Dog Score: Site suitability analysis using weighted overlay for dog owners in Portland OR.

Introduction

Upon moving to Portland or moving within Portland many homeowners, landlords or rental agency's will provide a location walk score, bike score and transit score. These scores range from 1 to 100, and scores closer to 100 are most ideal for those activities. A client would like to identify the most ideal location for owning a dog in the city of Portland in order to assist them in locating a potential new place of residence.

I propose to provide a dog score for residential units in Portland in order to identify homes that would be ideal for owning a dog. The criteria for a single family residential unit, in order of importance are, yard space, walking time to parks and trails, drive time to pet stores, and drive time to veterinarians. The criteria for multifamily residential units are, walking time to dog parks, walking time to trails, driving to pet stores and driving time to veterinarians. The weight was based on the frequency of use for a dog owner, the ranking for each criteria was based on the assumption that the average walking pace in 6km/ hour or 1000m/10min and the driving speed is 25 miles per hour. The criteria were then ranked using the clients criteria as mis range follows in order to identify a full range of results from 1 (poor) to 100 (ideal).

Methods

The data collected came mostly from Portland metro and some came from civic apps. I utilized a building layer, taxlot layer, trails layer, parks through ORCA (outdoor recreation and conservation areas) as well as a park finder layer through civic apps.

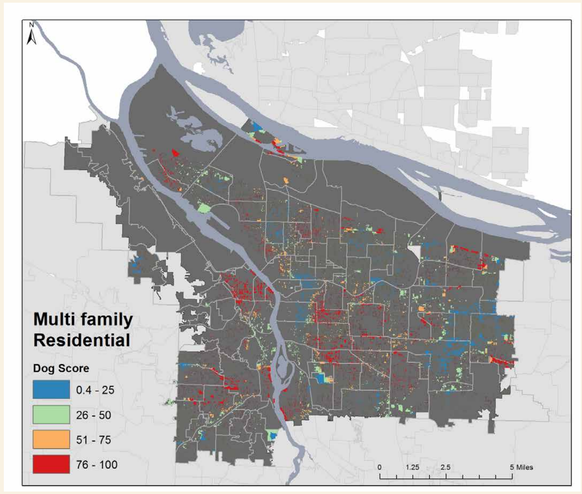
The building layer was used to extract the single family residential (SFR) buildings with in Portland. The taxlots layer was used to extract the single family tax lots within Portland. I then erased the SFR building layer from the SFR tax lot layer resulting in the "yard area" of every Portland SFR home. The yard space area was calculated and spatially joined to the SFR building layer. A raster layer of the buildings was created using the yard area as the value field. This raster was then reclassified into ranks based on how large the yard space is, 10 being the most ideal, 1 being the least ideal (figure 3).

The veterinary clinics and pet stores were identified from business license tabular data. The data was edited in excel in order to identify veterinary clinic (figure 5,9) and pet stores (figure 6,10) separately. I displayed the X,Y points, exported to a new layer and used Euclidean distance on both datasets using the city of Portland shape as the processing extend and raster mask.

Park polygons were downloaded from Portland metro which were spatially joined to the dog park points file derive from park amenity data. Euclidean distance was used for regular parks as well as dog parks which will be ranked individually for single family residential (figure 4) and multifamily residential (figure 8).

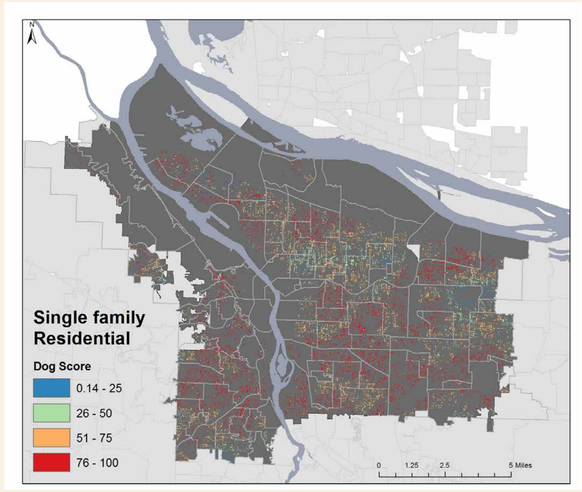
Trails data was also downloaded from Portland metro and select by attributes was used to identify recreational trails within Portland. Euclidean distance was used to not only rasterize but also buffer the trails to reclassify them ranked on the distance from SFR (figure 7) and MFR (figure 11) units.

After all the data sets are reclassified into individual ranking systems, each criteria is given a weight for how important it is overall. Raster calculator was then used to multiply the individual layer by their assigned weight before all the layer are added together. In order to achieve a "dog score" between 1-100 large fuzzy membership was used on the raster calculator results using the mean as the midpoint then multiplied by 100.



Multi-Family Residential weighting system	
Criteria	weight
Distance to dog park	5
Distance to trails	4
Distance to pet store	2
Distance to vet	1

Figure 1. Results of the multi-family residential (MFR) weighted overlay



Single family residential weighting system	
Criteria	weight
Yard Space	5
Distance to Trails	3
Distance to Parks	3
Driving time to pet store	2
Driving time to Vet	1

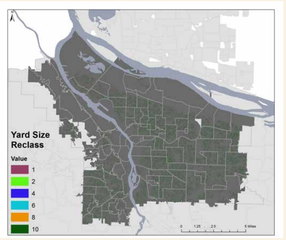
Figure 2. Results of the single family residential (SFR) weighted overlay

Results

The results of the suitability analysis on the single-family residential homes (figure 2) indicate that the majority of single-family homes are at least satisfactory (dog score of 50 or above) or almost ideal (score of 75 or above). The most heavily weighted criteria was yard space and upon initially investigating, almost all single family homes have yard space and more than half of single family homes have quite a large amount yard space. For this reason most single-family residential homes have high dog scores.

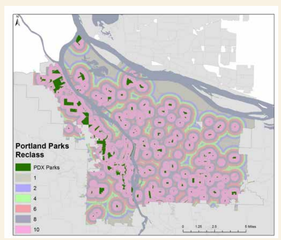
The suitability analysis on the multi family residential homes (figure 1) resulted in much more concentrated results because yard space was not included and distance to dog parks was the most heavily weighted. The locations of multi family housing with dog scores between 75- 100 in northwest Portland are located in the northwest, pearl, and old town neighborhoods, in North Portland high scores are located in the cathedral park neighborhood, and in southeast Portland the high scores are located in the sunny side, Richmond, Creston Kenilworth, and Mt Tabor neighborhoods.

SFR = Yard space (5) + Parks (3) + Vet + Pet stores (2) + Trails (3)



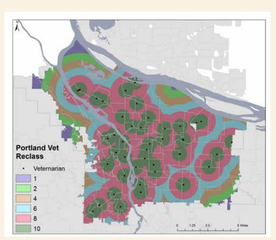
yard space (square feet)	
> 1000	10
800-1000	8
600-800	6
400-600	4
200-400	2
<200	1

Figure 3. reclassification results of single family residential yard space.



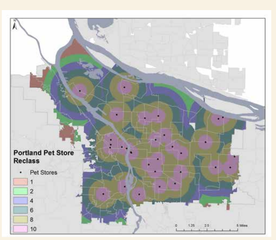
Distance to parks (m)	
500	10
500-750	8
750-1000	6
100-1250	4
1250-1500	2
>1500	1

Figure 4. Reclassification results of the distance to parks.



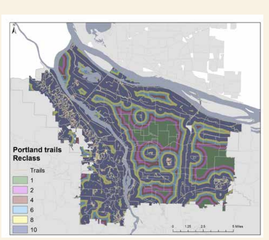
Distance to Vets (miles)	
0.6	10
1.2	8
1.8	6
2.4	4
3	2
>3.6	1

Figure 5. Reclassification results of the distance to veterinarians.



Distance to pet stores (miles)	
0.6	10
1.2	8
1.8	6
2.4	4
3	2
3.6	1

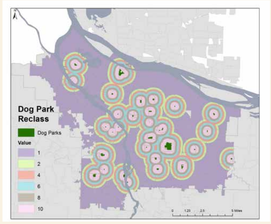
Figure 6. Reclassification results of the distance to pet stores.



Distance to trails (m)	
500	10
750	8
1000	6
1250	4
1500	2
>1500	1

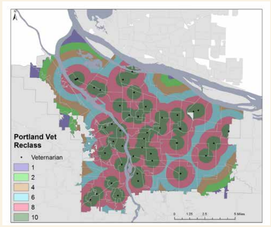
Figure 7. reclassification results of the distance to trails.

MFR = Dog parks (5) + Vet + Pet stores (2) + Trails (4)



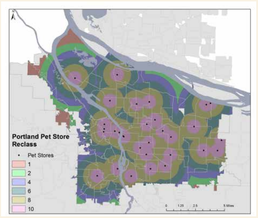
Distance to Dog Parks (meters)	
500	10
750	8
100	6
1250	4
1500	2
>1500	1

Figure 8. reclassification results of the distance to Dog Parks.



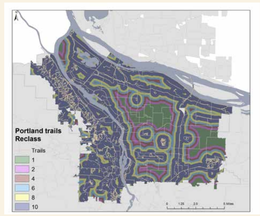
Distance to Vets (miles)	
0.6	10
1.2	8
1.8	6
2.4	4
3	2
>3.6	1

Figure 9. reclassification results of distance to veterinarians.



Distance to pet stores (miles)	
0.6	10
1.2	8
1.8	6
2.4	4
3	2
3.6	1

Figure 10. Reclassification results of distance to pet stores.



Distance to trails (m)	
500	10
750	8
1000	6
1250	4
1500	2
>1500	1

Figure 11. Reclassification results of distance to trails.

Data

All data was download from Portland metro RLIS (oregonmetro.gov) or civicapps (civicapps.org).

Maps are project in : NAD_1983_HARN_StatePlane_Oregon_North_FIPS_3601_feet_intl

Portland State UNIVERSITY

Tanja Hopmans