

Estonia's Victims of Communism 1940–1991

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Abstract—In 2018, the city of Tallinn established a memorial to commemorate the Estonian victims of communist terror between 1940 and 1991. Among the physical artworks created as part of this memorial is a large black stone wall with 20,000 silver bees attached to it. Based on a national Estonian poem, they are displayed sticking together in spite of hostile surroundings representing the strong spirit of the Estonian people. Alongside the physical landmark, a digital database was made publicly available preserving the records of the victims honored by the memorial including their names and some personal data. The goal of this project will be to recreate the above artwork using methods of information visualization and to make it interactive using the data stored in the memorial's database.

I. MOTIVATION

During a recent trip to the city of Tallinn, Estonia, I visited the memorial entitled "Estonia's Victims of Communism 1940-1991" (see <https://www.memoriaal.ee/en/>). It is a powerful landmark just outside the city center which disrupts the otherwise beautiful landscape it is built into. Two tall black walls lead from the waterfront countryside and connect the Baltic sea to a large park and military cemetery through a narrow and claustrophobic corridor. Where the corridor ends, a section of park called the "Home Garden" was created that features lush apple trees and a ceremonial square where a large-scale artwork is placed on the black canvas of the giant stone wall. The artwork displays some 20,000 small silver honeybees in a naturalistic and somewhat random formation alongside the first verse of a famous Estonian poem (see Fig. 1). The poem titled "Ta lendab mesipuu poole" [He Flies towards the Beehive] by Juhan Liiv (see below) is a piece of culture essential to Estonian national identity and its lyrics put to music are often sung at national song festivals to celebrate Estonia and to mourn those who have fallen to achieve its independence:

He flies from flower to flower
and flies toward the beehive;
and the lightning clouds are rising –
Yet he flies toward the beehive.

And thousands go down;
thousands are coming home
and will endure hard work and care
and fly to the beehive!

Soul, oh soul, oh when the times are hard –
How you desire to be in your fatherland;
whether you're home or in a foreign land –
you want to be in your fatherland!

And death's wind might be blowing against you
and a bullet of death might be coming towards you:
you forget about death and care
and hurry to your fatherland!

Soul, oh soul, oh when the times are hard –
How you desire to be in your fatherland;
whether you're home or in a foreign land –
you want to be in your fatherland.

Juhan Liiv (Translation: Matis Rüütel)

The artwork in the Home Garden serves as a powerful reminder of the terrors of political conflict, bringing together themes of death, loss and sorrow with hope and beauty. Relating the artwork to the United Nations Sustainable Development Goals (UN SDGs), it primarily contributes to Goal 16 "Peace, Justice and Strong Institutions" as it promotes peace through commemoration of the victims of political violence.



Fig. 1. An image of the honeybees artwork at the Home Garden of the memorial on a national holiday in Estonia. The lyrics from the first verse of Liiv's poem are placed on top of the artwork in large silver letters. Source: news.err.ee.

II. APPROACH

My goal for this visualization project will be to recreate the visual aesthetic of the beehive artwork in a digital format and to supplement it with information from the memorial's database in order to create an interactive digital homage to the original artwork. The resulting visualization could act as a supplement to the physical memorial and digital database and further bridge the gap between the two, giving an intuitive access to the contents of the database to visitors of the memorial if they do not have personal relations to one of the commemorated victims or even speak the language.

The memorial's online database contains, among other things, information about the victims' names, year of birth,

year of death and related entries in the database. Specifically, I aim to create a graph or network visualization using JavaScript (e.g. D3) or Python (e.g. pyvis) for a sample of these data points. Each node will represent one of the victims in the data set with each link representing a connection between the entries. The primary link will be that of family relations (represented in the data set as related IDs). This will result in nodes for related victims being located closer to another in the visualisation. By applying a physics simulation to the graph (i.e. repellent and gravitational forces), these nodes will be animated to converge to a stable circular formation, adding to the beehive metaphor.

III. EXPECTED RESULTS

Originally, a scatter plot was considered that would show the year of birth and year of death for each victim, but since the goal of the visualization centers around a sense of community, a network graph was deemed more appropriate (see Fig. 2). The resulting visualization should be an interactive network plot recreating the visual aesthetic of the physical memorial but supplementing it with information from the memorial database. Each node of the plot should, in reference to the original artwork, invoke the image of a silver bee via its color and general shape. The links should represent family relations giving a strong intuition for the shared fate of the victims of communist terror and the impact it had on Estonian national identity (see Fig. 2). Additionally, it could be considered whether the lyrics of the national poem should be integrated similarly as they have been integrated into the original artwork (e.g. by placing them above or below the network visualization).

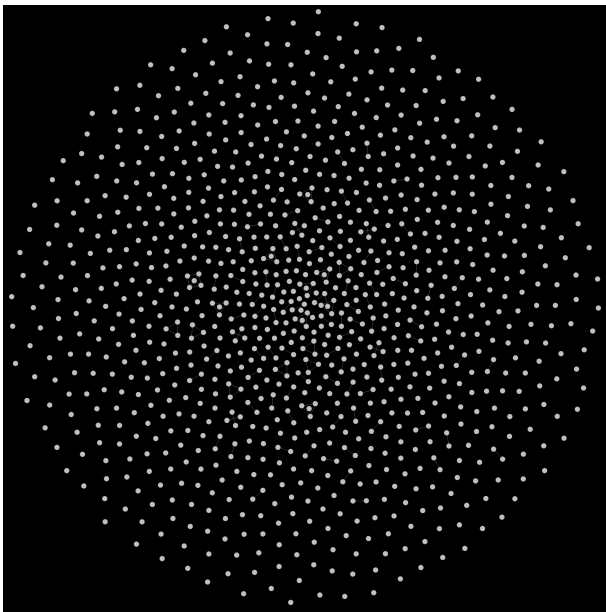


Fig. 2. A pre-visualization of the expected results. Each node in the network plot represents a victim from the memorial's database while each link represents a family relation between two victims. The data set comprises of only a small sample of the total entries in the database.

IV. USABILITY

Since the goal of this visualization is to provide visitors of the memorial with an additional way to connect to the topic of communist terror in Estonia, the usability of the visualization should aim to support those users—especially if they are unfamiliar with the history and topic at hand—in exploring the data. To follow the proposed format for this usability description:

I believe memorial visitors will learn about the general scale of the communist terror in Estonia as well as the horrible fate of the families and individual victims present in the data set when zooming in and out of the visualization to explore its scale or clicking on one of the nodes to reveal further information. I will know when I see the zoom (i.e. scale over time per session), click (i.e. distribution of the number of clicked nodes per session) and reading history (i.e. total duration where at least one of the node's information windows was open per session).

Expanding on this description, it should be ensured that the user is informed about the actions that can be performed in the visualization (i.e. zooming, panning, dragging of nodes, clicking on nodes) and what each of the visualized elements represent (i.e. a node represents a victim in the data set, a link represents a family relation).

V. INTERACTIVITY

The data points or nodes should be interactive, perhaps even animated, supporting the general beehive metaphor. On click, each node should reveal its underlying data from the database including the victim's name, year of birth and year of death if present. It could be considered whether the recorded fate of the victim (e.g. deportation) should be included as well. Being able to reveal detail about a specific victim in the data set should bring an additional layer of personal touch to the visualization and add to the overall theme of sorrow. Since this information is currently available only in Estonian, however, this would be a question of feasibility.

In addition to a click interaction, general navigation actions (i.e. dragging, panning, zooming) should be available to the user. These interactions are likely expected and can readily be utilized to further pursue the theme and goal of the visualization. Specifically zooming is a powerful interaction to reveal and understand the scale of the data. As previously discussed, there should be at least two discrete zoom scales: (1) zoom-out to reveal the size of the data set and (2) zoom-in to interact with single nodes and reveal their information. Should these discrete zoom scale levels be implemented, it could be considered whether the zoom-out should be slower than the zoom-in or decelerate to further strengthen the reveal of the scale of the data. Since the zoom-in would occur when a user is interested in a specific piece of data, this should feel responsive and quick.

As discussed further below, the inclusion of an interactive timeline could also be considered as this would add another element of interactive exploration to the visualization that can aid in the understanding of the development of Estonia's communist occupation.

VI. DATA TRANSPARENCY

The data set in question is a small subset (633 entries) of the memorial's database (ca. 22,000 entries) that can be publicly accessed through a bulk query, where all relevant fields (i.e. name, year of birth, related entries) have a value and where year of birth and year of death, if present, fall into a reasonable range (e.g. year of birth after 1800 and year of death after 1940). While the memorial's database is open to the general public, data can only be retrieved for specific entries through searching by name. The data set was collected through an empty query to the database's web service and constitutes entries from the first shard of the result. This, consequently, makes the data set an incomplete representation of all the entries in the memorial's database which in itself is an incomplete collection of entries for all Estonian victims of communist terror between 1940 and 1991. The smaller number of data entries detailed in the visualization should, however, significantly improve performance of the resulting web application without necessarily sacrificing the impact or message of the result.

The data has been collected and continues to be updated by an Estonian foundation, the Estonian Institute of Historical Memory (<https://mnemosyne.ee/en/>), and supports the foundation's general goal to inform Estonia's citizens about the state and development of human rights throughout the history of Estonia's Soviet occupation. The organisation was originally founded by the President of the Republic of Estonia in 2008 and has since been run by international research staff with a background in social and political science and history.



Fig. 3. The "Wall of Remembrance of the Journey" or "Journey memorial wall" consists of two large black stone walls forming a narrow corridor connecting the seaside and "Home Garden". Plaques inscribed with names from the memorial's database are placed on the wall inside the corridor. Source: news.err.ee.

The database was originally made public in 2018 but there is no indication as to the last time of update of the database. There does not exist any licensing scheme or public information about an access rate for the data. Other published adoption examples are part of the physical memorial and include, for example, the "Wall of Remembrance of the Journey" or "Journey memorial wall" where metal plaques are inscribed with names from the database and placed on two large black stone walls (see Fig. 3).

VII. TIME

As the topic of the proposed visualization deals with a certain period of Estonian history, time naturally plays an important role in the data. Taking a macro-perspective, the relevant time data can be divided into three distinct phases: (1) before 1940 (before the Communist occupation), (2) between 1940 and 1991 (during the Communist occupation) and (3) after 1991 (after the Communist occupation). Since all dates in the respective data set (i.e. year of birth and year of death) fall within one of these three phases, a visualization of those aspects—perhaps even an interactive exploration—could add to the desired experience and information transfer. Furthermore, since these three phases follow each other and represent one coherent narrative, a linear representation could be appropriate. One could, for example, imagine a scrollable timeline at the bottom of the visualization that would represent and control the current year displayed. Whenever a person's year of birth is reached, their respective node is added to the network graph.

Beyond this rather static representation of time in regard to year of birth, animation could be used to further visualize temporal information. The nodes could, for example, be animated following a limited random path (again, supporting the bee metaphor) or scaling up and down mimicking a heart beat as long as the current year on the interactive timeline is before their respective year of death, while each passing year decreases the node's overall animation speed. Once the year of death is reached, the node's animation speed would be reduced to zero with its lack of motion supporting the metaphor of death. This would lead to a somewhat erratic (hopefully even insect-like) animation of the whole network graph before the period of Communist occupation begins which slows down the longer this phase continues, giving a strong intuition of the oppressive nature of these particular acts of political violence. Since the data set does, however, not only comprise of persons who were killed during the Communist occupation, the motion of the graph would not fully stop throughout the entire phase between 1940 and 1991.

To achieve this desired effect even if the user does not interact with the visualization, an automatic slow loop over the timeline, for example starting after a predefined period of inactivity (e.g. five seconds), could be considered. This could, additionally, aid in discovering the interactive features of the visualization for novice users.

Finally, color or opacity and size could be considered to represent time in the sense of each person's age. One could, for example, set the opacity of a node during its entry's respective year of birth to a value of one, before decreasing the opacity and increasing the size of a node dependent on the age of the person they represent. This in combination with the previously proposed animation would result in children or younger victims being displayed as small, but bright and animated points in the resulting visualization which come to a sudden stop once their year of death is reached, emphasizing the tragedy in their loss of opportunity to grow and leave an impact on the world around them as both were taken by political violence.

By explicitly including time in the visualization, I can

create a more interactive, animated, more varied and visually interesting graph network, still deeply rooted in themes of sorrow and loss as well as hope, beauty and resilience.

VIII. SPACE

As the data from the memorial's electronic database does not include structured spatial information, but instead only in sparse and rudimentary form as an occasional place of birth, place of death or some free-form description that includes the names of regions, relying on spatial information for meaningful visualization seems difficult. Space is, however, still considered as a relevant dimension to emphasize age at the time of death: In the force simulation underlying the graph network, the repellent force (or mass) of each node is manipulated in a way that those nodes representing victims who died at a young age are pulled towards the center of the graph while those representing persons still alive are pushed towards the edges. This leads to (1) a sense of motion in the visualization until stability is achieved and (2) a stable image where those victims who died youngest are surrounded and in a way "protected" by all others in the data set.

Additionally, space in the sense of relative proximity is considered to emphasize family relations: As some entries in the memorial's database include information about related victims, the graph network uses this data to connect nodes representing related victims with a link. Through this, families are not only quickly visible when looking at the graph, but their respective nodes are also close to one another as links representing a stronger connecting force in the physics simulation than the repellent mass. This way, families still "stick together" in the final visualization.

IX. CONCLUSION

Through the use of data visualization techniques and by considering theme, usability, interactivity, data transparency, time and space, a concept for a graph network emerged that seems likely to be able to capture key aspects of the artwork and data that inspired it. It aims to bridge the gap between a real, physical memorial and an electronic database, bringing together concrete data and abstract themes around sorrow, beauty and resilience. With this visualization, I hope to enable other visitors and outsiders to Estonia's history to connect to a moving piece of art, to become interested in its underlying topics and to relate to its ideas. I am curious and excited to see how a real audience will react.