition to ETL [11]:

> A properly designed ETL system extracts data from the source systems, enforces data quality and consistency standards, conforms data so that separate sources can be used together, and finally delivers data in a presentation-ready format so that application developers can build applications and end users can make decisions.

It contains three main steps. First, of all - extract data. Its main purpose of it is to collect data from the source or many sources. Usually, data are unstructured like HTML pages or JSON files. All this data was extracted as is without any changes and after begins second step. Transform data is the main and most time and resources consuming step. The main purpose of this step from unstructured data to extract needed data and with the appropriate structure for further purposes. In more detail, it can be joining data from different sources, cleaning up data from unneeded fields or from None values that do not have some value for the final purpose, calculating new fields based on extracted data, or sorting them by some rule. As the result, we had well-structured data set to work further. The last step is to load data. In many cases, it is the load to some relation or non-relation database to store them for the next steps of the project. But in general, it can be loaded to each suited format for the project, for example in a CSV file.

Web scraping will also be used. It is a procedure for extracting and processing web pages that are intended for viewing by the average user, to structure and store the necessary data.

Below will be a table with all Python libraries and purpose to use them in this work

Python Libraries	
Library name	Explanation
requests[13]	Used for sending a GET request to source sites and extracting HTML pages from sources
time[19]	Used to measure the work of the code
pandas[9]	Used to work with data, save them to CSV files, and pre-process data before giving them to functional which make visualizations
multiprocessing[8]	Used to parallel code for better performance
bs4[2]	Used to parse HTML pages to extract needed data for the project
pycountry convert[10]	Used for the determination of country codes and regions
re[12]	Used for the regular expression to parse long strings
altair[1]	Used as a core engine for visualizations of data
geopandas[5]	Used to work with geographic coordinates and read them into a data frame

TABLE 3.1: List of libraries used in project

Therefore, this overview provides an understanding of the concepts and tools with which the first part of the project will be implemented, namely the extraction and structuring of data from UN resources.

3.2 Extract Information about United Nations Voting

To extract data about voting was used UN Digital Library. Link to this source - UN Digital library[20]. This source gives full information about all resolutions which were approved by the UN. It includes resolutions from SC and GA. Unfortunately, the UN does not provide any API to extract needed data about voting. So in this case was used web scraping to extract needed data for further visualization. Further will be a design of this process.

First of all, this process runs in one Thread. Metrics and an explanation of why so will be in the next section. The pipeline consists of five steps. Describe them in more detail

- **Input range of year** - As input process has a year range. It is a parameter to know from which year star load resolutions and by which year end the process. It is divided into eight equal ranges for each thread.

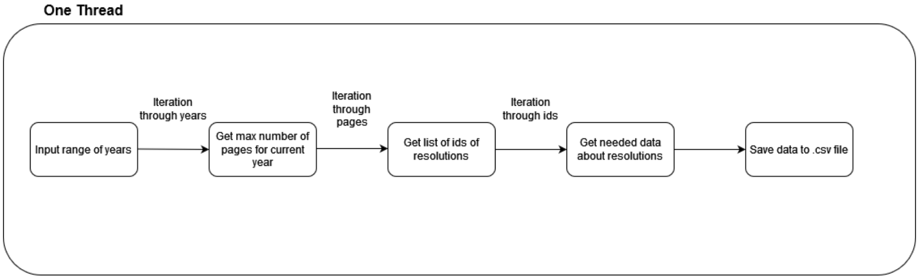


FIGURE 3.1: Design of the UN parsing process

- **Get max number of pages for current year** - The iteration through years begins and as input, the next function gets the year from which we need to load resolutions on the site. As each year were a different amount of resolutions we should know the max number of resolutions approved this year. Using BeatifulSoup we extract this from the front page this number. To interact with the site properly we put a specific year as a parameter to the link. Example of such link - here. In this example, we put 2000 year to the link.

- **Get list of ids of resolutions** - After getting the max page number we divided it at intervals. Because one page consists of 50 resolutions and to iterate it is needed to pass as a parameter to the link the number of the first resolution on the page. For example, 1 or 51 or 101. After we navigate to the page, using BeatifulSoup, we start loading the ids of the resolutions to proceed with the data extraction procedure. Example of such link - here. In this example we put 2000 year to the link and 51 as the number of the first resolution on the page.

- **Get needed data about resolutions** - Then we had ids of resolutions. We pass them to the link and get the whole information about resolution. Using BeatifulSoup we extract needed data about resolution and save it to the dictionary and put it on the list. Example of such link - here. In this example, we put 427539 as an id of resolution.

- **Save data to CSV file** - After all iterations, we have a list of dictionaries with needed data. We transform it to the pandas DataFrame and save it as a CSV file

A more detailed look to the data which we needed:

Field List	
Name of the fields	Explanation
country	The name of the country
vote result	Voting result. There can be 4 species: Y(For), N(Against), NV(Not Voted), A(Abstain)
title	Name of the resolution
vote data	The date when the resolution was approved
resolution	identifier code of resolution

TABLE 3.2: Detailed look to the extracted fields.

Thus, such an architecture was built for the first ETL to download general data on the results of voting on UN resolutions from 1991 to 2022. There is also a general description and view of how the data is stored before going to the second part of the project, namely to visualizations of this data.

3.3 United Nations Parser - Metrics

As was mentioned, code was paralleled to decrease the time of work. It is Embarrassing parallelism because threads pass different year ranges and during the work, they do not communicate between themselves, only put the result to the list in shared memory. To compare there will be tables with time metrics after the run in one thread and 8 threads:

Metrics(time in seconds)	
Number of runs	Time
1	1074.86
2	1095.96
3	1069.43
4	1043.18
5	1081.31
6	1094.36
7	1195.79
8	1290.04
9	1098.57
10	1183.65

TABLE 3.3: Time after whole acquisition in 8 threads

So, the average time of running whole acquisition in 8 threads is 1122.71 seconds. It is nearly 19 minutes to load data about every resolution from 1991 to 2022 years.

And now table with the same process but with one thread:

Metrics(time in seconds)	
Number of runs	Time
1	6653.06
2	6387.21
3	6548.89
4	6490.12
5	6506.85

TABLE 3.4: Time after whole acquisition in 1 thread

So, the average time of running whole acquisition in 1 thread is 6517.23 seconds. It is nearly 109 minutes or 1 hour and 39 minutes to load data about every resolution from 1991 to 2022 years.

In the final result, we have a speed up nearly 6 times for the same process. Such a significant win in speed we gave thanks to parallel code.

3.4 Extract Information about United Nations Voting in Security Council on which Veto Right Was Used

If we take a closer look at the UN Security Council, the data of the 5 countries that have the right to veto it are of great interest. These are China, France, Great Britain, the USA, and Russia. They have the unique right to block any UN decision and visualizing their decisions is one of the goals of this work. Unfortunately, the resource that provided information on other resolutions is not suitable for us, as it provides information only on those resolutions that have been adopted. And if the decision was vetoed, it was not made and therefore did not get to the resource. But the UN, in its other resource, provides data on all resolutions that have once been vetoed. Link to this source - UN Vetoed Table[15]

Further will be a design of this process.

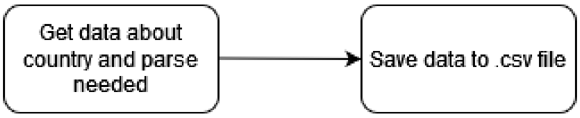


FIGURE 3.2: Design of the UN parsing veto process

- **Get data about country and parse needed** - Using the link and BeatifulSoup we parse the given table and extract the needed data to the dictionary. Save it to the list and transform to pandas DataFrame.
- **Save data to CSV file** - After all, we have a list of dictionaries with needed data. We transform it to the pandas DataFrame and save it as a CSV file

A more detailed look to the data which we needed:

Field List	
Name of the fields	Explanation
vote data	The date when the resolution was approved
resolution	identifier code of resolution
topic	General topic of the resolution
country	The name of the country

TABLE 3.5: Detailed look to the extracted fields for veto countries.

Thus, such an architecture was built for the second smaller ETL to download data on resolutions vetoed by the UN Security Council from 1991 to 2022. There is also a general description and view of how the data is stored before going to the second part of the project, namely to visualizations of this data

3.5 UN Parser veto - metrics

In this situation, code was not paralleled because the time of execution of the pipeline was very small, so there was no need to use so many resources of machine to do such an easy task

Table with metrics:

Metrics(time in seconds)	
Number of runs	Time
1	1.01
2	1.33
3	0.95
4	1.19
5	1.33
6	1.43
7	1.28
8	1.14
9	1.23
10	1.40

TABLE 3.6: Time after whole acquisition in 1 thread for veto UN data

So, the average time of running the whole acquisition in 1 thread is 1.23 seconds. It is nearly 1 second to load data about the country which used veto rights.

Chapter 4

Pre-processing of Data and Visualisation

4.1 Theoretical United Nations Background

To further understand the project as a whole and why certain architectural decisions were made, it is necessary to get acquainted with the UN structure. The data that will be taken from the general resource is divided into two categories. Some from the UN Security Council and others from the General Assembly.

The main function of the Security Council is to maintain international peace. It has 15 permanent members, 5 of whom are permanent, and 10 are elected to the General Assembly regularly.

The Security Council has many mechanisms for maintaining world peace. These can be simple recommendations for the conflicting parties or sanctions or the direct use of UN peacekeepers. It should be noted that the decisions of the UN Security Council are binding on all UN members[21]

It is also worth noting that among the 15 members of the Security Council, 5 have been permanent members since the organization was founded. Today it is somewhere in the United States, Great Britain, France, China (the successor to the Republic of China), and Russia (the successor to the USSR). In addition to being permanent members, they also have the unique right to veto any decision in the UN Security Council. That is, they have every right to block any decision, regardless of the results of their vote. Such privileges were granted to these countries as countries that won World War II.[21]

The General Assembly consists of all UN member states, each of which has the right to vote. It is the main body that shapes the organization's policy, sets the budget, and elects representatives to the Security Council.[4]

The Assembly meets regularly from September to December each year. Also tempting unscheduled meetings due to emergencies in the world. Works as a regular parliament, where various topics are discussed and resolutions are adopted[4]

4.2 Project Visualizations - Introduction

So let's move on to the second and key part of the project, namely the visualization of data collected from UN resources. The first visualizations will be a general picture of the relations between the countries in the UN. It is important to first describe the processing and preparation of data for this visualization. First of all, it was necessary to count the total number of resolutions that were voted in the same way as another country and not, in the same way, another country. By the same token is meant the same vote for a particular resolution. That is, two countries abstained or voted for or voted against. Nor does it mean that this is any permutation of possible options, so one country voted for and another abstained or voted against, and so on. Next, is the percentage of the total number of resolutions that were for a particular country and which are against it. Since there were so many countries, it was decided to make additional segregation by region. That is, each pair of countries will have a region in which they will be displayed. For example, the African region will show the relationship between African countries, and the Africa / Europe region will show the relationship between African and European countries at the UN. Visualizations are interactive, so the user can choose the region and look at the relationship between countries. The hit map was chosen for visualization because it shows the interconnectedness of the two categories. In this case, the two categories are pairs of countries and their relationship is expressed as a percentage of UN resolutions. It should also be noted that the data on the visualization are sorted by the average percentage of support in a particular region of the country. First, there are countries with the lowest rate and so on to the highest.

Having this knowledge of data preparation and some nuances of visualization preparation, let’s look at it:

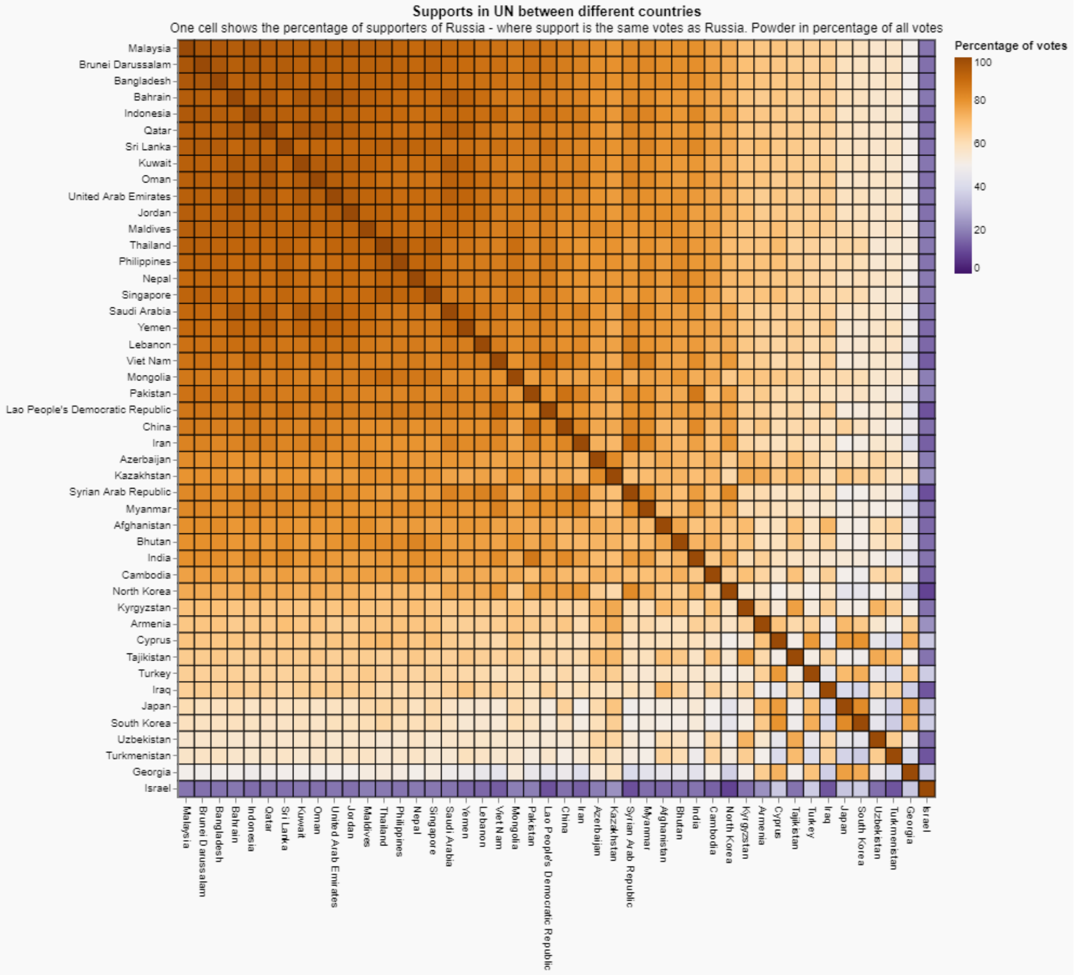


FIGURE 4.1: Supports in UN between countries

This is an example of visualizing the Asian region. The most unfriendly country in the region is Israel. An important point of visualization is that after crossing the 50 percent line, the color begins to change sharply to contrast to show the difference.

Israel is purple everywhere, and this demonstrates the fact that the percentage of support from other countries in the region is very small. This can be justified by the fact that throughout history Israel has had many military conflicts with its neighbors and it is obvious that their relations have deteriorated. With this knowledge, you can understand why the visualization is so contrasting. The general neutrality in the regions of China, which is right in the middle of the visualization, is also clearly visible. In general, in this visualization, you can see a lot, of the political influence of different countries in different regions and so on.

Also, to see analogs and track patterns that may not be visible in the visualization that is sharpened with the support of countries, developed the opposite visualization, which is sharpened under the opposition of different countries.

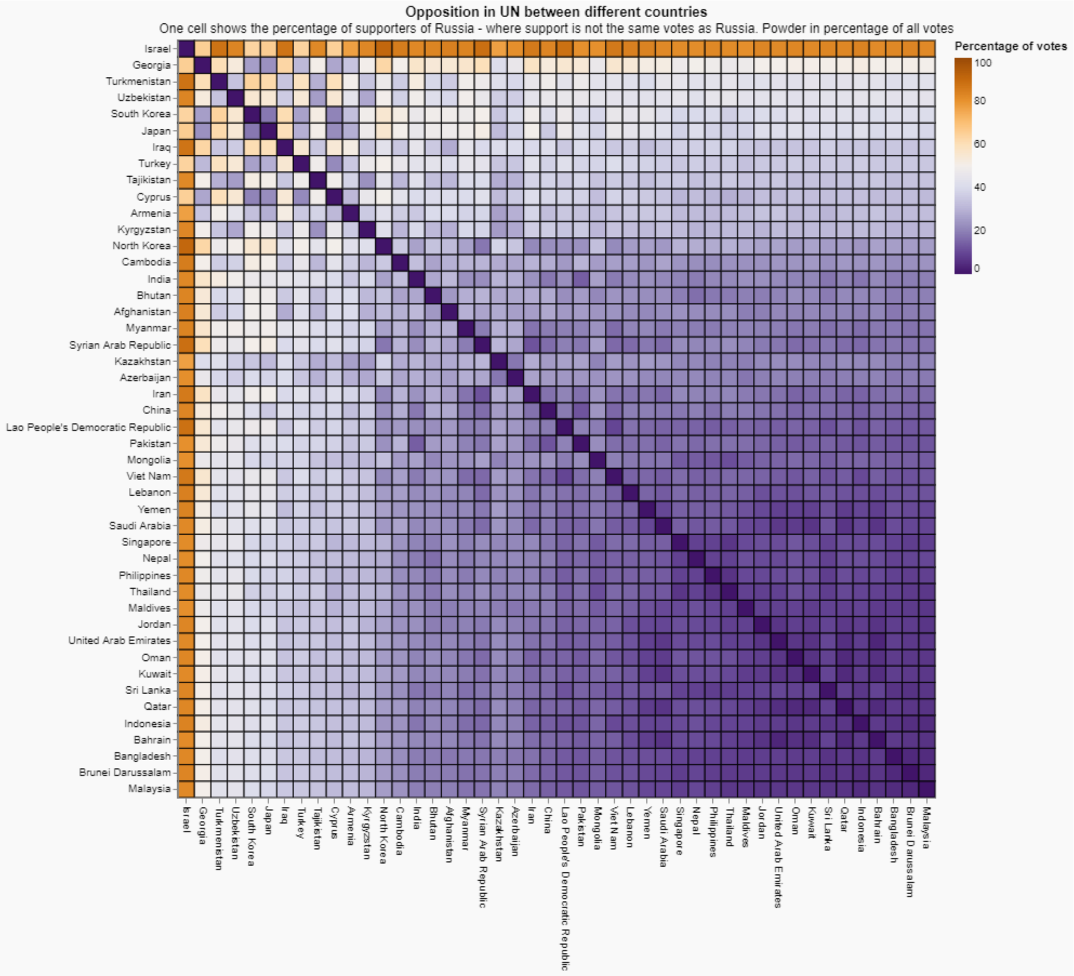


FIGURE 4.2: Oppositions in UN between countries

4.3 Relations between Russia and countries in the United Nations

It is worth understanding one feature of the data - the fact that all the resolutions adopted by countries, which is a mix of resolutions from the UN General Assembly and the UN Security Council. For example, this slightly distorts the performance of China, the United States, Britain and France, as they are permanent members of the Security Council and therefore took part in more votes than other countries.

Therefore, it was decided to look in more detail at these two separate structures and show the behavior of countries in them. To this end, the data were divided into two network dates according to the resolution code - the General Assembly and the Security Council, and similar visualizations were performed with them, which could be observed in the previous section. Now let's narrow down the introductory visualizations and move on to the main thing - to find allies and opponents of Russia in the UN. Let's start again with a few words about preparing data for visualizations. Most used a similar functionality as for the previous visualization, so the search for interest rates only now specifically with Russia and the definition of regions of countries. Here are some important points. First of all, Russia's percentage support since 1991 has been calculated. This is done in order to then demonstrate the dynamics of countries' voting on Russia in terms of time. Work was also done with the map to be used for interactive visualization.

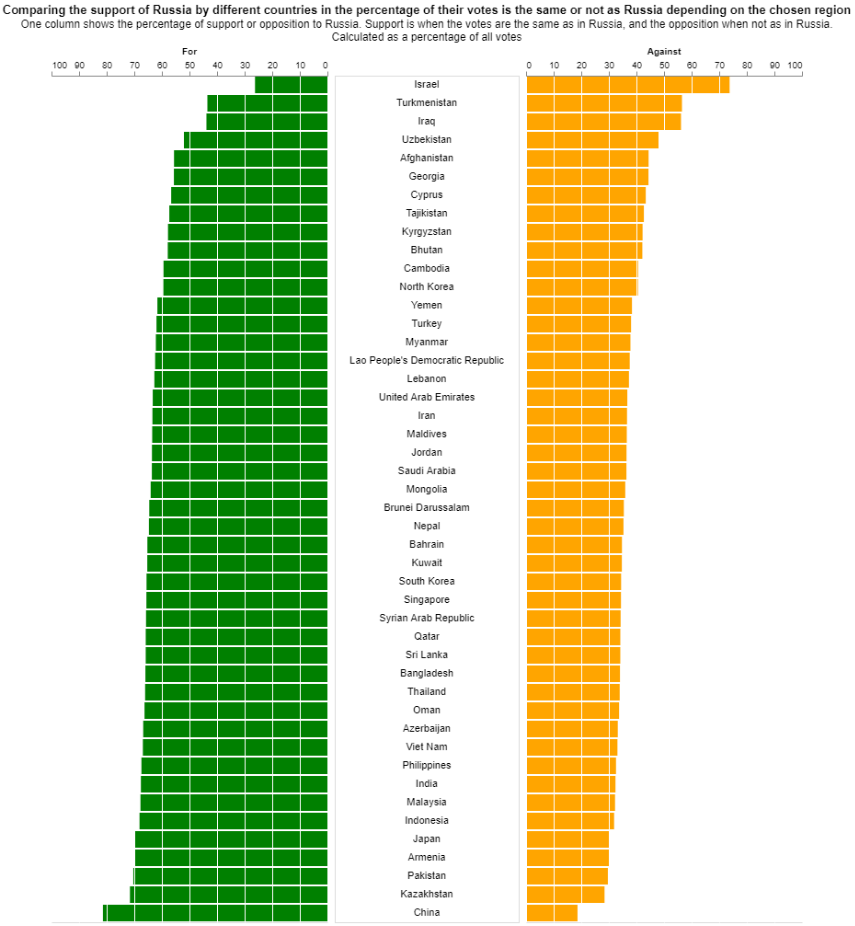


FIGURE 4.3: Russia's allies and opponents in Asia

In the first visualization, we see a bar chart that reflects the percentage of support and opposition to Russia at the UN. The schedule is sorted by the principle that the countries with the highest percentage of opposition to Russia are at the top and with the highest percentage of support at the bottom. In this case, we consider the region of Asia. It shows that Israel has a fairly high percentage of votes other than Russia and is the main opponent in the region. And the main ally in his. in turn is China, which has the highest percentage of support for Russia. In general, the visualization can clearly show different geopolitical trends towards Russia in different regions, who is a bigger ally and who is a bigger opponent. This allows experts to study in more detail the interdependence of Russia's political influence in the regions through the prism of voting at the UN. From a technical point of view, it should be noted that the visualization is interactive and the user can select the region of interest by using the drop-down.

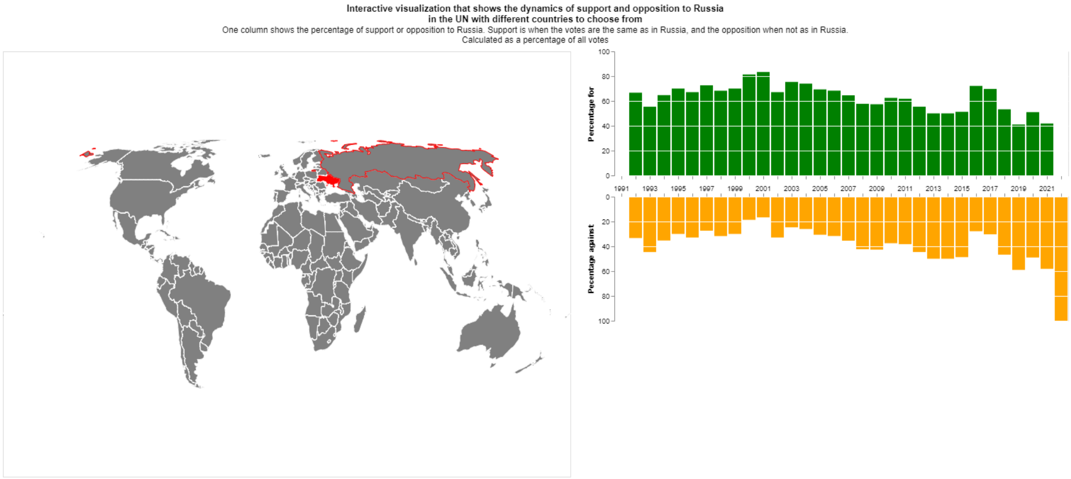

Interactive visualization that shows the dynamics of support and opposition to Russia
in the UN with different countries to choose from
One column shows the percentage of support or opposition to Russia. Support is when the votes are the same as in Russia, and the opposition when not as in Russia.
Calculated as a percentage of all votes
Percentage for
100
80
60
40
20
0
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
2019
2021
Pecentage against
0
20
40
60
80
100

FIGURE 4.4: Dynamic of Ukraine voting

It is a composite visualization consisting of two parts - an interactive map where you can click to select the desired country that will interest the user and a bar chart that shows the dynamics of voting with Russia through the prism of time. Russia is marked directly on the map by the red border, and the other crash, which is painted red, is the country chosen to view the statistics. The dynamics of Ukraine are demonstrated by an example. As you can see in the 2000s, the percentage of support was quite high, but after 2014 it began to fall and rise in opposition to Russia, and in 2022 it reached its maximum because so far Ukraine has not voted for any resolution as Russia. In general, this visualization gives a more detailed look at the attitude of specific countries to Russia, because the previous version showed a general trend of relations, and this allows you to first look specifically at a country and trace its change or stability in Russia during the existence of this country and catch interesting patterns as with Ukraine, which after 2014 increased its percentage of non-votes like Russia in the UN.

4.4 Situation in the Security Council

It is worth understanding one feature of the data - the fact that all the resolutions adopted by countries, so a mix of resolutions from the UN General Assembly and the UN Security Council. For example, this slightly distorts the performance of China, the United States, Britain, and France, as they are permanent members of the Security Council and therefore took part in more votes than other countries. Therefore, it was decided to look in more detail at these two separate structures and show the behavior of countries in them. To this end, the data were divided into two network dates according to the resolution code - the General Assembly and the Security Council, and similar visualizations were performed with them, which could be observed in the previous section.

To make a better analogy, let's take Asia again as an example. The first thing that catches your eye is that the number of countries has become smaller than it was in the previous visualization. This is because not all countries were able to be elected

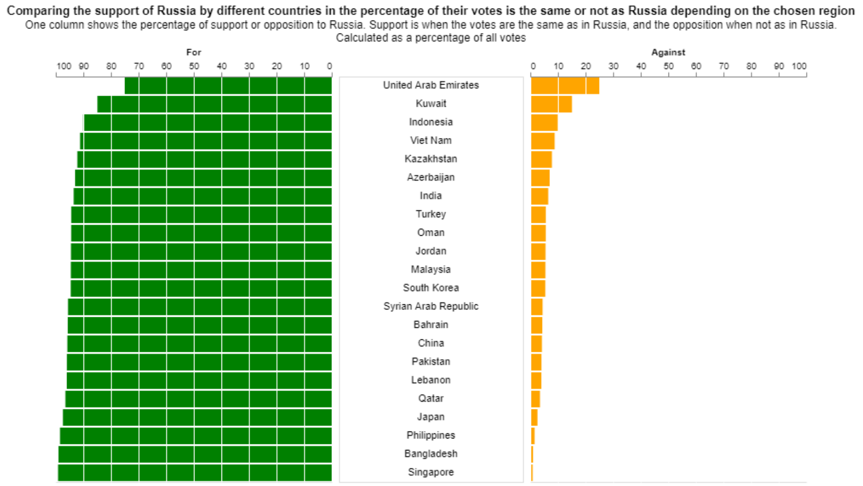


FIGURE 4.5: Russia's allies and opponents in Asia in SC

to the UN Security Council, and therefore did not have resolutions with a code from it. The absence of countries can also be a subject for in-depth analysis. For example, by mentioning the Heat map that was illustrated at first, one could notice the hostility from Israel to all countries in the region. And non-permanent representatives are elected to the Security Council at the General Assembly. Here we can conclude that due to such hostility, Israel's candidacy is rarely considered, and therefore this country can not be here. Looking at the visualizations in the complex, you can see and display many patterns, because we should not forget that they all use the same data and are therefore very dependent, which is also a strength of the visualizations implemented in this project. You can also see how sharply the percentage of Russia's support for the Security Council has increased. This phenomenon can also be explained by the definition of the Security Council because it addresses issues of world security and is, therefore, more important than the general resolutions of the General Assembly. Therefore, to go against Russia is a bolder decision.

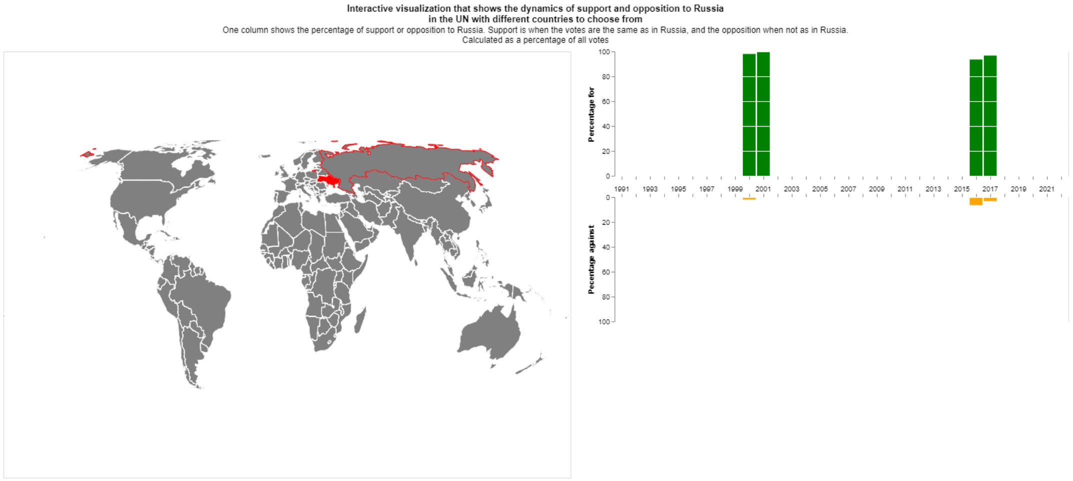
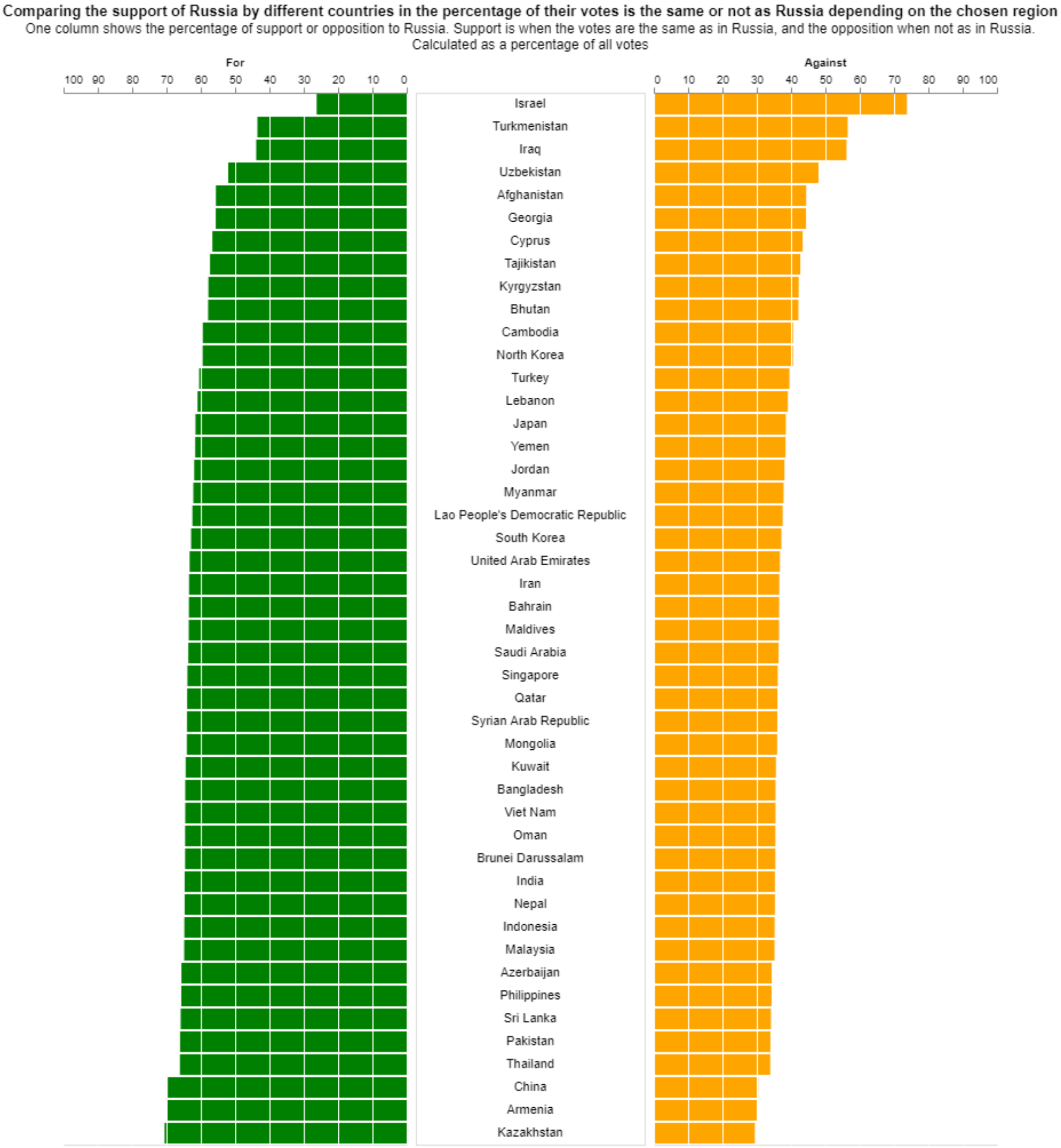


FIGURE 4.6: Dynamic of Ukraine voting in SC

Now let's move on to Ukraine again on an interactive map. First of all, it is possible to investigate when Ukraine and other states were in the UN Security Council from 1991-to 2022. Ukraine was twice elected to it. Here, too, the percentage of votes as in Russia is very large in contrast to the similar schedule with all the votes. The visualization is the same as that with only the focus on the Security Council, as well as the ability to track and analyze when countries were elected to it and whether they were elected at all.

4.5 Situation in the General Assembly

The UN General Assembly will now be considered on a similar basis. So we will act on a similar principle and for a better comparison, we will take the countries and regions that have already been used in the previous two sections.



Comparing the support of Russia by different countries in the percentage of their votes is the same or not as Russia depending on the chosen region
One column shows the percentage of support or opposition to Russia. Support is when the votes are the same as in Russia, and the opposition when not as in Russia.
Calculated as a percentage of all votes

FIGURE 4.7: Russia's allies and opponents in Asia in GA

Looking at the data from the General Assembly and the general data, we can conclude that there are no dramatic changes. Israel is still at the top of Russia's opponents, but for example, Kazakhstan has become the largest supporter in the region. In general, although at first glance there are no striking changes, it should be understood that these data can be interpreted as pure because you could see that in the

Security Council the percentage of support for Russia was very high and it made a little noise in the overall picture. rejecting this, China lost its first place, because now there is no evidence of support from the Security Council. This visualization better shows the general tendencies of countries on general issues, because since they are not very important for geopolitics, there is often more room for confrontation than in the Security Council.

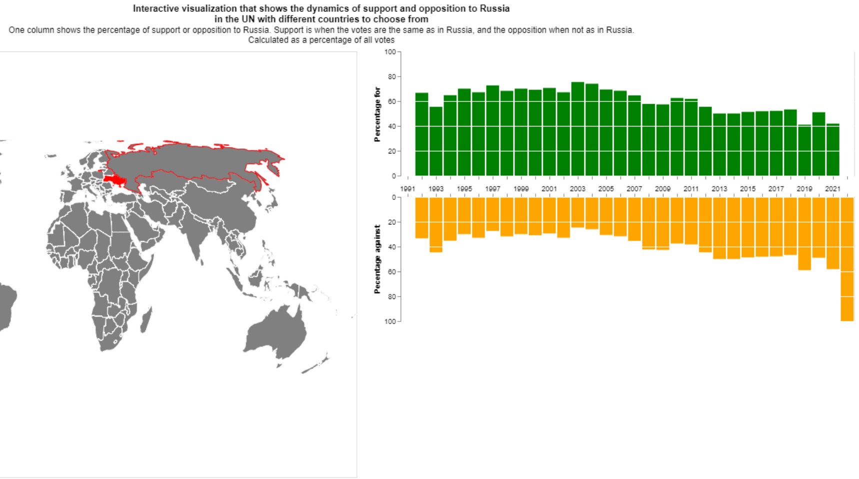


FIGURE 4.8: Dynamic of Ukraine voting in GA

We return to Ukraine again. There is a similar trend as in the general case, but it is clear that the percentage against here is higher, especially after 2014. It is here that events can be imposed because in 2016-2017 Ukraine was in the Security Council and this left an imprint on the overall visualization, wherein 2016-2017 the percentage of support for Russia increased. Now we see that without the Security Council everything has fallen into place and this subsidence is no longer visible but only the steady growth of opposition to Russia in the General Assembly. All these visualizations from the three divisions are very good to study together to make a deeper analysis of the political behavior of countries with Russia, because the visualizations are very good at showing all the behavioral patterns of countries.

4.6 Countries with Veto Rights in Security Council

The United States, China, Britain, and France play an important role in modern geopolitics, and it is these countries that have the right to veto in addition to Russia. Therefore, in the draft, these countries and their voting are presented in separate visualizations to take a closer look at how they relate to Russia in terms of voting. As for additional transformations, they consist only in the fact that these four separate countries are separated from the data on voting in the Security Council.

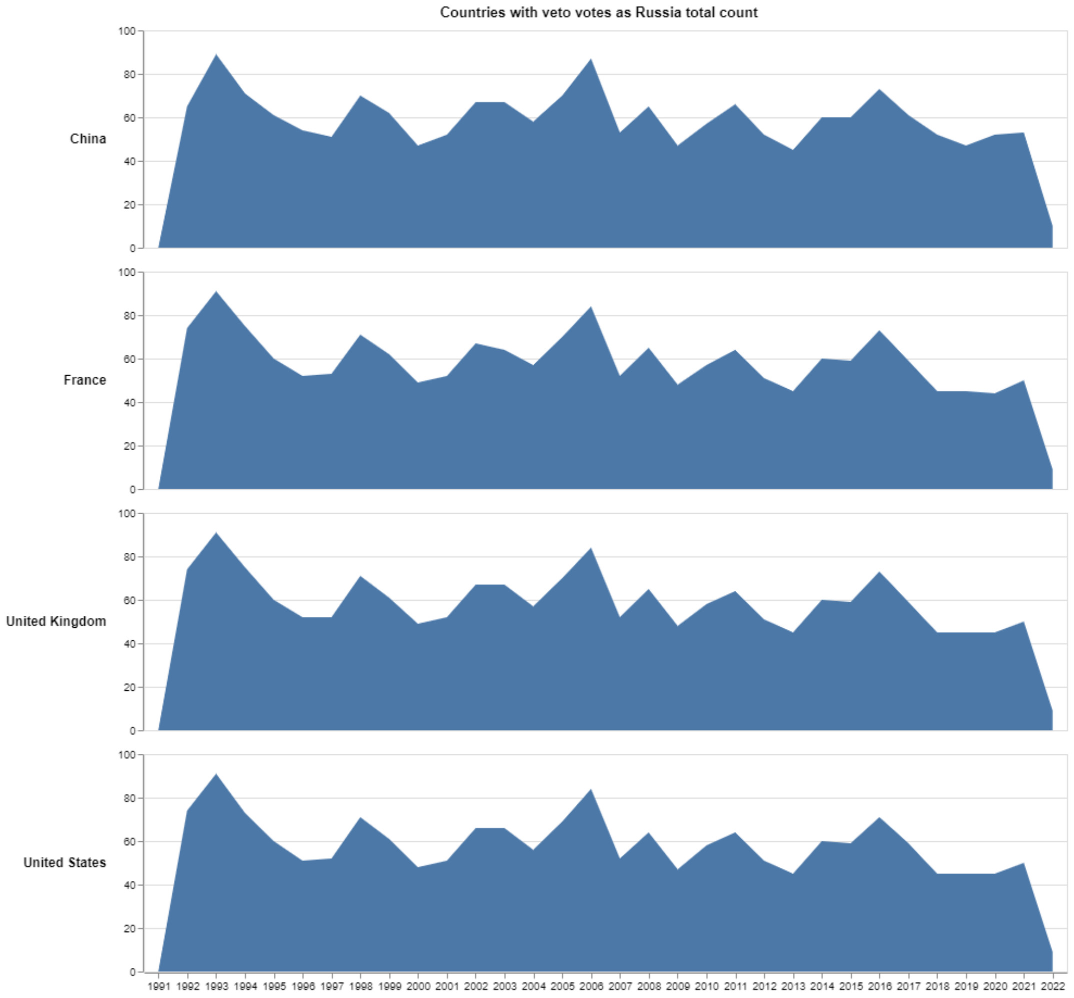


FIGURE 4.9: Total count of votes as Russia in SC

In this visualization in the form of an area chart, you can trace the dynamics of voting in Russia through the prism of time. This graph is enough to visually trace the dynamics of the voices of countries, their growth, and decline in a certain period. As you can see, all countries with the right of veto vote approximately equally in support of Russia, the difference is minimal and it is difficult to notice at first glance. This shows that it is very rare for countries with a veto to not support each other and not even abstain from voting when Russia votes in favor. But there is one very important nuance that should be considered for this and the next visualization. All data for them are taken from one source - the UN electronic library. And it includes only those resolutions that were adopted by either the General Assembly or the Security Council. It follows that when one of the countries vetoes a resolution, it is automatically not adopted and does not enter the UN electronic library.

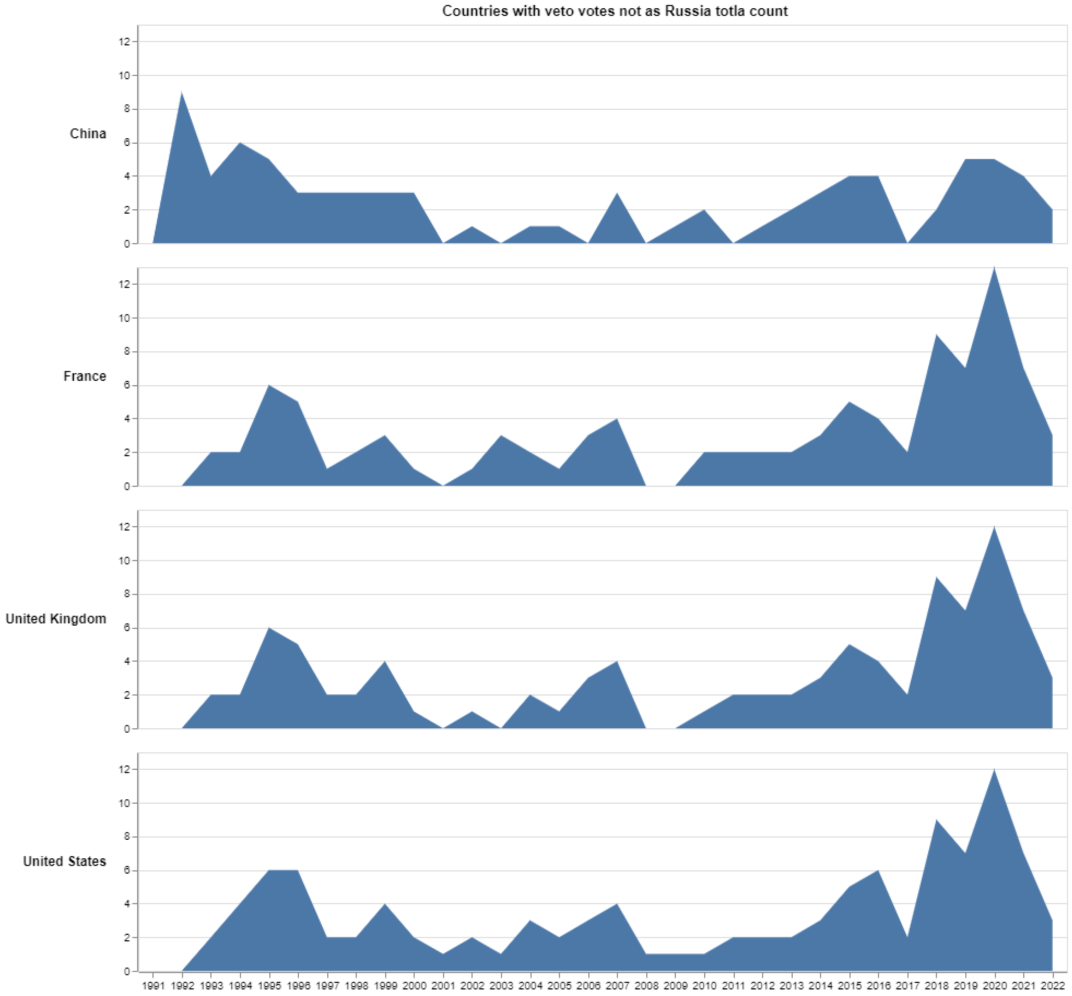


FIGURE 4.10: Total count of votes not as Russia in SC

A similar visualization, however, in the opposite direction to that shown above, shows cases where countries with a veto have voted differently than Russia. It is clear that the Western allies, namely the United States, Britain, and France, are unanimous in their support and opposition to Russia in the Security Council. But China is showing very interesting trends because it is clear that now it is more supportive of Russia in the Security Council, and in the 90s it is clear that China, on the contrary, was a bigger opponent of Russia than the same Western allies. The visualizations show the trends of key geopolitical players in the most important structure - the UN, and this opens another front for a more detailed analysis of these countries.

4.7 Vetoed Resolutions

Since the first source used does not provide information on the resolutions that were not adopted, which those that were vetoed, a decision was made from another resource that provides the UN to extract data specifically on the resolutions that were adopted. Calculations were made on how many times each of the three countries - the United States, China, and Russia - used the veto. France and Britain are not taken into account because they have never used a veto since 1991. Visualizations on this topic help the relations between the leading states, as well as show which topics were painful for them and what interests they defended in the world through the UN Security Council.

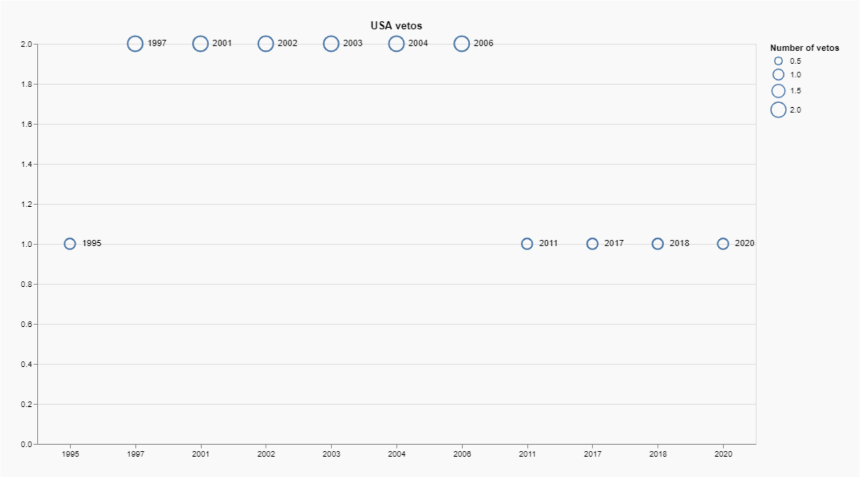


FIGURE 4.11: Numbers of USA vetos throught years

The data here is presented in the form of a dot chart, where the United States vetoes the UN Security Council every year. With the help of the size of the point is determined by the number of times of veto in a given year and when you point to it highlights the number of vetoes imposed this year. It can be seen that in the 2000s the United States used it the most and in the future it is possible to conduct a deeper political analysis in order to understand what was happening then that the United States so often used its veto. This presentation of data copes well with the representativeness of the dynamics of US votes over the years, which allows users to learn more about this particular country

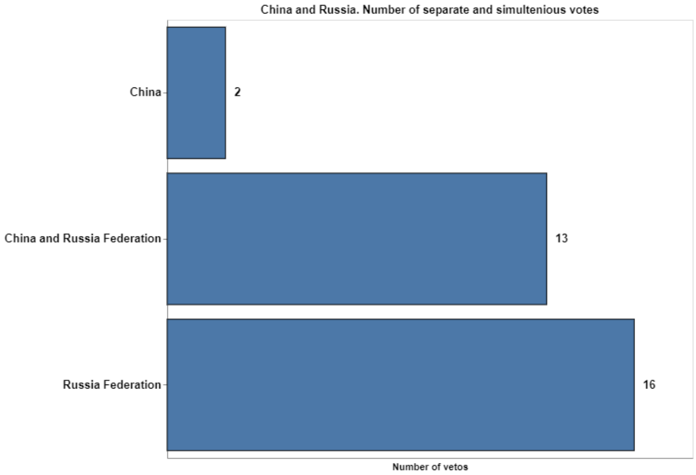


FIGURE 4.12: China and Russia. Number of separate and simultenious votes

This visualization is intended to demonstrate the relationship between China and the Russian Federation within the UN Security Council. It shows how much China vetoed the resolution on its own, how much Russia did and how much Russia did separately from China. One can see a rather interesting result that, since 1991, only twice have China vetoed resolutions on its own without Russia's support. As many as 13 times they did it together and on top of 16 times they did it themselves. It turns out that Russia has used its veto power in the UN Security Council 29 times. This visualization shows that China is always moderate towards Russia, because on the one hand he vetoed the decision together with it, which clearly supported its initiative, but 16 times did not veto with it, which either did not support or supported implicitly.

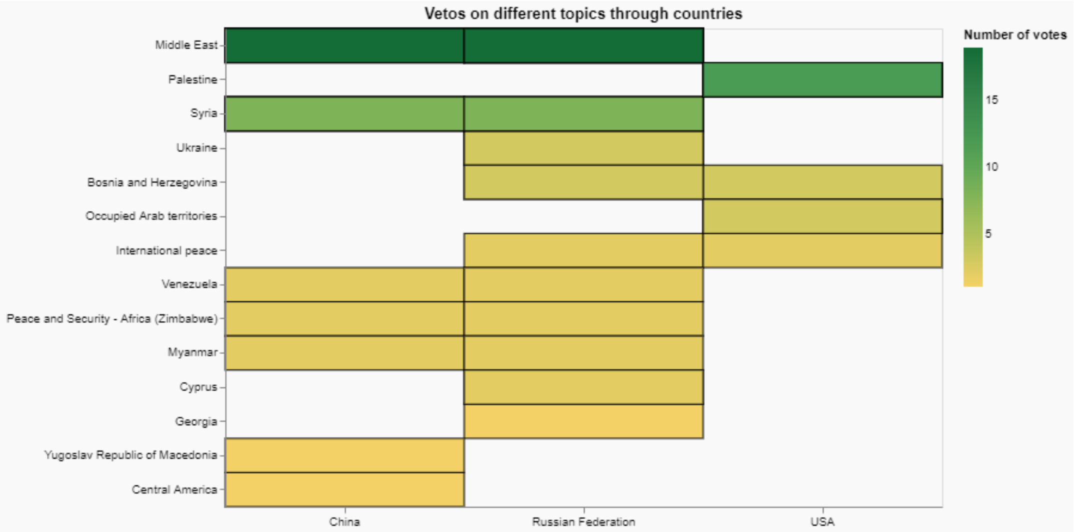


FIGURE 4.13: Vetos on different topics through countries

This heat map breaks down all vetoed resolutions by subject and country. The data is also sorted so that the most vetoed topics are at the top of the heat map. The Middle East, Palestine and Syria were the three topics in the region that caused the most debate among Russia, the United States and China, as most of the vetoed resolutions were on these three topics, and this fact only confirms how hot and unstable this one is. region in our world. You can also see that Ukraine is here and that 2 Russia vetoed the decision on it.

4.8 Work with Resolutions with Some Concrete Topics

The latest visualization will again work with general data on resolutions. Its main purpose is to show the total number of votes in support or opposition to Russia on certain topics of resolutions. Many topics relevant to our geopolitical space were chosen. These issues were found in the text of the resolutions and already on the basis of these data was the number of votes as Russia and not as Russia. These topics are - the war, Ukraine, Afghanistan, the Middle East, Israel, Palestine, Africa and Syria. After all, it is interesting to delve deeper into specific issues and see the dynamics of voting there, because we should not forget that, for example, the UN General Assembly often adopts fairly general resolutions that can not be interpreted as a specific position of the country when it votes like Russia or no.

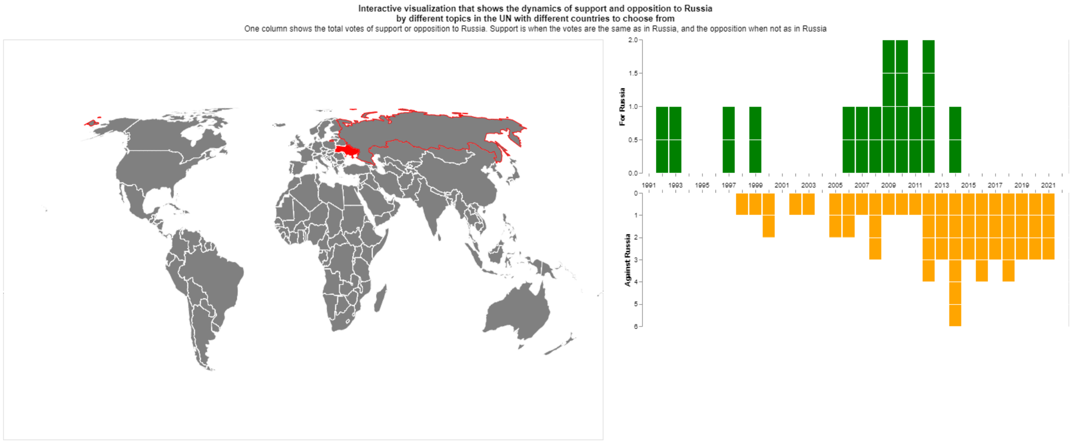


FIGURE 4.14: Dynamic of Ukraine voting on resolutions with topic "Ukraine"

The visualization is very similar to those composite visualizations that have already been demonstrated including maps. The difference is that first of all the number of resolutions is considered here and not their percentage and the second is that another level of interactivity is added, which allows you to choose which topic of resolutions interests the user. In this example, we look again at Ukraine and its voices about itself. It is quite obvious, however, that Ukraine has never voted as Russia did in its resolutions. This view provides a very wide range of in-depth studies of trends in other countries on a particular topic and allows for interdependencies between different previous visualizations

Visualizations will also be available in the GitHub repository in the form of a compiled Jupiter notebook in HTML format so that you can see all the code and visualizations and experiment with interactive visualisations.

Chapter 5

Summary

5.1 Results Discussion

So as a result of our work we have a project that consists of two main parts - ETL, which downloads data from UN sites, transforms them, gets what you need and cleans them, and puts them in CSV files, and visualizations that make preliminary calculations and visualize data. In total, this is a whole system that not only visualizes the data but allows you to update them by running ETL for a certain period and 20 minutes to update all the data needed for visualization. Visualizations allow showing a lot of behavioral patterns of different countries in the UN as a whole and relation to the Russian Federation. They are useful and informative both for ordinary people to simply broaden their horizons and for more specialized people who can use them to conduct research with a more detailed study of the geopolitical situation and the UN vote. Visualizations convey information about data to users, show certain patterns and are informative and impart knowledge and therefore cope with their main tasks.

Of course, this system has shortcomings, for example due to the lack of normal API on the part of UN resources, ETL are unstable and any change in the structure of the site will break the process and if there is no alternative, we must proceed from what exists at this stage.

A system that tens of thousands of resolutions from the UN online library turns it into valuable and interesting data for further professional analysis, that's what makes this project as a whole.

5.2 Future Perspectives

Regarding future improvements and development of this topic, you can, first of all, deploy all these visualizations on the site and make them public, because this information can be interesting for ordinary people. You can also add various modifications to the visualizations themselves. For example, connect and visualize voting data in the Council of Europe or try to add more data on freedom in different countries and their level and data on world trade between countries to impose other factors on the reasons for voting for or against Russia at the UN

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