

The Misty River:
A Report on the Mapping Project

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Mapping Project

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Concept

The initial idea for our project arose out of our own desire to learn more about the city to which we had recently moved. We both knew of the river that flows through Munich, but nothing about it. We decided to create a fun and informative interactive map to help ourselves learn more about our new city, and in turn we hoped that it would be useful to other people unfamiliar with the city. The project we envisioned would result in an engaging and informative product that would provide insights about the Isar river and the cultural and natural points of interest near it. Our target audience is people like us: those interested in the river and the city, but with a low level of knowledge and familiarity. We hoped that it would encourage users to explore the river and see its role in the city in a new light.

Our interest in mapping the river came from a video interview with a man who lives in Munich and commutes to work in the summer by swimming down the Isar. In the interview, Benjamin David explains that he was motivated to take up this unusual method of getting to the office because of the road traffic. He notes that the river was historically very important as a transportation route to and from the city, but in the past century it has not been used for transportation. The main reason for this decline is the emergence of rail and automobile transportation, but water quality was also a critical issue for several decades. It would not have been safe to swim in the river twenty years ago. This got us interested in the “swimability” of the river—the parameters of a river that contribute to a river’s usefulness for swimming. In the interview, David explains that before he leaves for his swim to work, he checks the water temperature and height, as well as the flow rate. Realizing that the river is temporally dynamic,

we wanted to incorporate some way of visualizing these parameters into our map to show how the river changes throughout the year.

The map we envisioned would have the user explore the Isar and Munich by “swimming” with Benjamin David. He would be represented on the map as an animated character figure “swimming” in the river. Points of interest along the river would be briefly explained with popups that would appear as David led the user down the river. The popups could be played through automatically in sequence, or they would pop up as the user interacted with the map by clicking on the points of interest. A separate component of the page would visualize seasonal averages for several river parameters, such as water temperature, water height, and water speed, that would be useful to know before diving in for a swim.

Data and Technology

We began developing our project as a slippy map using a Mapzen tileset. The map was integrated into a webpage built with HTML and CSS. We planned to use D3, a graphical library built with JavaScript, to facilitate the animation and interactivity of the map. We found points of interest through research, which we then digitized using their geographic coordinates. We planned to add these points to the map after converting them to GeoJSON format. Data for the river parameters came from the Grundwässerkundlicher Dienst Bayern[1]. The GIF on the landing page of the website was created in Adobe Photoshop from the video interview[2] of Benjamin David.

Through trial and error, we ended up using some of the planned methods and some unplanned techniques as well. Instead of a slippy map, we decided to change the basemap to one

created from shapefiles from Open Street Map data. These shapefiles were edited with ArcMap and then exported for design work in Adobe Illustrator. This data provided more ease of manipulation than the Mapzen tileset, and we could visualize different layers such as parks and green spaces much better. The slippy map with D3 would not work for our project given the amount of time and prior knowledge that we had because we wanted a high level of interactivity with the map and the animation. To animate Benjamin David, we ended up using an SVG animation with a path along the river digitized in ArcGIS and a figure of David digitized from a photograph. The radar chart was made using D3. To collaborate on the project files and data, we used Dropbox.

Methodology

Our first steps were to plan the scope of our project: what would be included on our map, how would we represent our data on the map, and what tools and methods we would use. We then looked for data and did research on D3 to learn how to create the animation and interactivity. We created a webpage framework with the GIF and the slippy map and the placeholder for what would become the radar chart showing the river parameter data. We ran into problems with using the slippy map made with Mapzen tiles and incorporating D3, so we decided to try a different method to create the animation and interactivity. D3 was recently updated and there are not enough tutorials and examples to work from in the new version. We briefly considered using a parallax webpage concept to visualize the flow through the city. But trying to figure out Jarallax, a JavaScript library, to implement this was confusing and neither of us had any prior experience with it. We settled on using an SVG animation approach to realize

our initial design concept. The final product's elements are implemented with SVG, HTML, CSS, and D3.

Processing and stylizing our data also took some trial and error. When we chose to use the Mapzen tileset, we thought it would be relatively simple to stylize and add our data points to create the basemap. However, we had problems with stylizing individual layers such as urban land use and green spaces using this method. We abandoned that and decided to use data from Open Street Map, which we processed in ArcMap. The individual layers were then much easier to stylize in Adobe Illustrator, and then we could easily add graphical elements representing the attractions along the river to add visual interest.

The river data for the radar chart required a lot of processing because the datasets were so large. For some parameters, the raw data was only provided in 15-minute increments, and we wanted seasonal averages. The data also had some inconsistencies and needed to be cleaned before processing. We used Microsoft Excel to calculate mean values for each parameter for each day for the year of 2016, the most recent year for which complete data for all parameters was available. Then from those values, we calculated mean values for the meteorological seasons.

Results

Despite unexpected problems with our original plans, and alternate methods being used for the final product, our map successfully achieves our original goal of using Benjamin David as a guide to explore Munich via the Isar.

The Misty River Project

*There is a river flowing through Munich: the Isar.
Benjamin David commutes to work by swimming in the river.
Let him guide you on a journey exploring Munich via the river Isar!*



Figure 1: Landing Page

The user first encounters the landing page, which displays the title and a brief description of the project. A large portion of the page is dedicated to a GIF of Benjamin David swimming in the Isar, which we hope is a very attention grabbing introduction to the theme of the map.



Figure 2: Scroll Down to Map Button

The user can then click on the small down arrow at the center bottom to be taken directly to the start of the map.



Figure 3: Instructional Modal Popup

When the user first encounters this part of the page, it has a window with information on how to use the map, as well as more background information about Benjamin David and the river. This modal popup window can then be dismissed after the user has read the information, and the user can begin exploring the map. It can be reopened by clicking on the “Swimming Instruction” tab on the right.

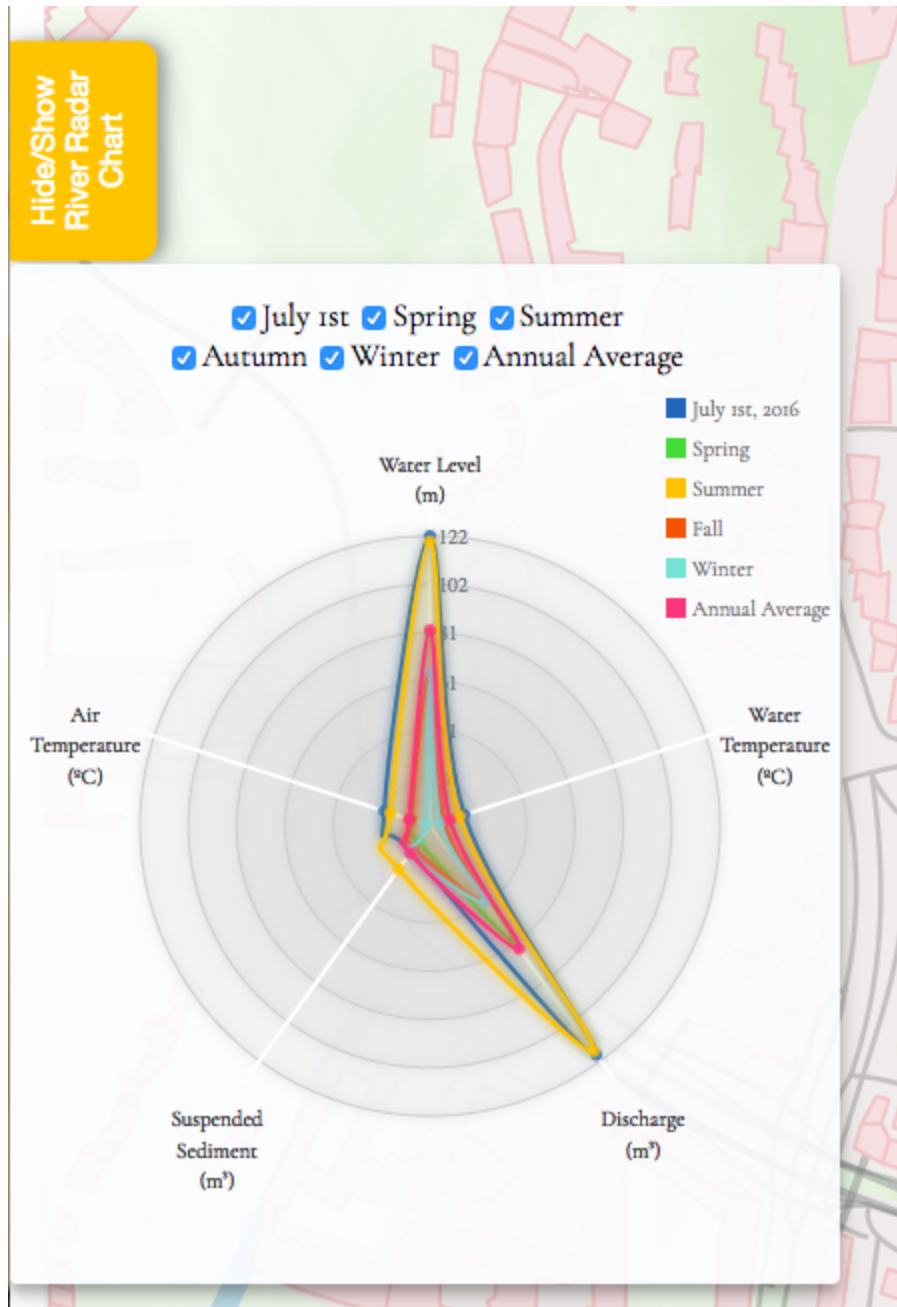


Figure 4: River Conditions Chart

The radar chart is open by default, but it can be hidden to see the part of the map that it covers by clicking on the tab above it. It shows parameters of the river for the seasons, as well as

the day Benjamin David is swimming and the annual averages. These parameters can be shown/hidden by clicking on the checkboxes.

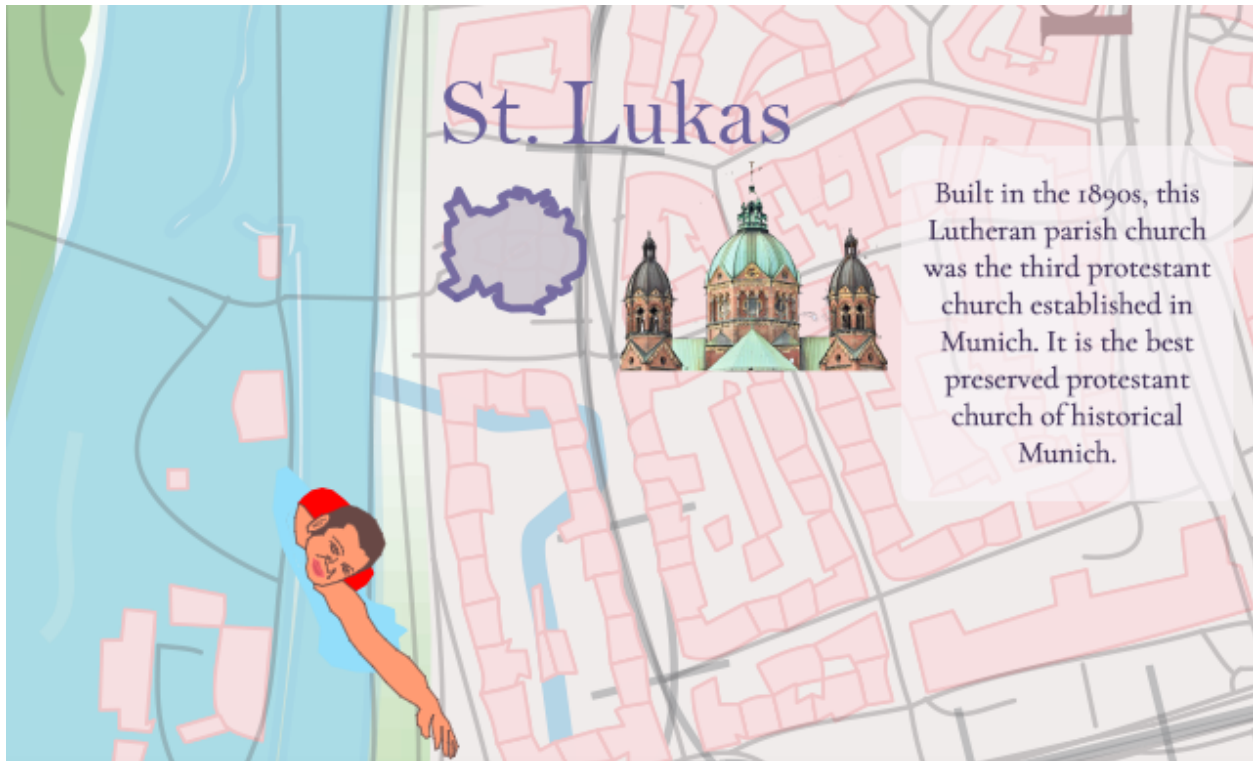


Figure 5: Benjamin David Swimming by a Point of Interest

As the user scrolls down to follow Benjamin David on his swim down the river, the informational windows about the points of interest pop up. This figure also shows the basemap and an example of the graphical elements added to add visual appeal to the points of interest. The figure shown here of Benjamin David swimming is the animated SVG.

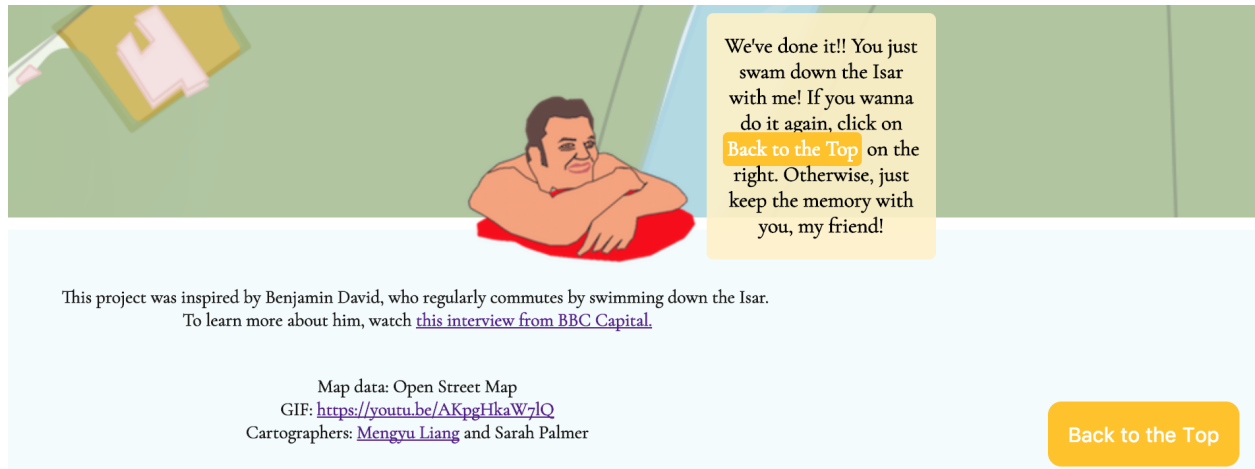


Figure 6: The Bottom of the Page

When the user reaches the bottom of the page, another figure of Benjamin David explains that they have reached the end of the swimming journey. The credit information and a button to go back up the top of the page are also here.

Outlook

The primary goals of the project have been met, but there are many areas in which the project could be improved with more time and work. The major issues are limited interactivity and lack of responsive design. As it is, map users don't have control over the animation or the popups displaying information on the points of interest. It would be nice if the map were designed so that the users could have more control in their experience while swimming and exploring the points of interest. The webpage is also not responsively designed, so there are issues with display on different screen sizes. With more time, we could use Bootstrap to add responsively to the page to make it more usable for people.

Another minor issue is that the GIF is limited by the original video quality. The page would look cleaner with a better resolution GIF, which we could make only if we had access to a higher quality version of the interview footage.

The river conditions radar chart is also in need of a little more work. It currently does not have values for the other four axes besides water height. It is also problematic to have parameters with such different scales of measurement represented on one chart. The chart is difficult to interpret and could be more user-friendly.

The basemap could also use some improvement. We were limited by the quality of the data from Open Street Map, and many of the lines and polygons are messy. A different source for the basemap might provide better, more consistent data. There is also a large portion of the river with no points of interest, which we could work on. This comes inherently from the fact that the center of the city is more densely packed with points of interest, but perhaps we could add something regarding the river in general, such as natural science or history information.

[1] <http://www.gkd.bayern.de>

[2] <https://youtu.be/AKpgHkaW7lQ>