Seattle Band Map Redesign

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ABSTRACT

We propose a redesign of the Seattle Band Map (seattlebandmap.com), a visualization of crowd-sourced data about Pacific Northwest bands and the connections between them. The current visualization is difficult to navigate and is not organized in a way that supports exploration or discovery. Our redesign began by rethinking the process of how users explore the graph. We focused on clustering the bands in meaningful ways to generate points of interest on the graph, adding interaction to guide the exploration experience, and enhancing the dataset to create a rich, multimedia experience. We created a proof of concept that allows users to listen to audio samples, filter bands by date range or genre, and view relationships between bands based on different characteristics. For our project, we used a subset of 521 bands.

Many music discovery and artist collaboration visualizations effectively reduce large networks by having the user input a band or song and generating a graph of related data points [1, 2, 3, 4]. Rather than having the user input a starting point, we use the shape of the network to prompt exploration and allow for broader discovery. This challenged us to find new ways to organize the data and to give users enough control to navigate the global view as well as identify and focus in on points or areas of interest.

Author Keywords

Data visualization; music; collaboration; bands; network graph; artist collaboration; music visualization

INTRODUCTION

Seattle, and the greater Pacific Northwest, has long been known for its vibrant music scene. In the 60's and 70's Seattle fostered a flourishing soul and funk scene and produced musical exports such as Jimi Hendrix. In the mid-80's and 90's grunge, or the "Seattle sound", emerged and was popularized through bands like Nirvana. Today, Seattle boasts a strong indie music scene, with bands like Modest Mouse, Death Cab for Cutie, and The Postal Service hailing from the Pacific Northwest, as well as successful hip-hop and experimental groups such as Macklemore and We Paint With Sound.

The Seattle Band Map project began in 2009 to document and showcase this vibrant music scene across the decades, broaden understanding of the local music scene, and spotlight underrepresented artists and musical genres [5].

Originally a hand drawn art project, the map was expanded to a 12-foot long banner with 700 bands, and then turned into a website in 2011. The current visualization explores "how bands from the Pacific Northwest are interconnected through personal relationships and collaborations"[4]. It consists of a node-link diagram where each node is a band, and each link is a connection between bands.

The website allows the public to submit data about bands and their connections, including the band name, current city and state, band website, band members, and names of bands that they are connected to. To qualify as a band, a group must have "recorded and publicly shared at least one song and/or played a public show"[5]. Bands can be listed as connected if they "share band members or two artists have collaborated on a project"[5].

Thus far, 3,466 bands have been submitted, with a total of 4,786 connections. Numerous connections to bands outside the Pacific Northwest have been added. The dataset is continuously being updated, with the latest update five days prior to the writing of this paper. The resulting graph (Figures 1 and 2) is a large network with a highly interconnected center, and few distinguishable clusters.

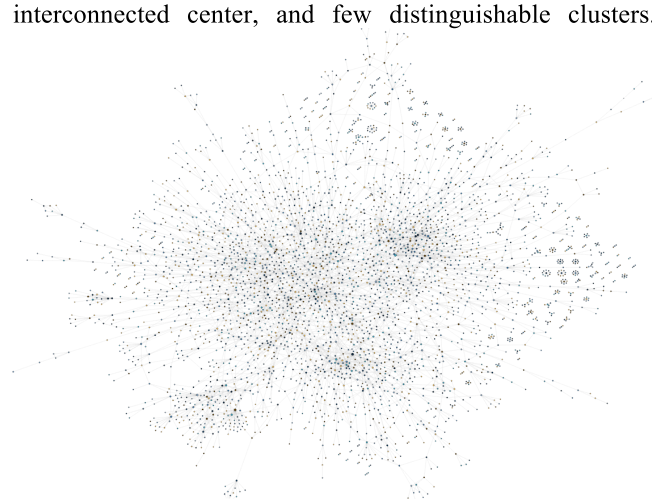

Figure 1. Current Seattle Band Map, global view.

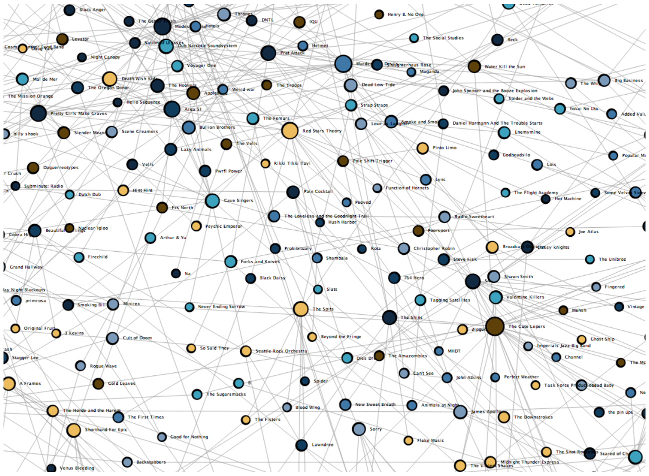

Figure 2. Current Seattle Band Map, zoomed in view.

The current map allows users to zoom in and out of the graph, view the name of the band by mousing over a node, and view the band connections, website, location, and members by clicking on the node.

While the Seattle Band Map holds an immensely interesting dataset, the current presentation of the information makes it challenging to identify a starting point for interacting with the graph. On the global level, there is no way to interact with the graph to look at broader patterns. Our redesign addresses these issues by providing viewers multiple entry points for exploration.

RELATED WORK

Other Surveys of Music Visualizations

Numerous visualizations have been created to map relationships between artists or genres over time or to support music discovery by connecting acoustically similar artists. Daniel Brownstein of the blog *Musings on Maps* discusses a selection of these visualizations in his post "Attempts to Map Music" [6]. His post discusses the merits and challenges of different types of mappings, and calls out the "massive problem" [6] of space and crowding that the Seattle Band Map faces. His post asserts that the large number of bands and high level of interconnectivity renders the map almost unreadable within the current website, and calls into question the utility of such an extensive mapping.

Paul Lamere of The Echo Nest gave a presentation entitled "Finding Music with Pictures: Data Visualization for Discovery" [7]. The presentation surveys different visualization techniques for music discovery, including the hand drawn version of the Seattle Band Map. Many examples from this presentation inspired and informed our design.

The majority of visualizations that relate to our dataset take one of two forms: 1) egocentric networks where the user inputs a band or song as the ego, or center point, and can change egos to dynamically reveal new portions of the network, or 2) static network graphs that show the global view of the network.

Dynamic, Egocentric Graphs

Live Plasma [1], Music Map [2], Map of Jazz Musicians [3], and Musician Map [4] are examples of egocentric graphs that reveal a small portion of a larger network, based on a user-submitted ego. Users can click on or submit new points to change the ego and reveal new portions of the network. These visualizations allow users to see first-degree connections to the ego, and many include songs, video, or photos for each artist. While this approach is effective in limiting the number of artists displayed to a readable number, we feel that it limits discovery to genres that the user is already familiar with. Additionally, it does not allow for explorations of broader patterns across the entire network.

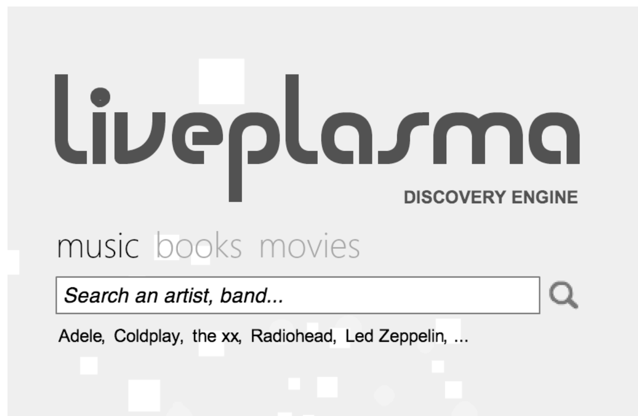

Figure 3. Live Plasma splash screen. A graph is generated based on what is entered in the search box.

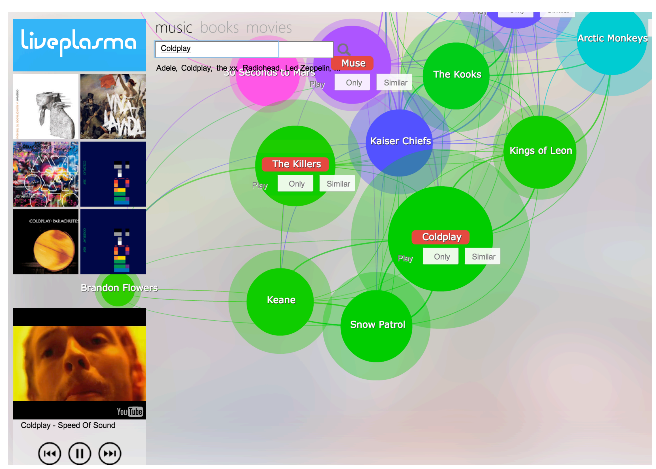

Figure 4. Live Plasma graph generated by entering "Coldplay" in the search box.

Static Network Graphs

World of Music [8], Landscape of Music [8], and the Last.fm Artist Map [10] are examples of static network graphs. The focus of these visualizations is the entire shape of the network, and where individual points fall in relation to the whole. These networks form beautiful shapes and are incredibly dense—not intended for exploration on a granular level. The examples that we viewed had limited interactivity: primarily zooming, clicking on points to see band names, and searching for bands.

Figure 5. World of Music

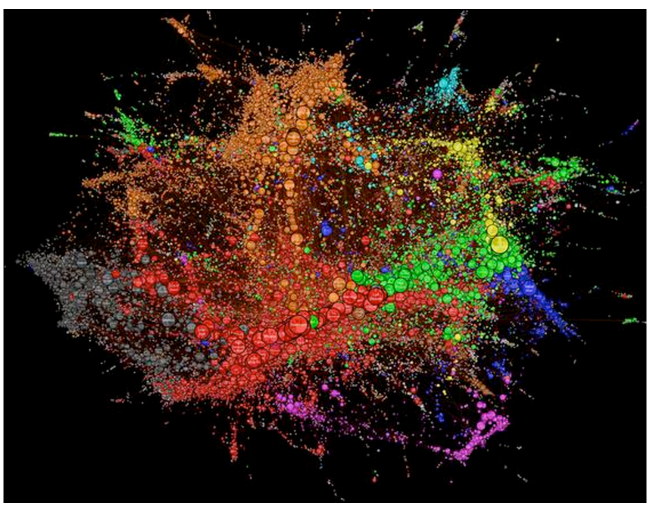

Figure 6. Last.fm Artist Map.

A Richer Discovery Experience

Our design combines strengths from both types of visualizations to offer a new exploration experience. On the global level, we allow the user view the relationship between bands in different ways by toggling between two views. One view links bands by shared genres (each band belongs to multiple genres and subgenres), the other by collaboration with other bands. Users can also manipulate the global view by using the date and genre filters. On the band level, users can click on a band to see its first-degree connections, hear a music sample, and see album artwork.

METHODS

Data Collection

We retrieved multiple pieces of metadata for each band from Wikipedia, using tables available on DBpedia [11]. We felt that the most valuable attributes were active years for each band, and genres. Of the 3,400 bands in the Seattle Band Map dataset, only 506 were found in the Wikipedia dataset. Each band was categorized into an average of three genres or subgenres, with a total of 330 genres for the 506 bands.

We later discovered that iTunes assigns one primary genre to each band. We retrieved this data along with song samples and album covers for each band using the iTunes Search API. Because of the structure of the API, we had difficulty maintaining data quality and ended up with a handful of bands linked to incorrect genres or song samples.

Visualization Algorithm

We used HTML, CSS, JavaScript, and the d3 JavaScript library to build a force-directed graph. While we considered representing the network as a matrix, we felt it would be too hard to extend the matrix and map all the bands onto the limited space of a webpage.

We calculated the force between nodes in two different ways, and allow users to toggle between these two views of the graph. In the "Collaboration View", nodes are linked to bands they have collaborated with, and the force of each connection is equal. This results in a very even placement of nodes.

In the "Similarity View", we calculated the force between bands based on the number of shared genres from the Wikipedia dataset. We treated each genre and subgenre as a separate attribute, and used the following equation to calculate the force between nodes:

$$C_{ij} = \frac{\sum_{a\in A} v_{ia} \cdot v_{ja}}{\left(\sum_{a\in A} v_{ia} \cdot \sum_{a\in A} v_{ja}\right)^{1/2}}$$

In this equation, *i* and *j* are nodes in the graph, *a* represents a genre, and *v* is a binary value representing whether or not the node belongs to that genre. Nodes with a similarity value of $C > 0.4$ (out of 1.0) are connected. We applied a force-directed layout algorithm [12] to cluster the connected nodes, while the amount of similarity is shown by the width of the edges between the nodes.

Initially we wanted to try different ways to calculate node proximity but the loose matrix formed by the large number of subgenres did not provide sufficient information to train the data. We feel it would be useful to retrieve additional data from platforms such as Spotify, Pandora, or Beats Music, and that a larger dataset would allows us to calculate a better estimation of acoustic similarity.

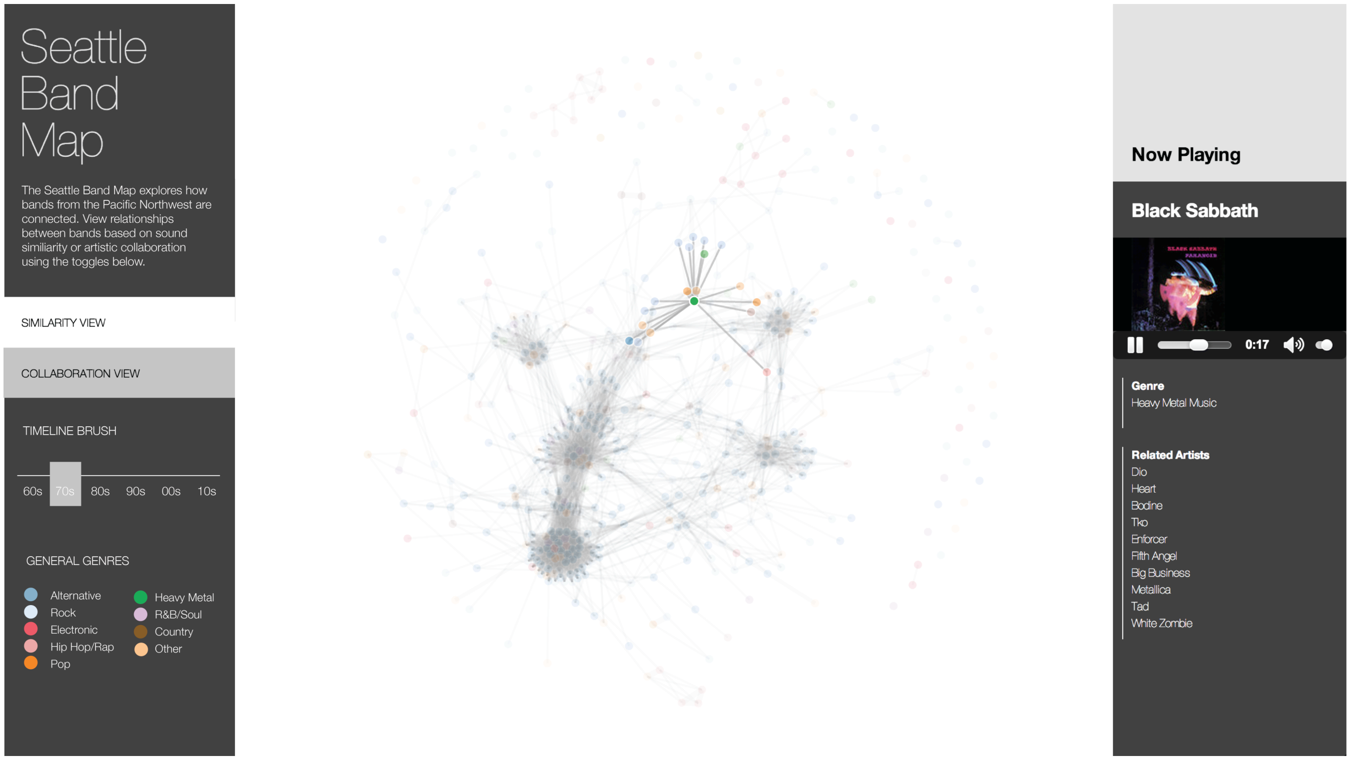

Figure 7. Redesigned Seattle Band Map interface with Black Sabbath selected.

RESULTS

Interface

Our web-based interface consists of three sections (Figure 7). The network visualization sits in the middle, with information about the graph and global controls—toggling views and filtering—in a panel to the left. To the right of the visualization is a panel containing information on the selected node.

Interaction

In the left panel, users can toggle between views of the graph that either cluster the nodes by sound similarity (shared genres) or by collaboration. Users can also highlight a subset of bands by selecting a date range or genre using the filters.

On the graph, users can click on a node to highlight it along with its first-degree connections. Clicking on a node will also begin to play a song sample, which will appear in the right panel. Once a band is highlighted, the right panel populates with its genre data from Wikipedia and its connections. Nodes stay highlighted when users toggle between views. Nodes are colored by their primary genre, found in the iTunes dataset.

DISCUSSION

The goal of our design was to support exploration of the graph by giving users a starting point for discovery and useful ways to interact with the graph. While the techniques we used were not new, we combined them in a way that created a meaningful discovery experience for the dataset we were working with. Along the way, we received and incorporated feedback about our design, and learned about the challenges of crafting an exploration experience for music.

Incorporating Feedback

During the poster session on March 13, 2014, we received feedback on our design from numerous people and were able to watch people interact with the graph. Originally, we linked nodes and calculated the gravity between them based on shared genres *and* collaboration. This turned out to be a major point of confusion for people, as the edges in the graph did not necessarily represent collaboration between bands. In our final design, we separated out these two variables and allowed users to toggle between clustering the bands based on collaboration or on subgenre.

Lessons Learned: Classifying Music

One major challenge that arose in trying to add metadata to our visualizations was the sheer number of genres and subgenres, and the fact that bands fall into multiple genres. We struggled with how to integrate our two genre datasets from Wikipedia and iTunes, and with how to allow users to filter by genre without losing data and eliminating subgenres. The large number of subgenres made us questions whether there was a more meaningful way to classifying music than bucketing it into distinct genres.

FUTURE WORK

The design we created is a proof of concept that uses about one sixth of the total Seattle Band Map dataset. As we extend the dataset to include all the bands, we need to continue to think about how to layout bands so that the global view is still navigatable. One design we would like to explore is stretching the network out along a vertical timeline.

Another solution for dealing with the density of data would be to narrow the dataset to only include Washington-based bands. While it is interesting to see connections between Washington-based bands and famous bands elsewhere, this dilutes the dataset. The Seattle Band Map is distinctive because of its local focus, and we feel that keeping this focus will help further the goals of the project to spotlight underrepresented artists.

We also would like to explore other interactions, such as allowing users to leave comments or annotations on different views of the graph. This would allow us to crowd-source rich metadata about the patterns and clusters in the graph.

Currently, the original Seattle Band Map poster is at the Experience Music Project museum. We are interested in updating the installment with an interactive digital exhibit. This would allow us to explore many more forms of interaction.

AKNOWLEDGEMENTS

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