AN INTERACTIVE MAP FOR THE LOPEZ URBAN FARM

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Abstract: This paper details the development and implementation of an interactive map aimed at providing information to visitors in a user-friendly web application for the Lopez Urban Farm. The map leverages the Google Maps API to seamlessly integrate location tracking as well as clickable icons and markers that the user can interact with to view relevant information, including crop fields, animal enclosures, and recreational areas.

1. INTRODUCTION

Our group was tasked with visiting Lopez Urban Farm in Pomona to find out how we could help improve their farm, not by planting seeds and moving dirt, but by applying our knowledge and skills related to computer science. When visiting, we talked to Lisa Christie and asked her what problems or issues they have with the farm that we might be able to help with. At first she was having trouble – she was unsure what problems they have which computer science could fix – but we reassured her of our creativity. She eventually identified a concrete issue they have, getting people to explore the farm on their own without having to find a volunteer and ask them for help. Lisa concluded by asking if we could make “some sort of map”. Based on the layout and functionality of the farm, the group decided on making an interactive map which people could access on their phones via scanning a QR code at the entrance. The map would include all notable locations on the farm, short descriptions for each location, and a live pin of the user’s current location on the map.

2. RELATED WORK

The original inspiration for this project was the interactive map that Cal Poly Pomona uses for its campus. The CPP map makes great use of labels and geometry to easily navigate the campus. The history of such interactive maps goes back decades. In 1993 Xerox PARC, a research and development company specializing in computer technology, released what could be called the first interactive map, the “PARC map viewer”. This map was crucially different from the other digital maps at the time, users were able to zoom-in and out and change layers. Most importantly, this map used a Common Gateway Interface (CGI) server to get user requests, render maps on the server, then finally send back the completed request to the user. This method is still used on many interactive maps today. PARC even pioneered the inclusion of latitude and longitude in the URL, which is also still used in Google Maps today and was important to creating our interactive map.

3. PUBLISHED RESEARCH

An article titled “Interactive maps: What we know and what we need to know” written by Robert E. Roth, a geography professor at the University of Wisconsin-Madison, was published in February of 2013. Roth begins by defining cartographic interaction as, “the dialog between a human and map, mediated through a computing device, and is essential to the research into interactive cartography, geovisualization, and geovisual analytics.” It can be interpreted that interactive maps have a science and methodology to them, not only to efficiently give out useful information but also in regards to how a user will view and interact with the map. The article then explores some philosophical questions of mapmaking; What is the meaning of cartographic interaction?; Why provide cartographic interaction?; When should cartographic interaction be provided?; Who should be provided with cartographic interaction?; Where should cartographic

interaction be provided?; and finally, How cartographic interaction should be provided? These six fundamental questions should always be asked when creating an interactive map. Roth goes into depth about each question, explaining how we should approach the answer along with the scientific evidence used regarding cartographic interaction. Roth concludes by saying there are realistically more questions brought up just trying to answer these six fundamental questions than questions answered themselves. Although he does state, “it is necessary to reflect on additional approaches for generating insight within cartography, both for cartographic representation and cartographic interaction” and “it is upon the map where the cartographic ontics meet the cartographic epistemologies, where the bodies of cartographic knowledge meet the ways of constructing this knowledge.” Meaning, the real location of the map can only truly be interpreted by itself. We improved on this in our map by asking the owners of the farm questions about what they would like to see be represented on the map. Using Roth's beliefs, we did not simply map the location of the farm on earth, but the interpretation of the location created by a group of people.

4. METHODOLOGY

As the basis of the map, we implemented the Google Maps API to highlight key areas in Lopez Urban Farm. These key areas are made distinct by clickable rectangular icons for crop fields, and red pin-shaped icons representing recreational areas or points of interest such as seating areas and animal enclosures. Upon clicking the icons, the user is presented with titles and detailed descriptions about the area. This allows for users to interact and gain relevant information without the need for assistance from on-site personnel. In order to make an accurate map for users to navigate the farm, we recorded the coordinates of the four corners of each crop location and one coordinate for the general location of each recreation area using the longitude

and latitude. These geographic data points were stored within objects in a separate JavaScript file, then called by functions in the main program to be placed in their accurate locations. We made use of a proxy server hosted on Render to hide the Google Maps API key, and created our own custom map style to create a layout with a colorful background, removing landmarks that were not relevant to the map. The codebase included two Javascript files along with html and css files for the website structure and styling. Coordinates for the landmarks and crop polygons were hard-coded.

5. FEEDBACK

After creating the first draft of the map, we emailed a link to the owners of the farm to gather relevant feedback regarding potential improvements to the map. The main issues they identified emphasized making it more mobile-friendly, as this would be the main format visitors would view it in. The owners also advised correcting inaccurate descriptions and highlighting more important points of interest over others. Taking these comments into consideration, we adjusted how the UI scales on mobile and corrected the descriptions and points of interest to address their suggestions. We also created a QR code to make the web app more accessible to incoming visitors.

6. REFLECTION

This map could be improved in a few different ways, the first being the load time. The load time of the map from the time the link is clicked to the map finished loading can sometimes exceed 20 seconds, which is far longer than what most people are used to when loading up a map. This was because we had the most basic free plan for our proxy server, which takes a long time to load. On top of that, the Google Maps API itself can be slow to load. A potential method to mask this long wait time is putting a short tutorial video at the start of the waiting duration

while the request to the Google Maps API is being made in the background. Another change that could have been done is making the map a bit clearer. The current map only uses geometry for the crop and garden areas along with the border around the farm. Adding more geometry, colors, and even custom images of structures on the farm would make our map look less plain and also more like the farm in front of the user for easier navigation. The final potential addition is a way for the contents of the farm to be updated. For example, when the fruits and vegetables that are planted in the “Crop 1” are rotated for other plants, the only way the description of “Crop 1” can be changed to inform of the new plants is to update the code and re-upload the map. A better way to do this would be to store all the landmarks and crops in a database and retrieve them from there. An advantage of this is that it would be more secure and allow more flexibility, where administrators could simply manipulate the database without needing to redeploy the front-end map. In contrast, our method of using hard-coding allowed for the implementation to become much faster and allowed us to easily change the description and coordinates, which underwent many revisions. However, we still believe that if we had no time restraints and did this again with the knowledge we have now, the database would be a superior option.

7. CONCLUSIONS

We believe that the interactive map we created will solve the issue of getting people around the farm. The use of Google API and its features allowed us to create geometry and pinpoints that visitors can click to view a description of the location. These pinpoints form a simple layout of the farm that allows visitors to explore the farm with ease. Reflecting on the map, improvements that could have been made would consist of improvements to visuals of the map and the creation of a database. All of this is said with the hope that we could still continue to improve on the map if Lopez Urban Farm wanted to work with us in implementing and improving it.

REFERENCES

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