Mapping Legal Plunder: The Documentary Archaeology of Late Medieval Europe

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INTRODUCTION

In this project, we have collaborated with the Documentary Archaeology of Late Medieval Europe (DALME) project to visualize 14th century legal plunder in Lucca, Italy. The primary goal of our visualization is to enable our collaborators – historians and domain experts – to seamlessly explore the geospatial ecosystem of plunder in order to answer extant research questions. In total, we provide 5 views on the data: a map, a timeline, a histogram of object categories, an object list, and an animated flow of wealth. In order to facilitate data interrogation, we include a number of different modes of interaction, including brushing, selecting, cross-filtering, details-on-demand, panning, and zooming. We believe that our tool provides a new approach to geospatial data exploration in the digital humanities.

Audience

The primary audience of our visualization is our DALME collaborators: Gabriel Pizzorno, Preceptor on History and Director of the Digital History Program at Harvard University, as well as Daniel Smail, Frank B. Baird, Jr. Professor of History at Harvard University. Given that our primary audience consists of domain experts, we wanted to create a visualization that would enable them to explore the data across axes that were most useful to them. All of the features that appear in our visualization were the result of direct communication with our collaborators.

RELATED WORK

In our design phase, we began with "Visualizing the Republic of Letters" [3] for inspiration. In particular, the multiple views and modes of interaction served as a good starting point. Our collaborator Dan Smail's book *Legal Plunder* [16] provided a detailed historiography that enabled us to contextualize our work within the broader goals of [14]. The direct input of our collaborator Gabriel Pizzorno in the conceptualization phase and the design phase was invaluable. Other related work that we consulted can be found in our references; in particular, we drew from a number of `D3` examples online that helped us in conceptualization and in implementation.

METHODS

Data

The dataset that we used for our project was acquired directly from our collaborators at DALME. It consists of a number of linked `CSV`s. Our DALME collaborators compiled the dataset through an extensive process of transcribing inventories from the notarial archives of late medieval Lucca. These inventories consist of lists of material goods that were legally plundered using the procedures of European legal courts to satisfy various debts [16]. In addition to the names of the objects collected, our data also includes the names of both the new and former owner, the latitude and longitude of the location where the objects were collected, the date on which the object was collected, as well as a general category of object to which the particular object belongs.

Tools

We utilized `D3 v5` for our visualization [2]. We consulted many examples online, which can be found in our References [19, 20, 10, 8, 4, 5, 13, 6, 18, 7, 11, 15, 12, 1, 9, 17].

RESULTS

Our final visualization can be viewed here: `https://cse512-19s.github.io/FP-Mapping-Legal-Plunder/`. We will now describe our visualization in terms of the different views on the data and the different modes of interactivity.

Multiple views on data

Map

Upon loading the webpage, the map first displays all of Italy and then zooms to the region of interest around Lucca. In total, 155 towns are displayed, all of which have had objects plundered from at least one of its residents. Each town is represented by a dot, where the area of the dot is proportional to the number of plundered objects in the town. Zooming and panning is enabled on the map, and the dots on the legend

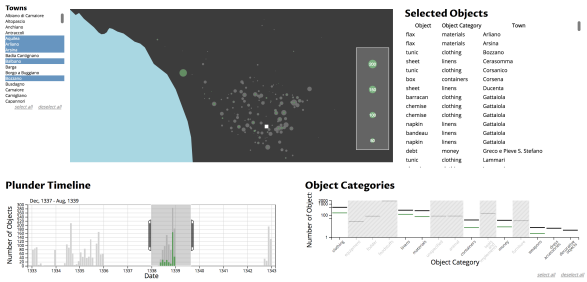

Figure 1. Overall View.

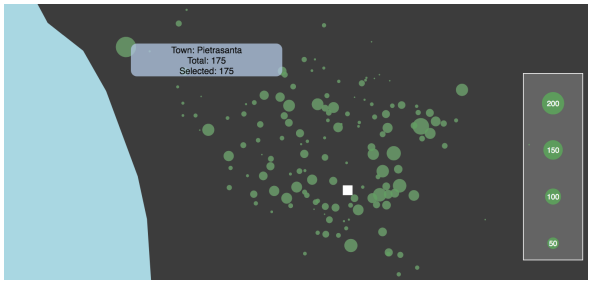

Figure 2. Map.

dynamically scale to the zoom level. The default map view can be restored by clicking the *default view* button to the bottom-right of the map.

Town list

The town list provides a list of all of the towns that appear on the map view, sorted alphabetically.

Timeline

The timeline displays a histogram of plundered objects according to date. The large spans of time without plundering events is due to the fact that transcription of inventories is currently in-progress, as well as the incomplete state of the historical record.

Object Category Histogram

This histogram displays the plundered objects as they fall into 15 different categories: animal, clothing, containers, decorative objects, dress accessories, equipment, fodder, foodstuffs, furniture, linens, materials, money, tools and implements, weapons, and a catch-all category of "unspecified."

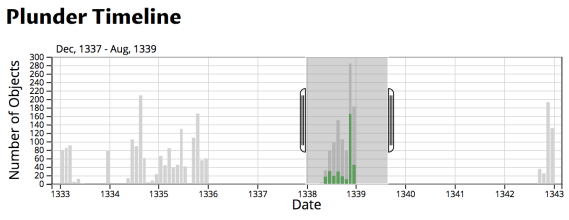

Figure 3. Timeline.

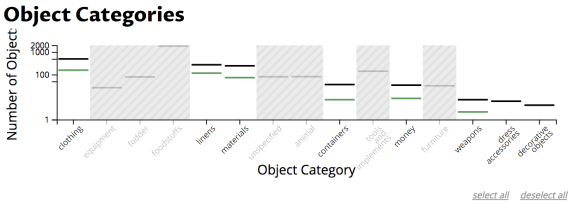

Figure 4. Object Category Histogram.

Object List

The object list displays plundered objects. The displayed fields include object name, object category, the town from which the object was plundered, and the object ID within the database.

Animation of Wealth Flow

When clicking the animation link on the main visualization, a new map visualization loads in the browser, showing an animated flow of wealth. Each colored dot corresponds to the movement of a plundered object from the debtor to the creditor. As the animation plays, the month and year dynamically update underneath the plot. The user can toggle back to the main visualization by clicking the appropriate button.

Interactivity

In order to produce a visualization that would be of most use to our collaborators, we focused on incorporating many modes of interactivity, which we list below:

1. *Brushing* on the timeline dynamically filters the map, category histogram, and object list.

2. *Clicking* on town names in the town list dynamically filters the timeline, category histogram, and object list. The filtered date range appears to the top-left of the timeline and updates dynamically. For fast selection, one can *select all* or *deselect all* towns.

3. *Clicking* on bars in the category histogram dynamically filters the map, timeline, and object list. For fast selection, one can *select all* or *deselect all* categories.

4. *Cross-filtering* can be accomplished by applying 1, 2, and 3 together.

5. *Panning* and *zooming* on the map using the mouse allows the user to explore the map. The zoom extent and pan extent are fixed between set ranges for ease of use. Clicking *default view* to the bottom right of the map returns the map to its original configuration upon loading the page.

6. *Hovering* over towns on the map produces tooltips on-demand that display the town name, the total number of plundered objects from the town, and the number of selected objects via cross-filtering.

7. *Hovering* on bars in the category histogram produces tooltips on-demand that display the total number of plundered objects from the town and the number of selected objects via cross-filtering.

DISCUSSION

Our visualization of legal plunder enables our collaborators to interact with their data in entirely new ways. By providing many views of the data (detailed in Section 4.1) and numerous modes of interaction (detailed in Section 4.2), our collaborators are now able to simultaneously analyze the geospatial, temporal, and qualitative facets of the plundering ecosystem in 14th century Lucca. The cross-filtering enables our collaborators to filter the data in a compound fashion dynamically, which they previously were unable to do. The object list also enables a dynamic update of cross-filtering, allowing our collaborators to analyze the objects in a more granular fashion. The animation of plundered objects over time allows our collaborators to answer the question of how plundering redistributed wealth: wealth primarily moved to the city center of Lucca. Lastly, it is worth noting that although this visualization was designed primarily for historians and domain experts, the visualization can also serve as an effective public history tool for engaging the public and educating them about medieval plunder. We hope that in addition to everything that has been mentioned, using our visualization is fun!

FUTURE WORK

Currently, our visualization tool functions as a case-study for Legal Plunder. We would love to extend our visualization to support generic digital humanities datasets, as we believe that there is a real need for such a tool. We would also love to support topographic maps but were unable to do so for this submission due to time constraints.

ACKNOWLEDGMENTS

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