**Documentation Data Challenge Capital One**

Assumptions and Considerations:

1. I have restricted this Data Analysis to 2-bedroom housing properties in New York.
2. The houses with room type “Private Room” in Airbnb data in a 2-bedroom setting apartment has a price for only 1 night’s stay in room. This has been multiplied by 2 for such properties as if rental management can potentially earn double rent of this property as it has 2 bedrooms. However, the overall rental price per night may not be exactly double as the other room may be smaller or have lesser or more appeal than the room in the listing.
3. Occupancy for the Airbnb listings have been assumed to be 75% throughout the year
4. The rent of each property is assumed to increase every year by the rate at which the value of property appreciates. The calculation of this rate has been discussed section 2.

Metrics Created:

1. Annual\_Rent:

This is annual rent collected from a property in Airbnb assuming 75% occupancy using rent price per night from Zillow data. This value is assumed to be fixed.

1. Payback Period: This is the number of years required to earn back the initial cost of investment from annual rental income from property assuming 75% occupancy throughout the year. The annual rent is assumed to be fixed for this metric.
2. Occupancy: 0.75\*365 ( Assumed occupancy of all properties in Airbnb)
3. Rate : So we all are aware that properties value appreciate/depreciate depending upon the neighborhood and locality. In the Zillow data we have the average housing prices for a zipcode for as far back as 1996 but these columns have lot of missing values.

However, we do have complete data from 06-2007. The difference between in prices in 06-2007 and 06-2017 divided by 10 has been taken as an average rate by which a property rises in that zipcode. Although a naïve approach, it still captures the essence of appreciation/depreciation of property by zipcodes over the years and would be useful

In adding a location specific factor in Return on Investment calculations

Roi\_without : This metric is return on investment in 10 years assuming rent appreciates at a constant rate without including the the equity value of the property.

It is calculated as follows:

(Annual\_Rent(1+Rate/100) ^10)/Current Price of the property\*

\*(The latest price we have in the data)

6) Roi\_10: This metric takes into account the return on investment through rental

as well as equity appreciation i.e. the increase in the price of the house is also taken into account to calculate roi. This has been calculated for 10 years as well.

It is is calculated as:

A= (Annual Rent(1+Rate/100) ^10)/Price of the property {Rent amount in 10 years}

B= (Price of Property(1+Rate/100) ^10)-Price Of property {Increase in cost of property in 10 Years}

Roi\_10= (A+B)/Price of Property

Usefulness of these metrics:

Payback\_Period : This tells us how fast we can recover investments from our property.

This may be one of the conservative estimates to evaluate expected profits from a property.

Roi\_without : This metric is a good metric to assess profitability from a property.

Because of variable rates of appreciation for each zipcode this metric gives a good estimate how location of zipcode determines ROI of a property

Roi\_10 : This metric would be useful to assess overall value of investment keeping in mind the increase in value of asset and also opens the value analysis in case rental

Property decides to sell the current asset after 10 years.

It is expected that Roi\_without would be very similar in results in ROI\_10 as it has high equity appreciation has same rate of increase as rate of rentals but ROI\_10 . But some interesting insights can be drawn from differences in behavior of these two metrics for zipcodes.