**Model Component**

Our chosen model is a multi-attribute value or utility hierarchy model, which breaks down the objectives a user might be considering in deciding which home to buy. The rationale comes from the types of data we use, and the type of decision involved. From a user perspective, the decision-maker only needs to decide on the best home for their needs. There are no follow-up decisions, no chance nodes, and no impacts of the decision to be modeled. Meanwhile, the decision space is mostly unstructured, the decision is based on subjective feelings regarding the value of particular aspects, and a logical decision will need to consider multiple competing objectives. As a result, a multi-attribute utility hierarchy model is the best decision for modeling this problem.

Previously, we collected external data needed for our problem. We split the data into two types: attributes intrinsic to the home, and environmental features. The intrinsic data include the size of each home in square feet, the number of bedrooms and bathrooms, and the cost. Environmental features available include the nearest school, a constructed rating of the school based on SOL pass rate, nearby bars and restaurants with ratings, and nearby community centers and public transportation stops. These data can be merged with potential homes and their addresses to form values for each means objective.

Inputs would include user input, elicited through a user-friendly survey, asking users to assign each means objective a level of importance ranging from “Very important” to “Not at all important”. These would be captured in a spreadsheet, which would then be used to convert user input into weights of between 0 and 1. The product of weights and values for each means objective would be summed to give the total value of each alternative, resulting in the output – an overall utility for each alternative. We would need to convert this output into a ranked list, possibly a top X alternatives, to present to the user in a manner reasonably easy to understand, ideally with an associated thumbnail of each home.

Our data are currently in a raw form – while we can use algorithms to find the number of bars or restaurants in range, or the nearest school, or the distance to the nearest bus stop, we do not yet have a value assigned to each aspect of a home. The changes needed in our data therefore include using the algorithms to find relevant information for each home, including:

* Normalized monthly cost of home
* Number of bedrooms (already available)
* Number of bathrooms (with processing for fractional bathroom counts)
* Number of bars within reasonable range of home
* Number of restaurants within reasonable range of home
* Some way of quantifying the ranking of bars and restaurants – possibly an average rating of all bars or restaurants in-range

We would need to run algorithms to get these data for each home alternative, and then convert them into values or utilities between 0 and 1 (In this particular decision context, we use values and utilities interchangeably, as there is no risk involved in the decision-making and therefore a user’s risk-aversion need not be considered). After these changes to our data are complete, they will fit our model perfectly, and be conducive to integration with weights elicited from our user to determine overall utility of each alternative.

A functional diagram of the MAU hierarchy model is included below:



. In addition, provide the functional requirements for your DSS. These requirements should address user needs, the capability of the system and the requirements for the data and user interface.

The DSS still requires a finalized user interface and integration of the user interface with the rest of our model. These will be completed in the future, but we are already making progress on a Google Forms UI to allow users to input their preferences, which can be converted to weights.