Project Final Report

Visualizing Indian Indenture to South Africa

CS9639/LIS9721: Information Visualization

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Visualizing Indian Indenture to South Africa

Executive Summary

Problem

Between 1860 – 1911, over 150 000 indentured workers migrated from India to Natal, South Africa to provide labour for the sugar industry. Information about these migrants is contained in ship registers, which store the migrant's name, father's name, age, sex, caste, ship, and place of origin in India. Information from these registers was digitized and put into a number of Microsoft Excel files by an amateur historian.

The information is a large dataset of over 150 000 records and is only able to be browsed in that form and is difficult to draw generalizations from the information. While the dataset contains geographic information, that information is not easily understood spatially. Any patterns or connections between various aspects of the information, like caste and gender and geography, are not easily identifiable.

Solution

We have created a visualization system allows researchers to solve a number of issues. In the system, users can filter and color the information by a number of properties, which will allow for pattern recognition. The migrants are displayed over a map which allows for spatial understanding and pattern recognition. Our system also allows the user to search for migrants by name, which will allow People of Indian Origin (PIO) in South Africa to trace their roots and be able to register this status with the Indian government.

Our system includes a complex timeline which allows users to simulate migration from India through animation, contains complex glyphs representing migrants and ships to aid in comparisons, plots overall migration over time to aid in visualizing migration, and shows encoded historical events which allow users to make connections between migration and these events. Our system also allows for the selection of subsets of the data and calculates aggregate properties, which aids in the understanding of the data.

Catalogue of techniques

Patterns

Tokens
We used migrant tokens, which encode five properties of migrants in one mark to ease comparison between migrants. Similarly, we used ship tokens to encode properties of ships and migrants on ships to ease comparison between ships. We have also used tokens to represent events--yellow lines on the timeline represent “push” factors (events that may have led to people leaving India) and red lines represent “pull” factors, events which attracted migrants to Natal.

Area
We used a map to represent the spatial properties of migrants. This spatial representation, which can be drilled in to reveal further information about the space (India in 1860 - 1911 and modern day India) allows for the ability to understand the spatial properties of migrants historically and within a modern context.

Coordinate
Our timeline contains a line graph showing levels of migration over time. When various filters are applied (i.e. gender), this graph changes to reflect the filter(s) chosen. This is a powerful tool that will allow researchers to understand the migration of migrants of various attributes over time and find patterns or understand relationships between events and migration.

Fusion
We have used fusion to represent migrants in a continuous fashion which has no distinguishable component parts.

Spectrum
The use of tokens that contain opacity allows viewers to easily understand that more intense colours areas of the map represent areas where more migrants came from. We also use spectrum to encode the migrant makeup of the ships in our ship glyphs.

Link
One technique we were not able to finish was showing how migrants are related. The dataset contains relations between migrants and users will be able to link migrants based on familial relationships.

Group
We have done grouping of the tokens using the color by option. We can differentiate between different tokens in our visualization with respect the option that is selected in color by. We have

also used grouping in our “Selected” area to show the selected migrants compared to the average within the dataset.

Epistemic action patterns

Drilling
The user can perform drilling throughout the representation:

1. Click on a token to get detailed information about migrant, ship, or event
2. Zoom into the map to get detailed information about the map and see a complex glyph of the migrant

Filtering
Filtering is used throughout the representation:

1. Filtering by age, gender, religion etc. and their combinations to see only those migrants on the map
2. Filtering by year through the timeline
3. Filtering by search, where only migrants with the name entered into the search bar are represented

Searching
The representation allows for searching for migrants by name, which allows for easy retrieval of known migrants.

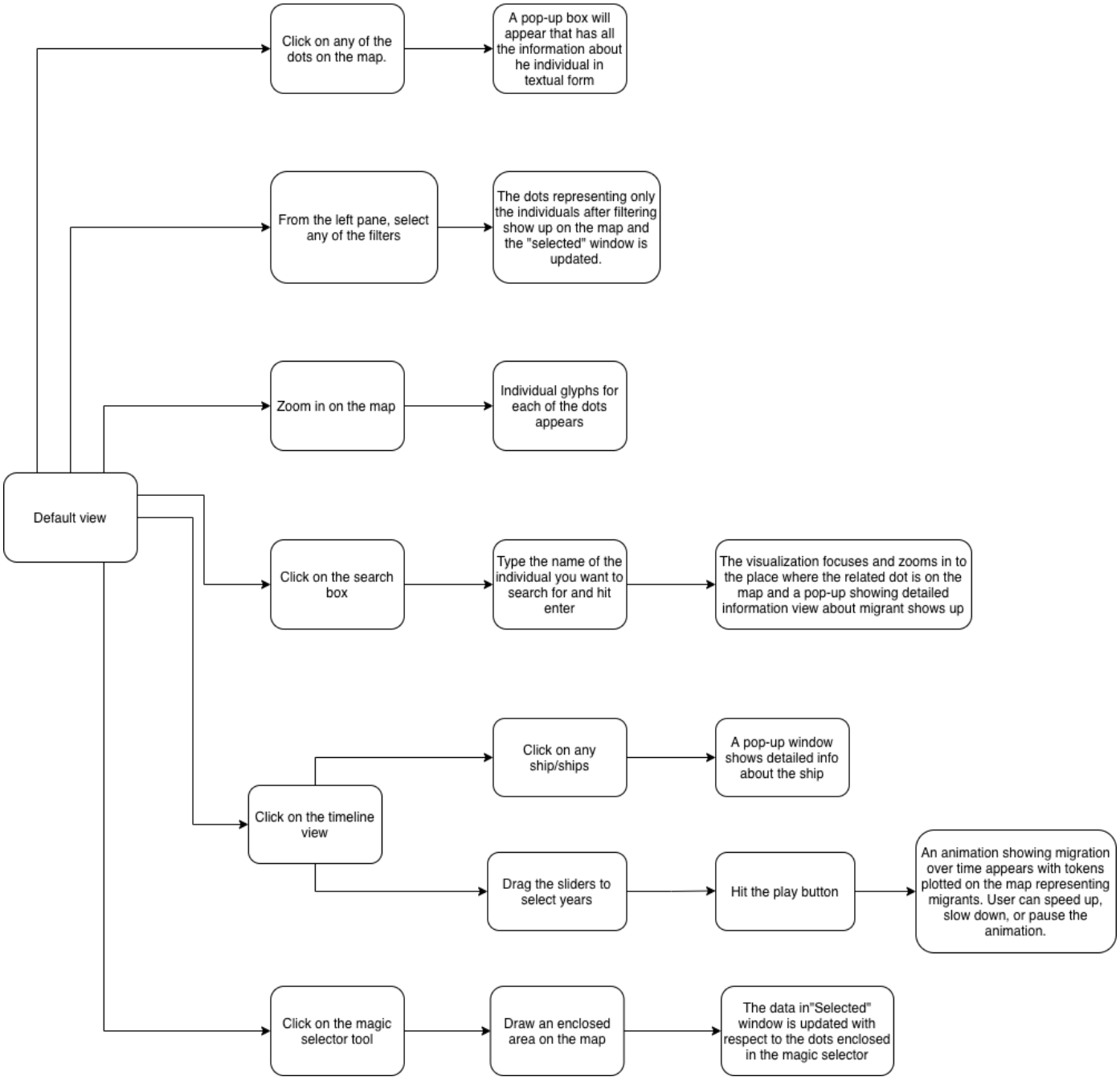
Selecting
Selecting can be done by clicking on a migrant, ship, or event, or by using the selection tool to select a group of migrants. The selected area on the right of the representation gives further information about the selected data along with the graph in the timeline.

Comparing
Comparisons can be made through clicking on ship tokens to see detailed views side-by-side, and also through looking at migrant tokens.

Accelerating/Deceleration
Using the timeline control features, the user can play a simulation of migration over a selected time and also speed up and slow down the simulation, allowing for the user to better understand spatial properties of migration over time.

Animating/Freezing
The timeline control features allow the user to play a simulation and freeze that simulation at any time, allowing the user to understand spatial migration over time and pause the animation at specific points to allow for pattern recognition.

Flow chart


Default view
Click on any of the dots on the map.
A pop-up box will appear that has all the information about he individual in textual form
From the left pane, select any of the filters
The dots representing only the individuals after filtering show up on the map and the "selected" window is updated.
Zoom in on the map
Individual glyphs for each of the dots appears
Click on the search box
Type the name of the individual you want to search for and hit enter
The visualization focuses and zooms in to the place where the related dot is on the map and a pop-up showing detailed information view about migrant shows up
Click on the timeline view
Click on any ship/ships
A pop-up window shows detailed info about the ship
Drag the sliders to select years
Hit the play button
An animation showing migration over time appears with tokens plotted on the map representing migrants. User can speed up, slow down, or pause the animation.
Click on the magic selector tool
Draw an enclosed area on the map
The data in"Selected" window is updated with respect to the dots enclosed in the magic selector