QuickDraw: Visualizing Aspects of Potential Residences

Adrian Leven
Stanford University
717 Dolores St. Stanford, CA
leven@stanford.edu

ABSTRACT
QuickDraw is a visualization application whose function is to help users learn more about the various options for housing on a university campus, in this case, Stanford. In this paper, I investigate the best methods for representing many different disparate data types in one all-encompassing program. I also discuss the Stanford Housing Draw Application, including a description of the process, as well as an investigation of documented problems with the draft and their solutions.

Author Keywords
Data Visualization, Housing, Stanford University, Ranking Algorithms.

INTRODUCTION
Stanford University is home to some of the smartest and most talented software engineers and human-computer interaction specialists on earth. Despite this, many of the institution's online tools and applications are severely lacking. One example of this is the University Housing Draw Application, known simply to the students as "The Draw."

The Draw is notorious for its inconvenience and unintuitiveness, but its main pain-point that I chose to highlight is its lack of provided information. Students are forced to make uneducated decisions about their potential housing, purely due to a dearth of good information to be found.

First, I will describe how the Draw works. There is little literature about the inner workings of the system; there are few who claim to understand them. I have pieced together an understanding of its machinations throughout my tenure at Stanford.

Essentially, the Draw is a campus-wide lottery system where applicants are assigned positions, or "Draw Numbers," which are used to determine each student's preference in housing assignments. Ultimately, Residential and Dining Services (R&DE) go through the list of applicants, starting at Draw Number 1, giving each student their most preferred residence that hasn't been filled yet. For example, a student with Draw Number 4 would get their first choice for residence in the next year, whereas a student who received Draw Number 1800 would have to settle for their top choice that had not been filled up already.

If that wasn't complicated enough, students may also draw in a group, which changes the assignment system. Commonly, larger groups are assigned to lower-tier residences, simply because it is less likely that a house will have fewer open spots than are needed for a group.

Another important aspect of the draw is *tiers*, which essentially dictate the quality of houses to which a student may be assigned. Over their career at Stanford, students can apply once to *tier 1 housing*, once to *tier 2 housing*, and once to *tier 3 housing*. This guarantees that all students will get the chance to live in a nicer house for at least one year.

For the purposes of this report, I will focus on one aspect of the Draw Application- the ranking of preferred residences. For the Draw, students are expected to list each residence in order of preference. This involves individually ranking over 70 different residences against each other. To make matters worse, there exists no real publicly available data from which to make decisions. Students are forced to make uninformed decisions based on incomplete data.

This is what inspired me to create this visualization. If I could create a single location where students could learn everything they need to know about the houses on Stanford's campus, they wouldn't have to make uneducated choices, and end up prioritizing houses that fit their needs.

If each student could more effectively and intelligently submit their housing preferences, then general satisfaction with housing would increase, as students wouldn't be unpleasantly surprised come move-in day.

RELATED WORKS
While this problem that I have chosen is quite specific to a small subset of people (undergraduate students at Stanford University), the visualization problems that I have chosen

CHI 2009, April 4–9, 2009, Boston, Massachusetts, USA.

to tackle are applicable to other datasets. For example, an online mapping application like Google Maps must go through some of the design challenges that I worked with.

http://www.utpjournals.press/doi/abs/10.3138/J0L0-5301-2262-N779

Google Maps, like the majority of Google's tools, is hailed for its clean interface, its readability, and most of all its ability to express a large amount of data in a way that is clear and engaging to the user. For this reason, I borrowed many visualization techniques from Google Maps, including the background map and the concept of clickable "points" on the map.

As far as similar existing applications, I was not able to find anything in the same vein. Utilities like Zillow or Trulia have similar features in that they allow users to browse potential homes, featuring an overhead map. However, the similarities end here. Many of the key data points that I highlight are not applicable for the "real world" real estate market. That said, this type of tool was useful in seeing which parts of their visualizations worked, and which didn't.

METHODS/FUTURE WORK

I build QuickDraw on the OpenProcessing visualization platform. This allowed for quick implementation of visual systems. Due to time constraints, I was unable to complete the engineering portion of the assignment to the level I would have liked, so in this section I will describe how it all would work if I was able to complete it.

Filters

One of the main value-adds of QuickDraw is that it presents data about Stanford's residences in one easy to understand place. If it were to present all 75 possible residences with their descriptions at once, it would be difficult to extract any information. This is the reasoning behind the inclusion of filters; by checking or un-checking filters, the user can view only the residences that apply for them.

Distance

Another important part of a living space is its location. Users would have been able to find out how far a house is from their favorite locations on campus. This would have required integration from the Google Maps API in order to give separate time estimates for walking and biking. Similarly, that would require an overhaul of the current "residences within radius *x*" system, which doesn't take into account Stanford's walking routes.

A Recommendation System

Quick access to information is important, but QuickDraw truly shines when it comes to its convenience. For this reason, if a user simply input their parameters, the application could generate an ordered list that can be directly input into the Draw Application, removing any requirement for interpretation of the data.

Such a recommendation system would use a simple weighted-sum algorithm to generate the rankings. This algorithm could use predetermined weights for each parameter of the query, or could survey the user first. This would enable the program to focus only on the features of a house that matter to them.

Resident Reviews

Of course, some of the best parts about a house can't be expressed simply by my chosen parameters. For this reason, I think it would be a great addition to include functionality for viewing reviews from previous residents. On top of this, it would be possible to extract sentiment from reviews using simple Natural Language Processing algorithms. From here, the residence recommendations would become even more precise, as we'd be able to use an artificial intelligence system like Amazon's to show the user where similar applicants lived, and what they thought of their house.