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Big Data Analytics
Lab 6

The Github repository for this project is located at: https://github.com/rmcelfresh/IST718Lab6/ the repository includes the Google Colab document including the code.

Investment Proposal

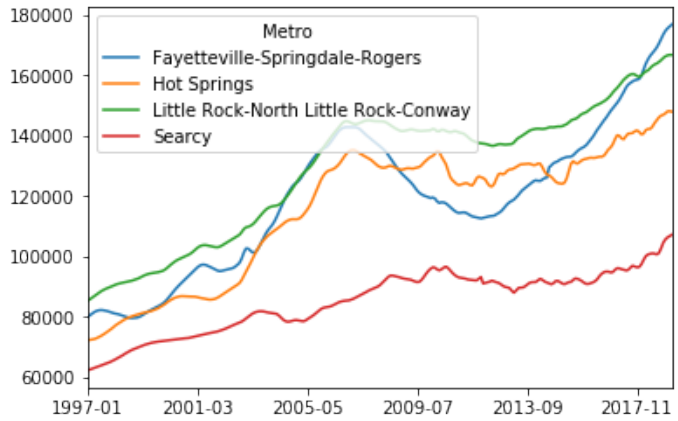
Background

The Syracuse Real Estate Investment Trust is currently looking for three zip codes to invest their capital in. Currently, the Trust has invested in four metro areas in Arkansas: Hot Springs, Fayetteville, Little Rock and Searcy. This proposal will review how these investments have performed since the initial investment in 1997 up to year end 2017. Following the review of current investments, a proposal for the next round of funding will be presented.

Investment Update

Since investing in metropolitan areas in Arkansas in 2017, the median housing price in all four metro areas has increased steadily. Three of these metro areas demonstrated an element of resistance to the effect of the recession in late 2008: Searcy, Little Rock, and Hot Springs. However, Fayetteville was affected by the recession. However, the trust's foresight to not reduce their investment has paid off, median housing values in Fayetteville have now increased past those of Little Rock and Hot Springs. Searcy, has had a much more limited renaissance, however, housing values have increased from ~$62,000 in 1997 to ~$107,000 in 2017. An overview of the change in the median housing price is presented below. Overall, these investments are doing well.

	Median Housing Price			
Metro Area	**1997**	**2019**	**$ Growth**	**% Change**
Fayetteville	$ 79,900.00	$ 176,825.00	$ 96,925.00	121%
Hot Springs	$ 72,150.00	$ 147,900.00	$ 75,750.00	105%
Little Rock	$ 85,206.67	$ 166,706.67	$ 81,500.00	96%
Searcy	$ 62,180.00	$ 107,133.33	$ 44,953.33	72%
Overall	$ 299,436.67	$ 598,565.00	$ 299,128.33	100%



Models similar to those that will be used to recommend the next round of investments were created for these metro areas based on a time series analysis of the 20 year period between 1997 and 2017. A comparison of these models with the above graph demonstrate that the model was fairly accurate in predicting the increased values of homes in the metro areas.

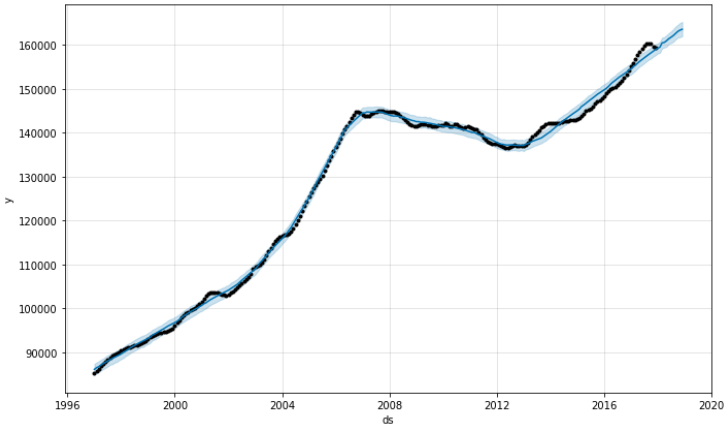


Image 1: Expected 2018 housing values for Little Rock Metro Area.

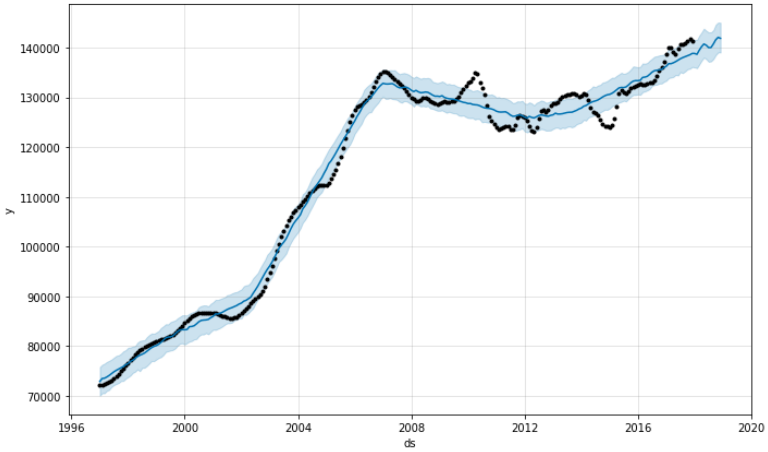


Image 2: Expected 2018 housing values for Hot Springs Metro Area.

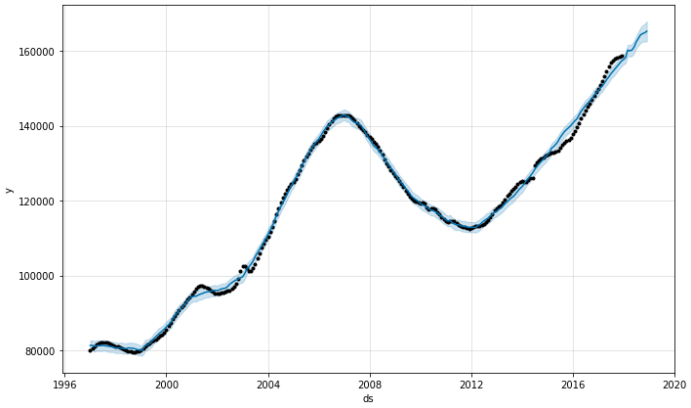


Image 3: Expected 2018 housing values for Fayetteville Metro Area

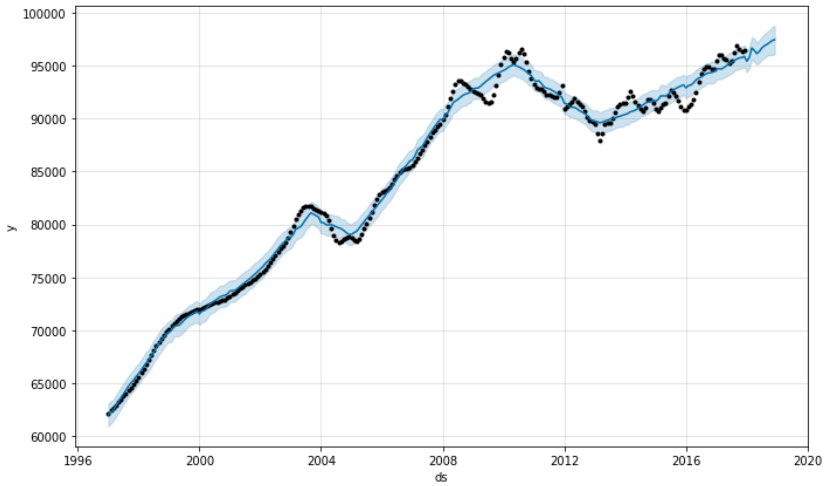


Image 3: Expected 2018 housing values for Searcy Metro Area

It is recommended that the trust hold onto the holdings in Arkansas and diversify the portfolio by adding in additional investments with a wider geographic distribution to protect the investors capital.

Recommended Investments

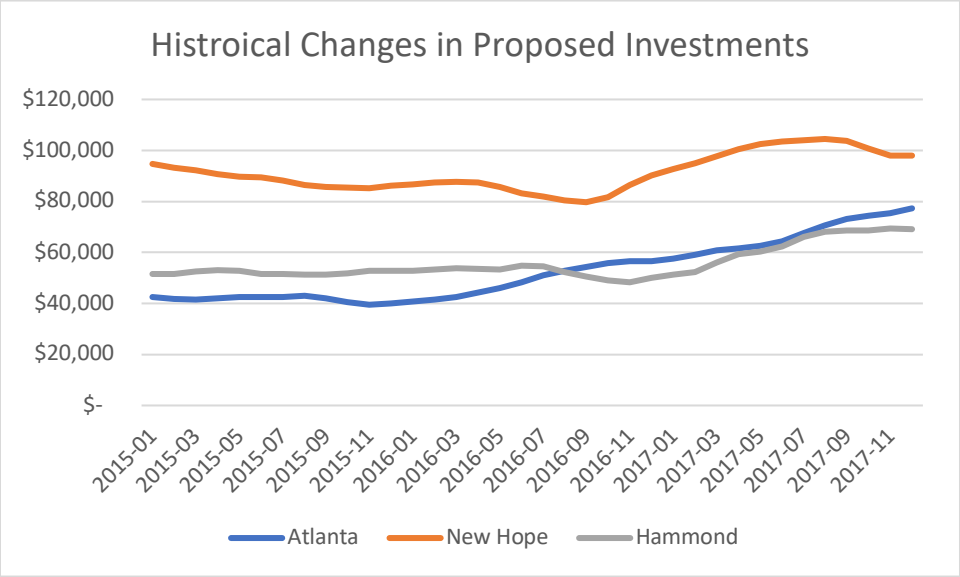
The median housing values of every zip code in the United States were analyzed for the purposes of this recommendation. A time series analysis of each zip code was performed to predict the change in housing prices in the zip code. There are several zipcodes in the New York-Newark-Jersey City metro area that have all experienced multi-million dollar increases in median home values. These areas are not recommended in an attempt allow the firm to spread out its investments into multiple properties to insure against a catastrophe destroying a significant amount of the firm's real estate holdings. Additionally, coastal zip codes were not chosen due to the firm's history of long term investments and the potential for significant areas of the coast to loss of property due to rising sea levels.

With these considerations in mind, the following zip codes are recommended for investment:

		Median Housing Price			
Zip Code	City	2017 YE	Predicted 2018 YE	Predicted $ Growth	Predicted % Change
35760	New Hope, AL	$ 97,900.00	$ 125,566.59	$ 27,666.59	28%
46320	Hammond, IN	$ 69,100.00	$ 94,864.97	$ 25,764.97	37%
30315	Atlanta, GA	$ 77,300.00	$ 99,113.16	$ 21,813.16	28%

All three metro areas are inland and have a relatively affordable entry point, so the trust can purchase multiple properties in each.

Below is the historic change in these zip codes, the current increase in all of them started in 2016.



A regression analysis was performed to identify what factors influenced percentage change in housing. Additional information was collected from the Census and the IRS. Predicted population values for 2015, the most recent year available were collected from the census for each zip code. Tax return information was collected from the IRS 2016 data was the most recent available on a per zip code basis.

An initial correlation plot was created to demonstrate what factors had an impact on the predicted December 2018 housing prices. The strongest positive predictors were: 2017 housing prices, A00300 (Taxable Interest Amount), A2650 (Qualified Dividends Amount), A00100 (Adjusted Gorss Income). The strongest negative predictors were: RAL (Number of refund anticipation loan returns) and the percentage of individuals living under the 125% poverty level. The positive predictors are reasonable, areas with high amounts of individuals holding investments are likely to also have real estate holdings. The negatively correlated items also are reasonable.

A regression analysis was performed and was able to predict 35.8% of the variety of predicted change in the median housing values. Interestingly, the majority of the variables in the regression decreased the median housing value and only Adjusted Gross Income, Number of Exemptions, Salaries and wages amount, and Taxable interest amount increased the value. The regression results are included in the provided GitHub repository.