I. Introduction

The study area was located in the northern suburbs of St. Louis, Missouri. Kinloch was a small town that was started in the 1920's as a community for African Americans. Kinloch was the only area north St. Louis County that blacks were allowed to purchase land and to build their homes. This meant that most of the residents had good jobs and took pride in their town and as a result the town was relatively clean and well kept for many years. After the Lambert-St. Louis International Airport was constructed the property values in Kinloch started to drop due to it being located on one end of the busy runways which caused an increase in noise pollution from the large airplanes that were taking off and landing at the airport. As property values decreased in Kinloch the crime rate and poverty levels rose.

In the mid 1990's the airport started a sound abatement and airport expansion program in the towns surrounding the airport. One of the main features of this program was money given to homeowners in the towns to improve sound-proofing in their homes, but many homes located near the airport were simply purchased and torn down. Kinloch was the closest town and was a possible direction for the airport to build the new runways that it needed. That need combined with the decreases in property values meant that almost all of the homes were purchased and torn down. Did this move the undesirable trait of being the closest residential area to the airport to the homes on the outskirts of the city of Ferguson? Did this cause the homes values of the homes to drop and increase the poverty levels in this area?

Projects like this are a common occurrence in cities all over the United States and the world over. These projects can turn areas that were once considered nice places to live and do business, to become undesirable with construction of industrial complexes and noisy transportation hubs such as airports. People quickly adopt the, Not in My Backyard or NIMBY attitude when these types of sites are proposed and go up and they choose to move away. Since the homes are now in a less desirable poorer families tend to purchase the homes increasing the poverty level of the area. It would be nice if planners and community officials had a quick and visual way of seeing the potential consequences of their proposed projects and plans.

Could remote sensing and photogrammetry be used to quickly and visually show these people and the community as a whole, what areas the proposed plans would or possibly could affect. By looking at different economic visual indicators in aerial photographs of areas that similar projects were carried out they could see how far reaching the effects of their project could reach.

The goal of this project is to establish a method of using use remote sensing to visually identify the areas urban and suburban locales that are affected by less than desirable developments such as air ports and industrial complexes. To find and identify landscape features that may indicate a decrease in property values or a decrease in the average income of the effected area. To determine if the process can use existing classification algorithms that are available in the Feature Analyst for E.S.R.I. ArcMap. If the algorithms don't work, manual classifications of smaller sample areas of the entire aerial image maybe necessary.

I can not find any past studies using aerial imagery to track poverty migration. I also can't find any research on poverty migration in urban or suburban settings. There seems to be a lack of research done in urban settings such as I have proposed.

The study area is in Northern St. Louis County, Missouri. Specifically the area that now composes the almost defunct and non-existent city of Kinloch, Missouri and the Ferguson, Missouri. Ferguson was established in the 1880's as a suburb of St. Louis. See fig. 1

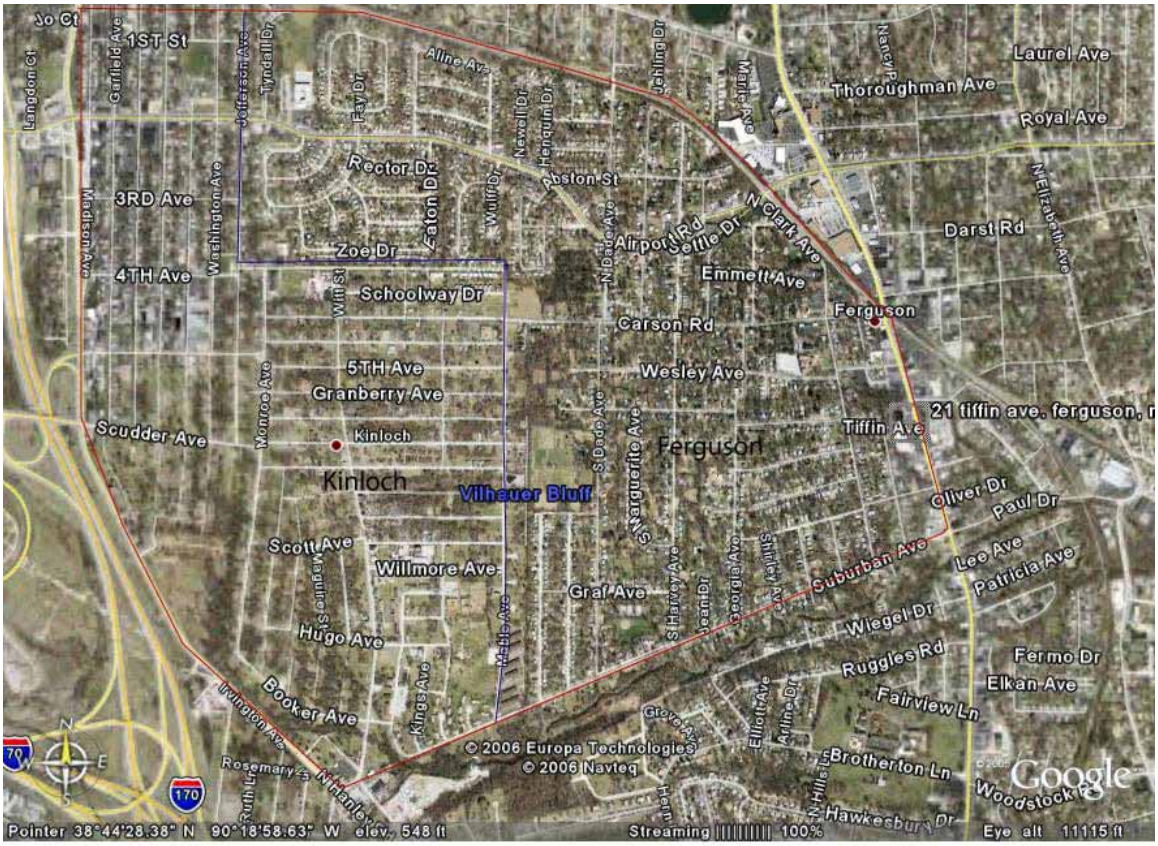
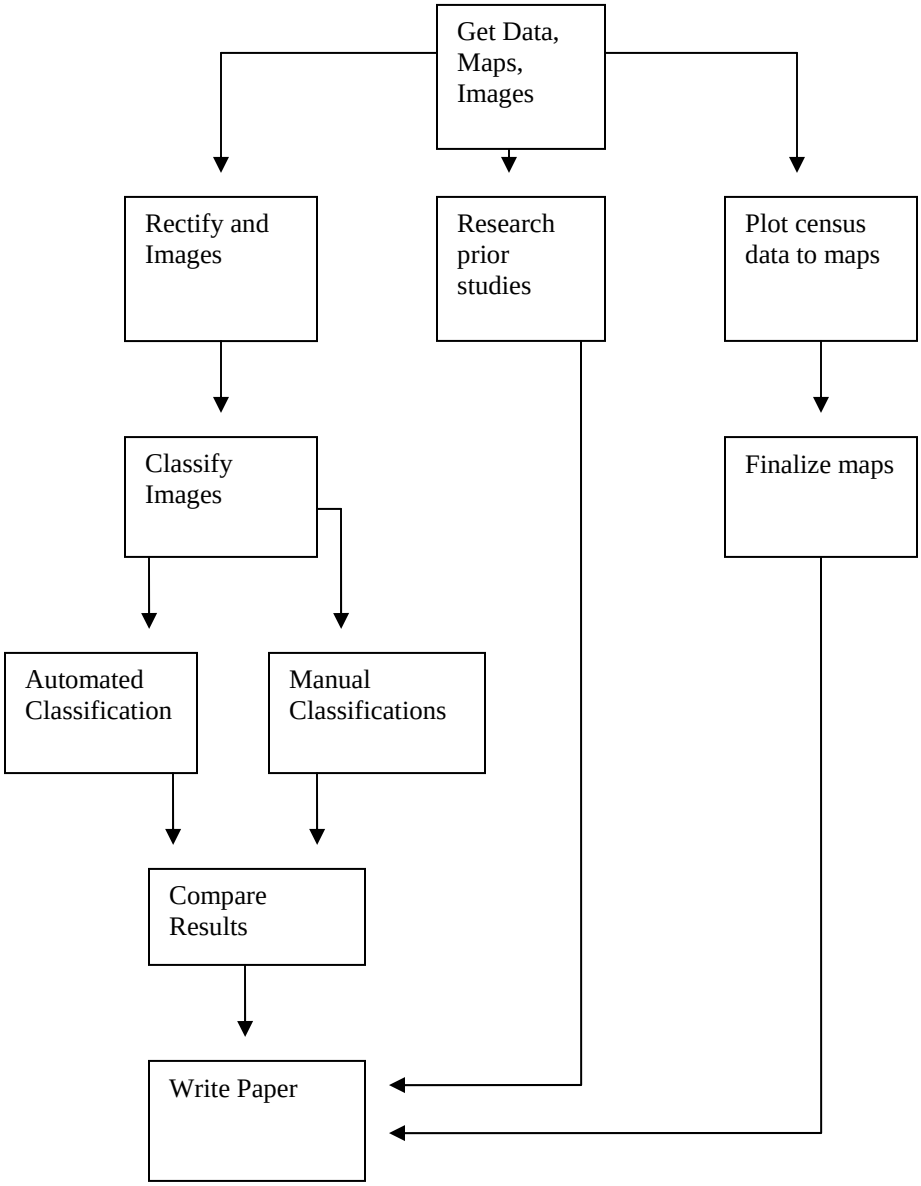


Figure 1.

II.Methodology



All aerial was obtained from the St. Louis County Revenue office. Imagery provided in paper for or digitally on cds in mrsid format. All digital images are georectified and georeferenced. Maps are from Google Earth.

Step 1:

Obtain aerial imagery from St. Louis County Revenue office in Clayton, Missouri. Dates used are from 1985 and 2003. Aerial image id code is 12J83 for both years.

Step 2:

Open images individually in GeoExpress View and convert each to jpeg.

Step 3:

Open arc map and start Feature Analyst. Then open the 1985 jpeg. From the feature analyst tool bar click on the learning button and then choose unsupervised. In the unsupervised classification dialog I choose the square sampling and nearest neighbor algorithm.

Step 4:

Repeat these steps in steps for the 2003 image.

Step 5:

Next I choose subsets from both Kinloch and Ferguson in the 1985 image and the same spot in Ferguson in the 2003 image. I saved the subsets as jpegs to be used in feature analyst for supervised classification and in Adobe Illustrator for manual classification.

Step 6:

Open the Kinloch subset in ArcMap. Then click on the learning button on the Feature Analyst toolbar and select vector and create new feature class. In the create new feature class dialog, choose the polygon radio button. Then using the pencil tool from the editor toolbar select rooftops that are very close in color. Then create an additional 7 layers until you have fig. 2

Kinloch 1985
Training Set

Legend

- Dark Vegetation
- Medium Vegetation
- Light Vegetation
- Light Roads
- Medium Roads
- Dark Houses
- Medium Houses
- Light Houses

Step 7:

Select the Light houses layer in ArcMap. Then click on the learning button on the Feature Analyst toolbar. Then choose the building category and name the classification whatever you want. Repeat the process for every feature class choosing the large man made linear features for the roads and land cover for the vegetation.

Step 8:

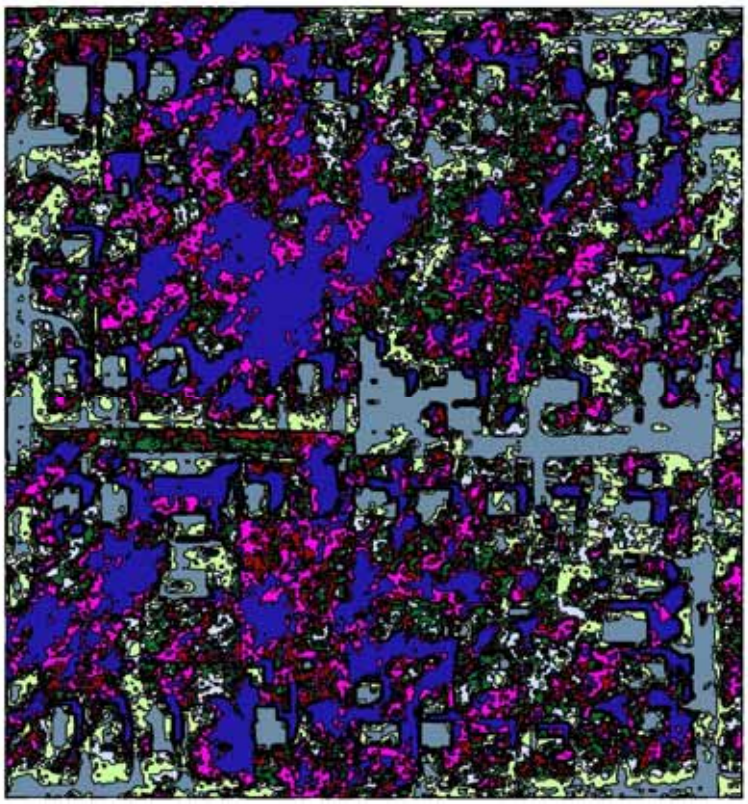
Repeat steps 6 and 7 for each subset.

Step 9:

Do a manual classification of each subset. Open Adobe Illustrator and load the first subset and using the pen tool draw outlines around each feature type into individual classes.

III. Results

The unsupervised classification didn't work very well. I did mange to pull out some streets and houses, but only a few. Feature Analyst classified on grayscale and not really on shape. See fig. 3



The Supervised classification of the Kinloch worked better correctly identifying most of the paved surfaces and a few houses. It didn't classify the vegetation or most of the houses correctly. See fig. 4 Because the unsupervised classifications didn't work for the 1985 image I decided not to spend more time trying to do anymore unsupervised classifications on the rest of the images.

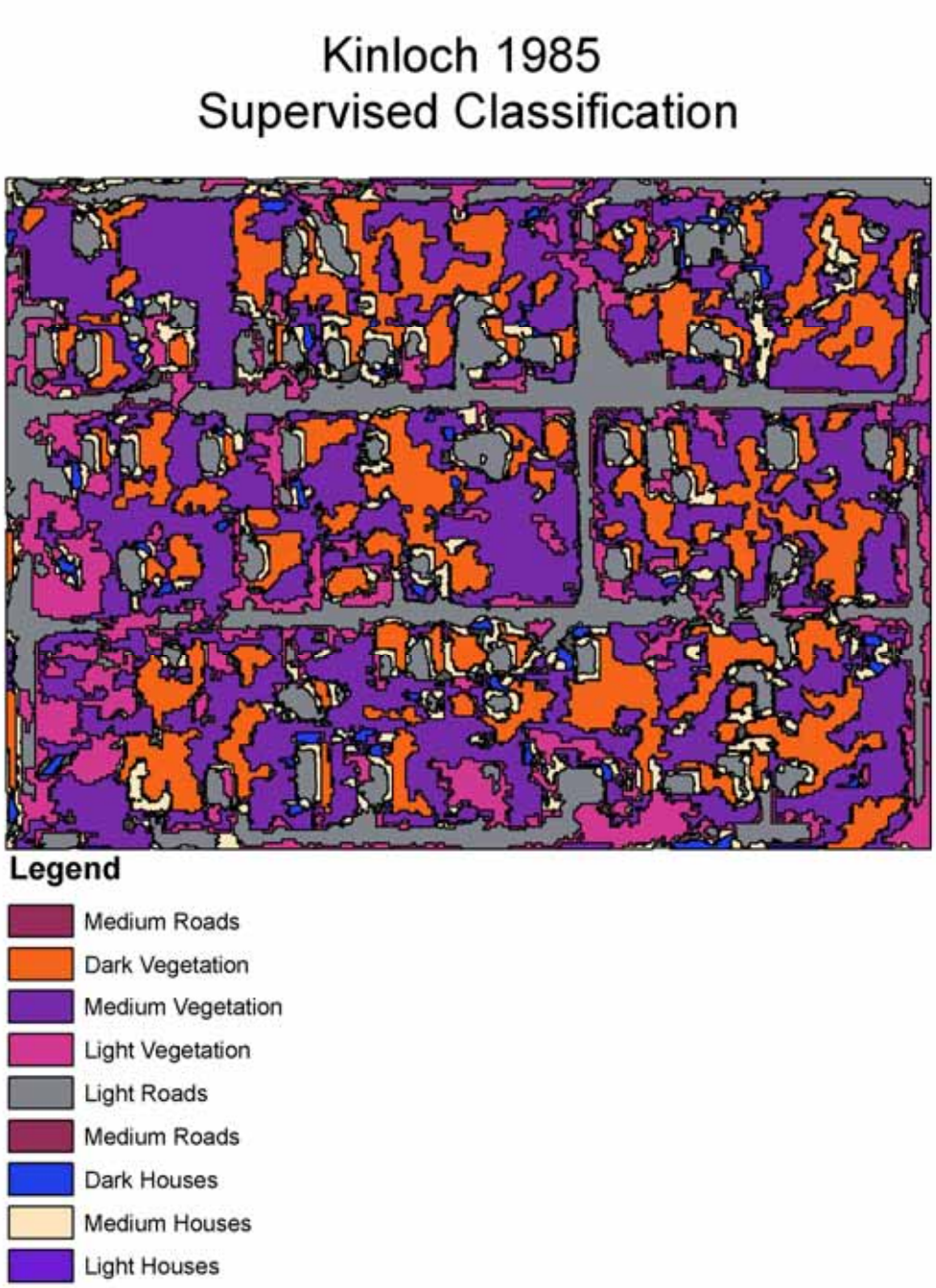


Fig. 4

The supervised classification for the 1985 Ferguson subset returned similar results. The classification pulled out some of the roads and a few houses. See fig. 5

Ferguson 1985
Supervised Classification

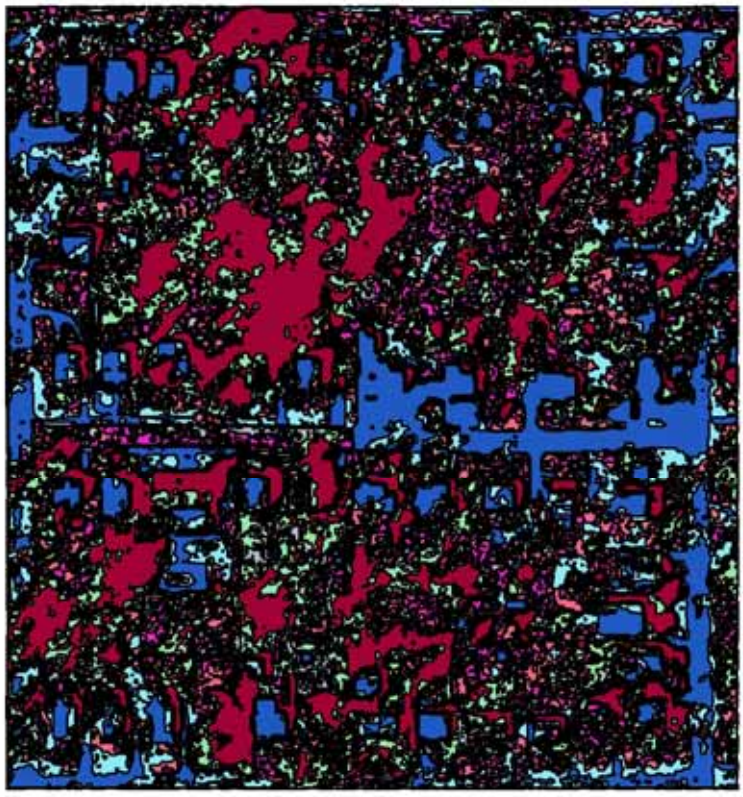


Fig. 5

Since the automated supervised classifications still didn't really work I decided to just do manual classification for all of the images. To do the manual classifications I used adobe Illustrator to draw the feature classes over the image. I divided the images in to 8 feature classes. Ferguson 1985 fig. 6, Kinloch 1985 fig. 7 and Ferguson 2003 fig. 8

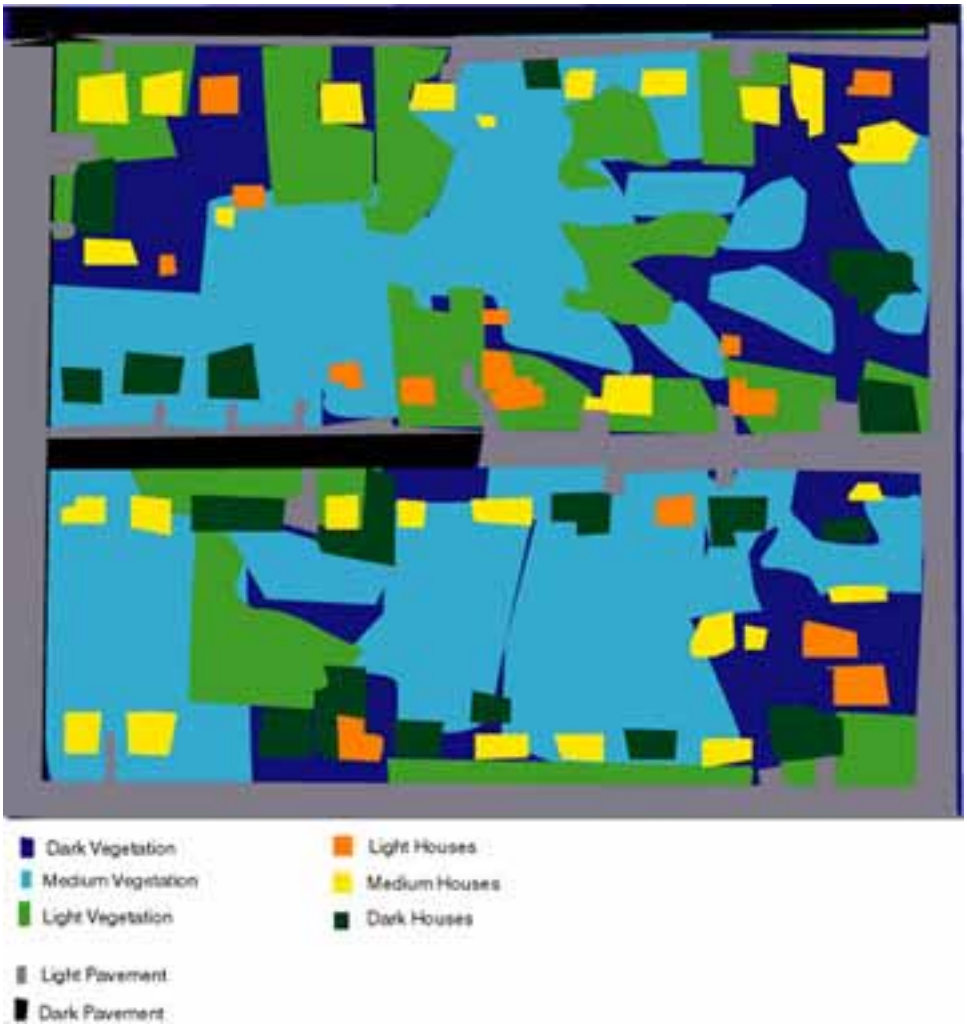

Dark Vegetation
Medium Vegetation
Light Vegetation
Light Houses
Medium Houses
Dark Houses
Light Pavement
Dark Pavement

fig. 6


Light Vegetation
Medium Vegetation
Dark Vegetation
Light Houses
Medium House
Dark Houses
Dark Pavement
Light Pavement

fig. 7

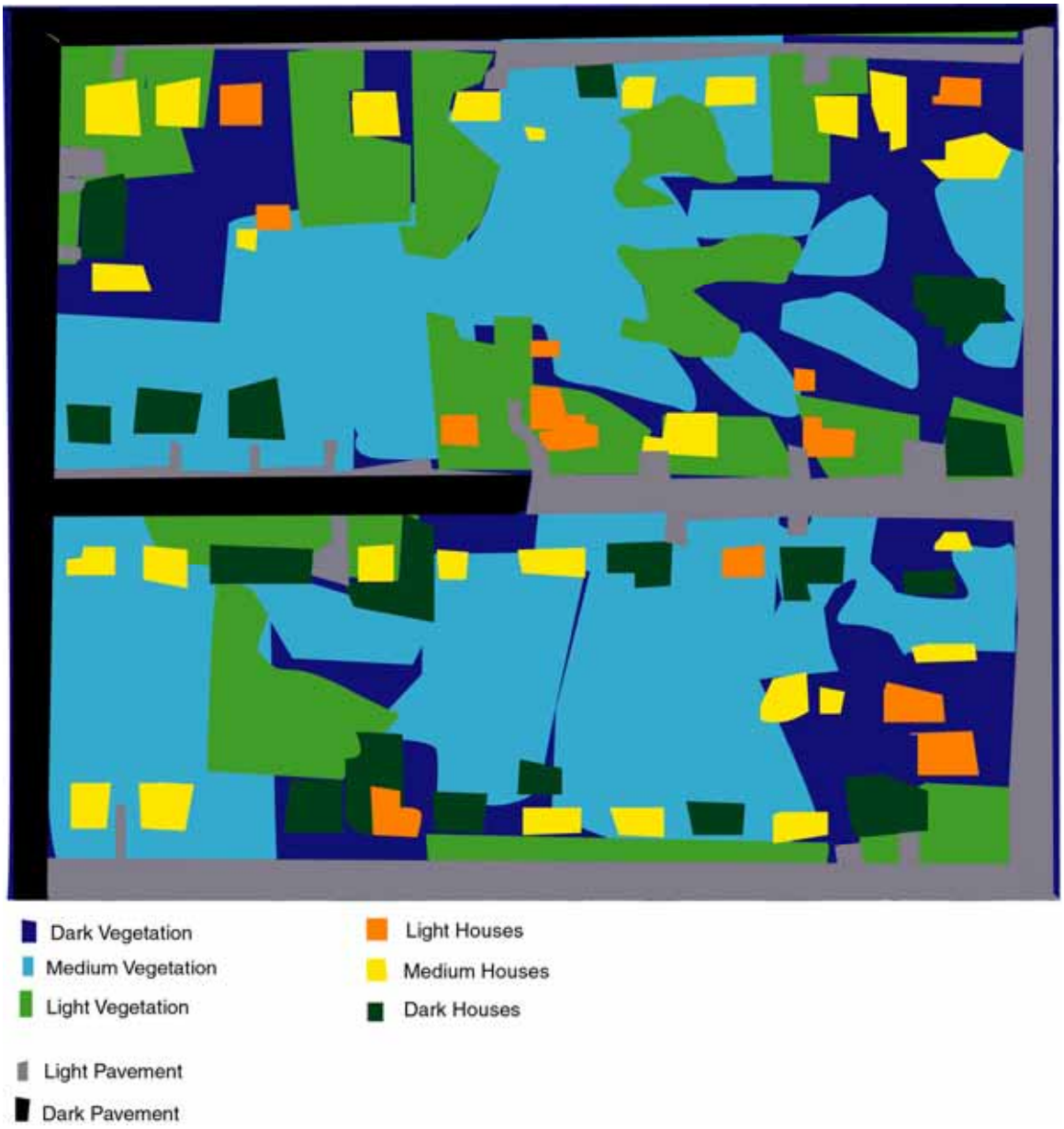


fig. 8

While the manual classifications worked well they still don't demonstrate a visible change in property values.

VI. Conclusions

Remote sensing and photogrammetry do not appear to be a suitable means for tracking poverty migration. It is possible that in a setting of an area where the property values were originally significantly higher than the adjacent less desirable properties that it would easier or even possible to track poverty migration to the more affluent areas. Another use for my data would be to use some of my qualifications for a decrease in property values in the assessment for property values for the revenue department.

If I had more time I would have tried to find more algorithms for my classification. I possibly could have found a better classification algorithm. I also would have maybe found another similar location

and problem in another city and state to see if it is possible to track poverty migration. Another option would have been to choose another city in St. Louis where the property values were significantly higher in the more desirable area.