Project Part 7: Evaluation
Homing Real Estate Search Mobile App

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Abstract—In this article we present the results from our empirical and analytical evaluations of our real estate search application. The empirical evaluation will include the observation of a prospective homebuyer who matches the likely demographics of users who we anticipate will use the mobile app. The user will be observed as they search for and filter potential housing options and add a house to their "Favorites" list.

I. INTRODUCTION

We conducted analytical and empirical analysis on our real estate search application. The process started with the empirical evaluation.

II. EMPIRICAL EVALUATION

A. Goals

We want to specifically find out how users are actually going to interact with our mobile app. By asking the user to think-aloud during the study, we should be able to observe and record UI problems that our analytical study missed. Since this user will be using this prototype for the first time, we hope to gain insights on how we can improve our UI with respect to learnability as well as utility.

B. User and Tasks

The user who participated in our empirical evaluation of our prototype is a married, Caucasian female, aged 40 who is currently searching for a home. She is college educated and an attorney. She is technologically proficient. An avid video game player. She currently lives with her husband in a 2-bedroom apartment in Methuen, MA. She owns an iPhone 5S and mostly uses the Outlook Mail app, Facebook App, Calendar, and Maps app.

She was asked to search for and filter potential housing options and save a selected house to their "Favorites" list. This task can be broken up into several subtasks. First, the user must search for a house by entering a location on the home screen. Then the user will need to apply a primary search filter so only housing options with 2 bedrooms and 2 bathrooms are included in the results. The next step for the user is to use the Map Boundary Tool to draw a specific neighborhood boundary within which the house should be located. Finally, the user should apply a secondary search filter to select houses in areas of low crime rate to further narrow the search. The user will then need to select a specific house from the list of search results and finally save the house to their "Favorites" list.

C. Which techniques and why

We used a medium-fidelity dynamic prototype built with myBalsamiq for our usability study. We selected this particular prototype because we felt it would be a less distracting experience for the user during the study compared to using a paper prototype since the evaluator does not need to hover right next to the user in order to move pages around. In addition, we were able to focus our attention on recording data and asking appropriate follow up questions rather than worrying about manually changing what appears to the user. We wanted to specifically find out how users are actually going to interact with our mobile app. By asking the user to think-aloud during the study and recording her verbal responses, we were able to observe and record UI problems.

We began the usability study by asking some general questions about the user's background as a warm up so they would become comfortable. We then asked the user to complete some thought exercises by thinking through them out-loud so she would be comfortable with the think-aloud portion of the evaluation. We first asked her to add 2 three-digit numbers aloud. Then we asked her how many windows were in her in-laws house and listened to her talk through counting each window. We then asked her "How many states that begin with the letter "A" can you ski in?" and listened as she reasoned through to a solution. Once she was comfortable with the talking-aloud aspect of the evaluation, we described the overall task that the user was to complete as well as described the subtasks in general so that she would know what to do during the overall evaluation. We did not describe how to do them or where to click so we could observe the user trying to reason through and figure out how to complete these tasks. We then explained the basics of the dynamic prototype and then asked her to begin.

We took notes during the evaluation and when we thought the user became confused with the prototype, we asked follow-up questions in order to clarify certain responses. We had also developed a written strategy containing a list of expected user

actions during the evaluation, which We also referenced to follow along with the user. After the user finished all of the subtasks, we asked her several follow up questions and recorded her responses.

D. All materials used in the empirical study

The materials used in the empirical study include a dynamic prototype created in myBalsalmiq. In addition, we developed several strategies to guide us during the evaluation. We also drafted a series of follow-up questions for the user to help identify additional areas of improvement. All of these materials are available in the Appendix of our report.

E. Data you ended up collecting (overview of the types, and appendix with all the raw data). Graded on richness and quality

The evaluation was completed in the user's apartment at her computer desk. Pictures of the environment are included in the Appendix. The evaluation was audio recorded and can be listened to in full at the following link: https://goo.gl/mJxR77 . The entire evaluation lasted approximately 27 minutes. The audio was then analyzed again to parse out additional observations and areas for possible improvement and are noted below. Handwritten notes made during the evaluation are also available in the Appendix.

Results of Data Analysis

- User would likely enter town for initial geographic search.
- Crosshairs icon might not be clear enough to users that it opens Map Boundary search tool.
- User would likely filter results first by bedrooms/bathrooms.
- User is generally able to easily understand how to select and also apply filters.
- User may not have high confidence in crime rate data without knowing more about the source of the information.
- User easily understood how to apply crime rate filter.
- User would like details on the number of garage spots in the detailed listing.
- User would like to be able to see other pictures of the house in the detailed listing.
- User liked the fact that the detailed listing included the actual address of the property.
- User really liked geographic boundary search tool, felt that it was easy and intuitive.

F. Adherence to original plan plus well-explained changes

We were able to adhere very closely to the original evaluation plan that we had developed but some minor deviations did occur. Our evaluation plan didn't explicitly mention completing a brief warm-up and think-aloud practice session with the user. We decided to implement this for our actual evaluation because we felt we would be able to obtain better feedback from the user if they were comfortable with the overall process as well as thinking-aloud during the study.

In addition, the user attempted to scroll through the pages of the dynamic prototype so we instructed the user to limit her interaction with the prototype to just clicking the mouse button instead of scrolling. We think the user just intuitively attempted to do this because they were viewing the dynamic prototype in the default PDF viewer.

G. Results

We were able to achieve our goal of learning more about how well potential users would interact with the user interface. In addition, we were able to identify several UI problems that we previously missed. The following insights were generated from examining our user's observations during the evaluation as well as her responses to our follow-up questions.

Insights:

- One limitation of our dynamic prototype is that it is easy for the user to bypass the intended page flow by scrolling through the pages of the PDF file. The user appeared to intuitively attempt to do this. Therefore, for future empirical evaluations it is important to instruct the user that they should not attempt to scroll through the prototype as if it were a normal PDF file.
- User indicated that without knowing the source of the crime rate data that she would have doubts about its accuracy. It may be necessary to briefly explain how the crime rate data was collected and the sources of that data.
- User indicated that the number of garages is an important factor when considering purchasing a house.
- User also brought up an interesting idea that certain features might be more important in different geographic locations. For example, in Arizona the existence of a pool would be very important in making a purchasing decision whereas in New England the type of heating system used would be a primary factor. Therefore, it may be necessary to highlight different features depending on the geographic focus of the search itself.
- User indicated that she would like to be able to see more pictures of the home when

viewing a specific result. It may be necessary to make it more clearly to the user that more pictures of the specific property are available. One possible solution would be to implement the picture display that is currently used on the home screen. This display contains a scroll bar and also graphically conveys to the user that other pictures are available.

- One area that prototype could be made more consistent and realistic is with regards to the results displayed. If a user does a geographic boundary search, all results should be from within the same neighborhood.
- User wasn't sure what happens after pressing "Save Home" button. One solution would be to add a popup message that the "Home Successfully Saved to Favorites."

III. ANALYTICAL EVALUATION: HEURISTIC EVALUATION

A. Heuristic Evaluation Test Plan

We decided to choose the Nielsen's Heuristic Evaluation. This type of evaluation allows experts to walk through the process we laid out in order to find what our interface does well, as well as where we could improve the interface.

The task that we walked through to perform the evaluation is searching for a house by applying several filters and then saving that house. This is intended to make the home searching process more simple by providing the user with all of the information that is most vital to them.

B. How The Analysis Was Performed

The analysis we performed was based on Nielsen's Heuristics. Each expert walked through the interface and searched for a house by applying filters and eventually saving the ideal home. The following are the characteristics we evaluated upon:

1. **Visibility of system status:** Is the system providing appropriate feedback at reasonable times?
2. **Match between system and the real world:** Is the system providing "phrases and concepts familiar to the user, rather than system-oriented terms?" This includes real world conversations.
3. **User control and freedom:** Does your system support an undo/redo system?
4. **Consistency and standards:** Is the terminology that has been used consistent with the system and platform?
5. **Error prevention:** Does the design prevent a problem from occurring? If an error occurs, does the system provide a detailed enough message that related what went wrong with the program? If the user is able to use an action that may or may not cause and error, does the system ask for confirmation before allowing the user to proceed?
6. **Recognition rather than recall:** Does the interface reduce the memory load of the user by making all of the objects, actions, and options visible when applicable?
7. **Flexibility and efficiency of use:** Is it possible for the system to cater to both experienced and novice users through the speed at which the task can be completed? Can the user "tailor frequent actions"?
8. **Aesthetic and minimalist design:** Is all the information that is displayed intended to be there; does the displayed information on the GUI have relevant qualities?
9. **Help users recognize, diagnose, and recover from errors:** Are error messages "in plain language (no codes), [do they] precisely indicate the problem, and constructively suggest resolution"?
10. **Help and documentation:** If help is needed with interface, will the user be able to find the right help documentation and understand all concurrent instructions.

C. Analysis

Upon review of the level of feedback provided to users, we were able to identify some areas for improvement. We have identified an opportunity to show a more clear view of the process and results of a user saving a searched house. Also, it would benefit users if they were notified of the initial search location and the active filters that were applied to the search.

For the most part, the system matches real world. Users will not be confused by terms or icons used within the application.

After examining the user control and freedom, it was determined that it would benefit the usability of the application if there were a more clear way to exit the help screen in the map view. We also need to address a way to close/exit the program so users know how to terminate the process of searching for a home with our app.

The application is very consistent throughout all of the screens. One aspect that could be tweaked is that the active filters are not shown to the user. Changing this will allow the user to modify and update filters and have a more positive experience with the app.

A common theme in the error prevention section is to allow the user to undo a filter or map

boundary in case they make a mistake. This change will benefit users by allowing them to draw boundaries and add filters while having the ability to undo them.

It would be helpful for recognition if it were more apparent where the saved homes and profile information are contained. If users know where to keep track of previous interactions with the app, they will be more likely to return and use the app more often.

The efficiency of the application was considered adequate by the evaluators. One small change that could improve efficiency is to have an option to pull up previous filters or search options.

The application is aesthetic pleasing according to the evaluators. For the most part, screens are not cluttered with unnecessary information. One aspect that could be improved is removing the filters when the search is returned.

The app does a great job of not allowing for many user errors. However, it would be useful to show the user the address he/she enters so they can tell if they made a mistake.

There could be a change to the help button on the map boundary tool so that the user can easily recognize it. Also, an options menu would benefit a user who wants additional documentation on the application.

D. Insights

- Primary Search Filters should be on the initial search screen
- Provide feedback on what primary filters were chosen by the user
- Add an exit icon to the primary search filters in order to reset them
- We need to add an options bar on the home screen to access saved home, look at the user profile, and exit the application
- The map boundary will have a default boundary that the user can manipulate to match their search

Heuristic Evaluation

Visibility of system status:
Is the system providing appropriate feedback at reasonable times?
Positives:

- Splash screen informs the user of the app they are opening while it loads.
- Toggle for Buy or Sell is right up top to begin
- Search bar has suggestions inside of it before the user enters anything
- Once the results page loads, the filters are up top and easy to see
- Quick Facts provides a great overview of the key info a user likely wants to see
- Options toolbar provides easy access to any action the user might want to take once viewing a house
- On the map boundary tool the Help button explains how to use it

Improvements:

- What is considered a Primary vs. Secondary filter is not obvious to a first time user
- The dropdown for number of bedrooms and bathrooms lists numbers, but then the number appears to the side, not in the bar where the dropdown originated
- No way to review saved houses
- On the map boundary tool the Help button is not immediately apparent. It would be better next to Apply Boundary.

Match between system and the real world:
Is the system providing "phrases and concepts familiar to the user, rather than system-oriented terms?" This includes real world conversations.
Positives:

- Familiar icons are used throughout:
    - House for Home
    - Crosshairs for Location
    - Magnifying Glass for Search
- Scrollbar has a standard look

Improvements:

- House as the icon for Home could be confusing since it is also part of the app logo
- Scrollbar on results page is a desktop bar. Mobile apps don't use this type of bar designation

User control and freedom:
Does your system support an undo/redo system?
Positives:

- User can enter any address that they choose
- User can select number of bedrooms and bathrooms independently
- User can refine the search using a variety of criteria
- User can return to the search once selecting a house if they want to keep looking
- User can return to Home and start fresh
- User can draw their own map boundary for location

Improvements:

- Help on the map boundary screen should exit upon a tap anywhere outside of it

Consistency and standards:
Is the terminology that has been used consistent with the system and platform?
Positives:

- Button design is consistent
- The Location and Home buttons are in a consistent place throughout
- Results page has the same look regardless of how much filtering

Improvements:

- Active filters are not immediately apparent while viewing the results

Error prevention:
Does the design prevent a problem from occurring? If an error occurs, does the system provide a detailed enough message that related what went wrong with the program? If the user is able to use an action that may or may not cause and error, does the system ask for confirmation before allowing the user to proceed?
Positives:

- Every option except for entering and the map boundary tool is an address is a dropdown or a slider
- Map boundary tool shows where houses are before drawing so the user can adjust for clusters

Improvements:

- Include an alert if the map boundary tool or other filters cause there to be zero results

Recognition rather than recall:
Does the interface reduce the memory load of the user by making all of the objects, actions, and options visible when applicable?
Positives:

- The Location and Home buttons use familiar icons which allow new users to easily recognize them and understand their purpose
- The drop down options for the various filters are standard drop downs which will be easy to recognize and use for first time users

Improvements:

- Finding where to access the profile or the saved homes is not apparent

Flexibility and efficiency of use:
Is it possible for the system to cater to both experienced and novice users through the speed at which the task can be completed? Can the user "tailor frequent actions"?
Positives:

- It is easy to select filter options to filter search results on the first use
- Home results are a standard list with key info for experienced users to skim, but focused enough for new users to be able to easily read it

Improvements:

- Map boundary tool might not be obvious how to use for first time use
- It takes an experienced used to understand what is considered a Primary vs. Secondary filter

Aesthetic and minimalist design:
Is all the information that is displayed intended to be there; does the displayed information on the GUI have relevant qualities?
Positives:

- UI is fairly clear
- Options on screen at any time are focused on the specific actions the user is working on
- Buttons are easily recognizable icons or clearly labeled to be clear

Improvements:

- Drop downs when filtering the number of bedrooms/bathrooms has a separate field to fill the numbers into instead of replacing the dropdown field
- Filter options on results page take up more space than necessary

Help users recognize, diagnose, and recover from errors:
Are error messages "in plain language (no codes), [do they] precisely indicate the problem, and constructively suggest resolution"?
Positives:

- Help dialogue in the map boundary tool uses plain language that is easily understood
- Options to enter major filters are straightforward and in plain language

Improvements:

- Add error message if filters return zero results

Help and documentation:
If help is needed with interface, will the user be able to find the right help documentation and understand all concurrent instructions.
Positives:

- Help dialogue in the map boundary tool is brief yet descriptive

Improvements:

- Help button in map boundary tool is up top where it might be missed at first. Might work better at the bottom near the apply filter button

Heuristic Evaluation

Visibility of system status:
The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.

Positives:

- At the launch screen the user is notified that the system is loading
- The user is prompted to click on the crosshairs to determine the search area for the home
- When the user selects from the primary search filters, table drops down to reveal the filtering options based on their selection
- When the user selects Bedrooms or Bathrooms a dropdown menu appears with numbers
- When the filters are entered a list of the results appears with the number of results displayed
- If the user clicks on the crosshairs from the results screen, a map with green markers displays the houses on a map
- The help button in the map view gives directions about how to use the map function
- The user can see the boundary as they draw it in the map view
- The Crime Rate slider can be seen moving as the user moves his/her finger on the bar
- If the user selects a house they are provided with additional details regarding the property
- When the user selects the options toolbar a menu appears with options for the user

Areas for Improvement:

- The search bar at the first screen could contain a keyword like “Enter” so the user is aware of what to do
- There is no confirmation that a house is saved from the options toolbar
- There is no submit button for after the user enters address information

Match between system and the real world:
The system should speak the user's language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.

Positives:

- The home icons is familiar for users to get back to the home screen
- Users are familiar with the concept of filters and they are used to narrow the search of houses
- The scrollbar in the search results will be recognized by users as a way to traverse the list of returned homes
- The crosshair icon is representative of using a map

- People are accustomed to using their fingers to interact with a phone interface and this is consistent with the map boundary
- The crime slider is familiar to users when rating things on a continuum and they know to use their finger to interact with it

Areas for Improvement:

- Maybe place the primary search filters as a dropdown menu on the home screen since most people have vital criteria other than location

User control and freedom:
Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undoes and redo.

Positives:

- The user has an icon to return to search results from the filters page
- They also have the option to return to search results from the map view
- There is an option to redraw the boundary if the user wants to change neighborhoods
- The user always has the option to return to the home page and start all over again by clicking the home button
- The user can return to the search results from an individual house view

Areas for Improvement:

- There isn't a clear way to exit the help screen from the map view
- The crime filter could use an option to reset the slider to its default state

Consistency and standards:
Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.

Positives:

- The home and crosshair button are consistent throughout the entire application
- The thumbnails of the home with the most relevant information is common among all home search applications
- The map view of the green markers is consistent with showing points of interest in GPS applications

Areas for Improvement:

- The quick facts button under an individual could benefit from a more descriptive or familiar name, such as "More Info"

Error prevention:
Even better than good error messages is a careful design, which prevents a problem from occurring in the first place. Either eliminates error-prone conditions or check for them and present users with a confirmation option before they commit to the action.

Positives:

- Under the bedroom/bathroom filter, the apply button is grayed out unless the user has chosen values for both of them
- The Apply Boundary button is grayed out until the user draws a boundary around an area
- The filter is also disabled for the crime slider until the user has chosen a value for the crime rate

Areas for Improvement:

- Possibly have a message pop up if the user's boundary line is drawn ambiguously and it is not certain if a house falls within the boundary

Recognition rather than recall:
Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.

Positives:

- The primary search menu drops down with a list of what the criteria it contains so the user does not have to remember what criteria is most vital
- The crosshair button takes the user to a map view of the area they specified to search so the user does not need to manually find the area on the map

Areas for Improvement:

- It isn't clear where the saved homes are populated so the user may need to remember the house they liked when the log back in

Flexibility and efficiency of use:
Accelerators—unseen by the novice user—may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.

Positives:

- The app shows the listings that are near the user at the bottom of the home screen so the user can quickly navigate to these if he/she chooses to
- The filters are separated by importance to the user so they do not have to search through all possible filters to find the house that is the best fit

Areas for Improvement:

- The map boundary could start with a default boundary drawn that the user could manipulate to fit his/her needs

Aesthetic and minimalist design:
Dialogues should not contain information, which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

Positives:

- The home screen is not cluttered with unnecessary dialogue or icons
- When selecting bedroom/bathroom, the user only sees the necessary drop down menus
- On almost every screen throughout the application there only exists icons and information that is directly related to what the user is trying to accomplish

Areas for Improvement:

- It might be helpful to minimize the filters when the houses are returned from the search
- Instead of the written description under the chosen house, maybe there are more specs listed below the house

Help users recognize, diagnose, and recover from errors:
Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.

Positives:

- The several help and dialogue boxes along with the shaded out buttons help prevent a majority of errors

Areas for Improvement:

- Produce an error message if the user does not enter a valid address

Help and documentation:
Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.

Positives:

- The help documentation for drawing the map boundary teaches the user how to use the function
- The documentation for the crime slider informs the user on the functionality of this filter

Areas for Improvement:

- There should be a box at the home screen that encourages the user to register for the app and briefly list benefits

Heuristic Evaluation

Visibility of System Status: is the user being informed and updated about what is going on?
Positive Attributes:

1. *Location: Splash Screen* - At the splash screen a loading bar is used to inform/allow the user to estimate the loading time before launch of the application
2. *Location: Search Results* – Users are notified about the quantity of "hits" that have been found at the top of their page. This can direct them towards the necessity to further narrow their search or select from the results that are presented.

Improvements:

1. *Location: Search Results* – Users are not notified about the initial search location/active filters. Adding this feature will improve user visibility/awareness.

Match between System and the Real World: Is the application free of jargon, difficult, and confusing? Is information provided in a logical order?
Positive Attributes:

1. *Location: Throughout* – The application uses familiar wording that is used commonly used for online search tools (i.e. shopping applications, other housing applications, and general search).

Improvements:

1. *Location: Initial Search* – It may be useful to have a link to documentation that defines commonly used housing terms that may be presented in the home details page/quick facts.

User Control and Freedom: Does the UI support redo, undo, and exit when necessary?
Positive Attributes:

1. *Location: Initial Search/Throughout* – Introduced at the initial search screen and continuing throughout, the home icon in the top right corner will take the user back to the initial search.
2. *Location: Primary/Secondary/Proximity Search Filters* – The user is allowed to reselect a previously determined search filter and adjust constraints at any time.

Improvements:

1. *Location: Search Results* – The search results screen does not support a feature to undo a previously set filter to restore results to unfiltered stated. Having an undo last filter and reset all filters feature may be beneficial.
2. *Location: Throughout* – Currently there is no feature to exit/close the program. This must be addressed.

Consistency and Standards: Does the application use the same words for performing the same operations throughout the entire process?

Positive Attributes:

1. *Location: Throughout* – The user is presented with consistent icons throughout the application. The word "return" is used commonly on buttons that bring the user back to an initial screen. The word apply is used throughout when a user is given the choice to finalize a filter setting.

Error Prevention: Are there possible areas where errors can occur? How can these errors be eliminated or prevented?

Positive Attributes:

1. *Location: Initial Search* – A user can accidently choose an unintended filter options from the initial search page. The "return to search results" button will bring them back to the search results page.
2. *Location: Boundary Tool* – A user can make a mistake drawing a boundary. Once a boundary has been drawn, users are given the option to redraw their boundary via a button.
3. *Location: Home Details* – If a user selects a home and is not interested, they can use the return to search button and select a different home from the previous search results.

Improvements:

1. *Location: Filters* – A user could mistakenly apply an unintended filter constraint. An undo/remove filter option is needed.

Recognition Rather than Recall: Where can visual options be used to help reduce the user's memory load? Are system instructions available and easily accessible for appropriate actions?

Positive Attributes:

1. *Location: Home Details* – The user is given the option to save a home to review at a later time.
2. *Location: Boundary Tool* – The user can reveal additional instructions when using the boundary tool.

Improvements:

1. *Location: Search Results* – A display of the selected search location and active filters must be visible to the user to reduce the memory load of what search criteria has been applied/not applied.
2. *Location: Initial Search* – Options to restore a previous search or bring up a saved home must be available to the user to avoid the user's need to remember previous search/filter settings.
3. *Location: Search Results* – The user has no option of saving their current search, and thus would have to reenter filters to perform the same search again. A save search feature must be added.

Flexibility and Efficiency of Use: Does the application cater to both experienced and novice users? Can users tailor frequent actions?

Positive Attributes:

1. *Location: Throughout* – The application is straightforward for the novice user, while having tools that an experienced user can take full advantage of when it comes to "narrowing" search results.
2. *Location: Initial Search* – The user is given the option to enter an address OR select from recent listings based on the user's GPS location.

Improvements:

1. *Location: Initial Search* – It may be useful to have an option for the user to bring up saved homes/restore previously saved search results/filters.

Aesthetic and Minimalist Design: Is only relevant information presented to the user?

Positive Attributes:

1. *Location: Initial Search* – The initial search page presents the user with two simple options; select buy/sell and enter a location.
2. *Location: Search Results* – Results from a search are presented in a simple fashion (picture/address/price/B-BR).

3. *Location: Home Details* – The user is given the option to scroll through a detailed home description or to click a button that will list "quick facts" about the home.

Help User Recognize, Diagnose, and Recover from Errors: If an error does occur, is the user notified (in plain language) of exactly what happened? Is the user given instructions on how to recover from or fix this error?

Positive Attributes:

1. *Location: Initial Search* – If the user enters an unintended location in the search bar, they can always return back to the initial search screen through the home icon.
2. *Location: Throughout* – While narrowing search results, the user is always given the option to return back to the previous search results page, prior to setting filter constraints.

Improvements:

1. *Location: Search Results* – It may be beneficial to show the location/address that was entered at the initial search. This would "notify" the user if they made a mistake in data entry.
2. *Location: Search Results* – As mentioned previously, it may be useful to give the users the option to see/undo filters that have been applied.

Help and Documentation: Can the application be used without help documentation? If not, are concrete steps to be carried out provided?

Positive Attributes:

1. *Location: Throughout* – The application is fairly straight forward, and thus many of its features will not require additional help documentation. The only feature that may require additional information is the boundary tool, which has been addressed via a "help" button that reveals useful instructions.
2. *Location: Boundary Tool* – Help button reveals additional instruction about the boundary tool.

Improvements:

1. *Location: Initial Search* – Although the application is simple to use. It may be beneficial to include an options menu that includes additional documentation about the importance of realtor/general instructions for basic search features.

Appendix A: Prototype
https://drive.google.com/file/d/0B3H6XMFC_igWb1o2d1MxVG1WZUU/view?usp=sharing

Appendix B: User Environment
https://drive.google.com/file/d/0B3H6XMFC_igWUF84aEplX2szU1JJZHp4T2tzM2dEU2stVFd3/view?usp=sharing
https://drive.google.com/file/d/0B3H6XMFC_igWY0pEdDAtbTBFX3V0VExIdEctVm4wdms5TXRB/view?usp=sharing

Appendix C: Evaluation Notes
https://drive.google.com/file/d/0B3H6XMFC_igWLVZsbFZ5STNfZ2c/view?usp=sharing

Appendix D: Follow-Up Questions and Strategies
https://drive.google.com/open?id=0B3H6XMFC_igWUjRDNU9MVTJnajg