# Effect of Local Services on Rental Prices in Bangalore City

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## 1 Introduction

### 1.1 Background

Bangalore is the IT hub of India. It is home to the major IT giants of the country and several startups as well. It is thus a spot where several young professionals relocate to pursue their career. It has a population of over ten million, making it a megacity and the third-most populous city and fifth-most populous urban agglomeration in India. It has an area of over 700 sq km.

Since several people migrate to this city, it is essential to maintain a database containing details of rental prices and local venues in all neighbourhoods of the city, The project aspires to construct one such coherent database using net crawling. Apart from this, since Bangalore is a lucrative spot to put up properties for rental purposes, I would also like to analyze the correlation between locally available services and rental price. This would help people interested in building guest houses etc. to choose suitable locations for their endeavours.

### 1.2 Business Problems

Questions to be addressed are:

#### 1.2.1

What is the correlation between different types of services (food, shopping, sports/recreational etc.) and rental prices?

To answer this question we need the data on average rental prices in all neighbourhoods and the number of venues providing different kinds of services located in the neighbourhood. Using methods like Regression, we can figure out the correlation.

#### 1.2.2

Is the correlation strong enough to compensate for the higher land prices associated with localities that have more services?

Neighbourhoods with more venues of interest have higher land prices. If the rental prices don't have a strong correlation with the presence of these venues, it is wise not to develop rental properties in such places.

### 1.3 Interested Audiences

1. People who are moving to Bangalore and need a place to rent can make use of the database created to search for a suitable neighbourhood based on the rental costs they can afford, the local venues they might refer and proximity to their work place (database also contains latitude and longitude of each neighbourhood).

2. Businessmen and property dealers who are looking for locations to build guest houses, rental properties etc. will find this study useful.

## 2 Data

### 2.1 Data Sources

#### 2.1.1

Firstly, we'll need the data containing all neighbourhoods of Bangalore city with the rental prices.

This data is available on url: `https://www.makaan.com/price-trends/property-rates-for-rent-in-bangalore`.

We use simple read html method of pandas library to extract the tables and merge them row wise. We drop the rows for neighbourhoods where all fields for rental prices are empty since they are useless for our analysis.

#### 2.1.2

We need the latitude and longitude of all these neighbourhoods. We make use of the Google search engine to find coordinates of each neighbourhood and BeautifulSoup package to extract the coordinates from the results page.

#### 2.1.3

Then, we need the data for local venues for which we use FourSquare API: `https://www.foursquare.com`.

We extract the categories list. We have grouped the categories into 4 major categories: food services, shopping venues, leisure spots/recreational centres and general services. We fill in each of the fields with the number of venues providing that service in the concerned neighbourhood.

You can view the data extraction and processing code along with the dataframe heads at: `https://github.com/sahilinneurospace/Capstone/blob/master/week4_notebook.ipynb`

### 2.2 Data Extraction and Processing

The basic rental prices data is extracted using the read html method of pandas from the url and the dataframes obtained are merged using df.merge function. The data contains several neighbourhoods for which the rental prices are unavailable for all 3 categories. We drop the rows corresponding to these neighbourhoods.

Then, in order to be able to use the FourSquare API, we need the coordinates of each neighbourhood. The simple way to this is search for Neighbourhood Name + "Bangalore India coordinates" on Google. The coordinates rounded to 4th decimal digit appear as search result. In order to extract these numbers, first we use requests package's get.text function to obtain the results page. We use BeautifulSoup.prettify() to obtain the web page source code in text form. From this, we extract the coordinates using python regex.

Then, we extract the venues list for each neighbourhood using the FourSquare API. The categories across all venues are merged into one list, which is split into 4 lists representing the 4 service categories - food services, shopping centres, leisure/recreational spots and general services (like health, banking etc).

## 3 Methodology

We have 3 types of rental properties: 1 BHk, 2 BHk and 3 BHk. We deal with each of them separately.

### 3.1

First, we observe the correlation between the rental prices and the number of each type of service available using scatter plots.

### 3.2

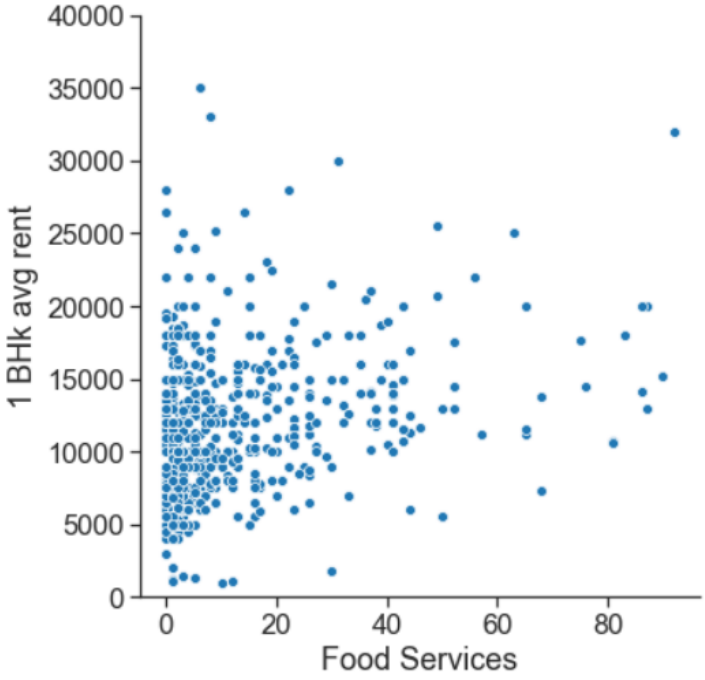
Then, we extract the minimum rental price for each group of number of services available (for example, we group all neighbourhoods with 10 food service providing venues and take the minimum rental price from them). This minimum price reflects the price of the most bare rental homes (i.e. with least number of in-home services like air conditioning, laundry, cooking service etc). This gives a picture of the rental prices which reflect cost due to location only. We take the regression plots for these.

## 4 Results

### 4.1

#### 4.1.1

The scatter plots we obtained are: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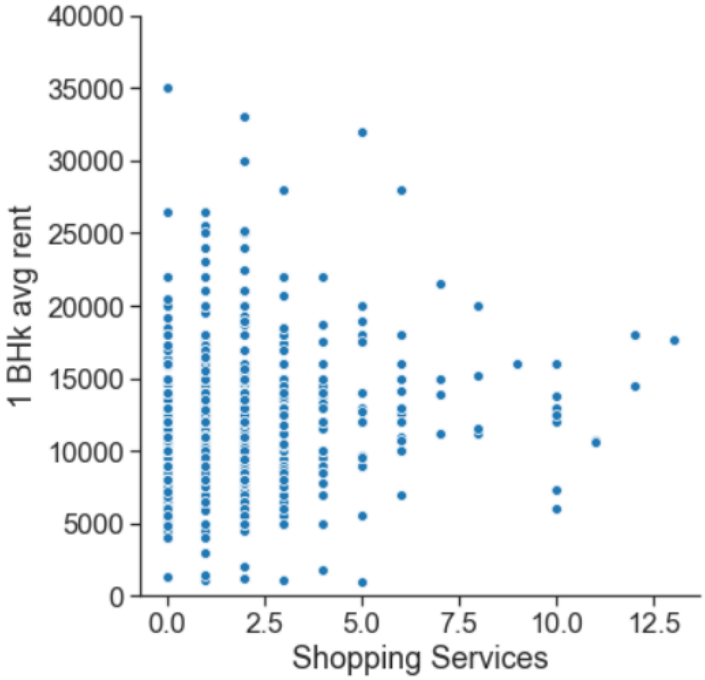
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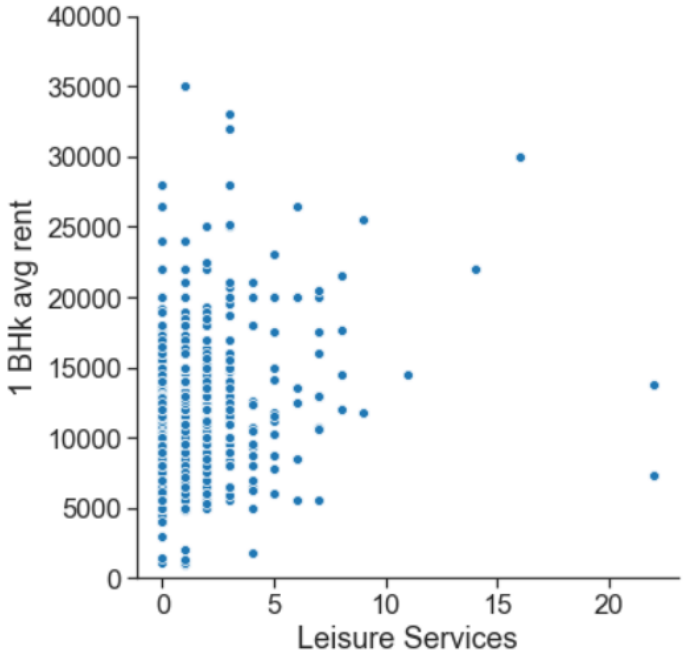
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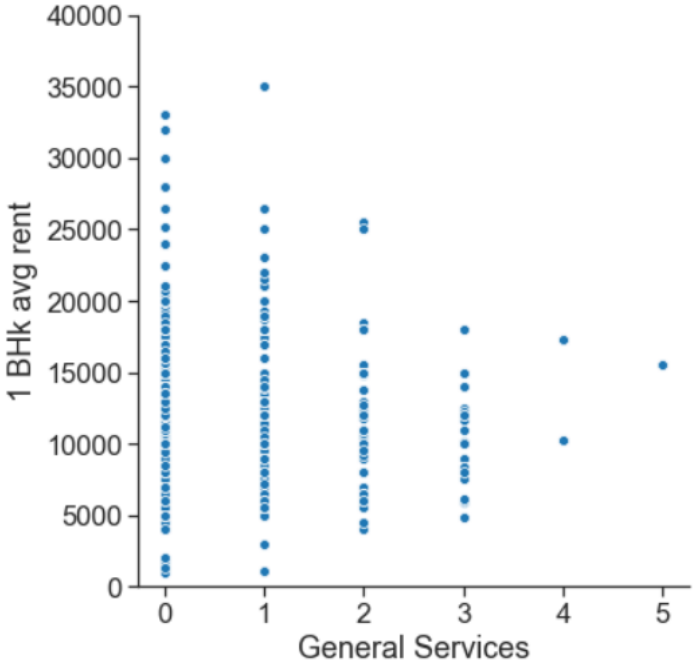
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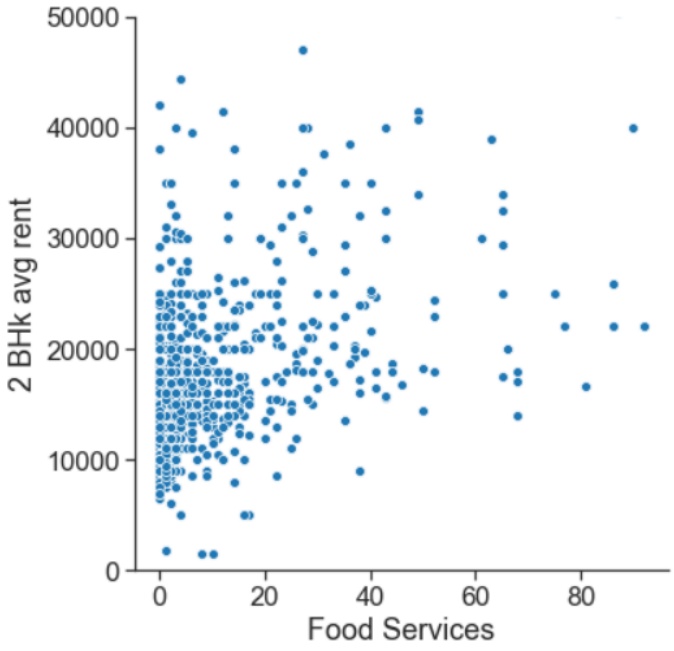
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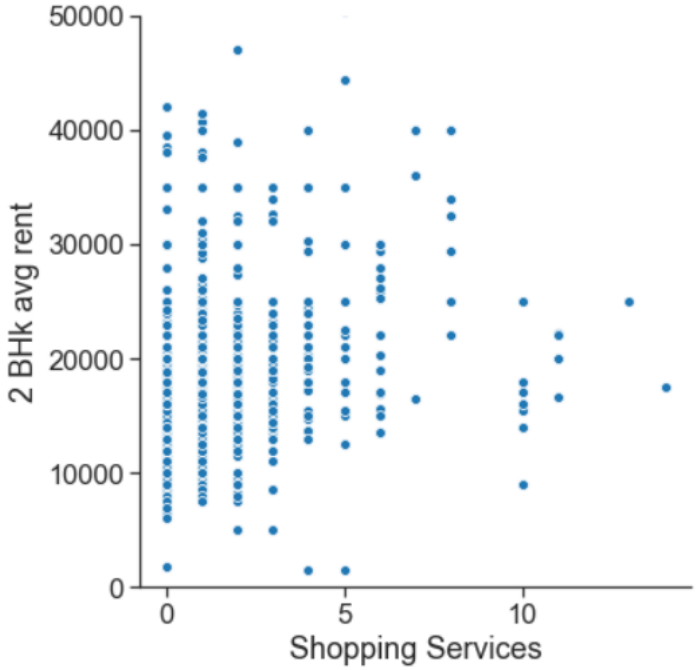
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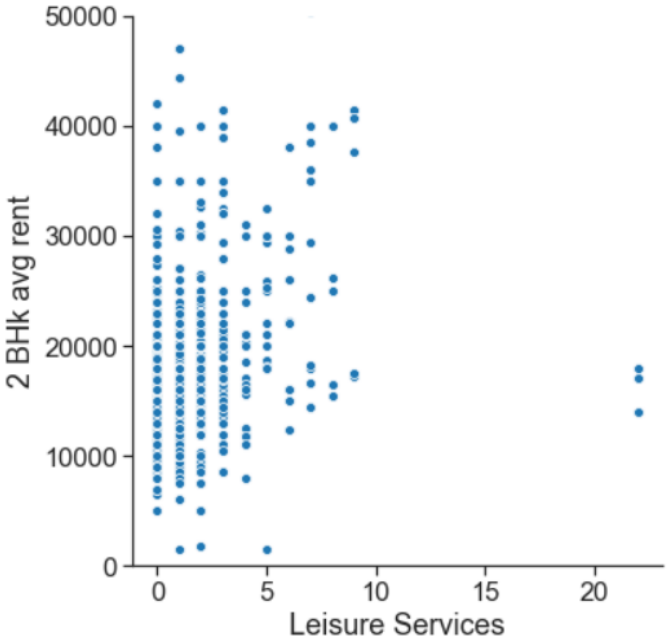
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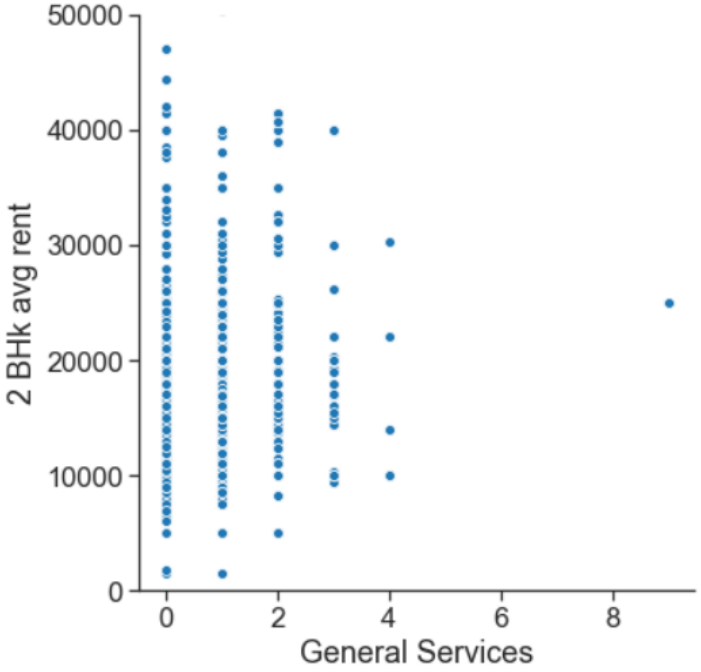
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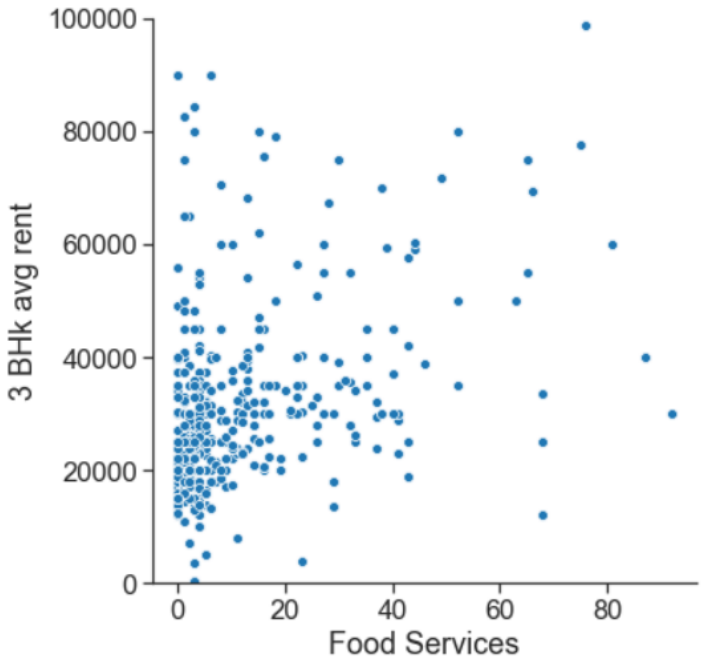
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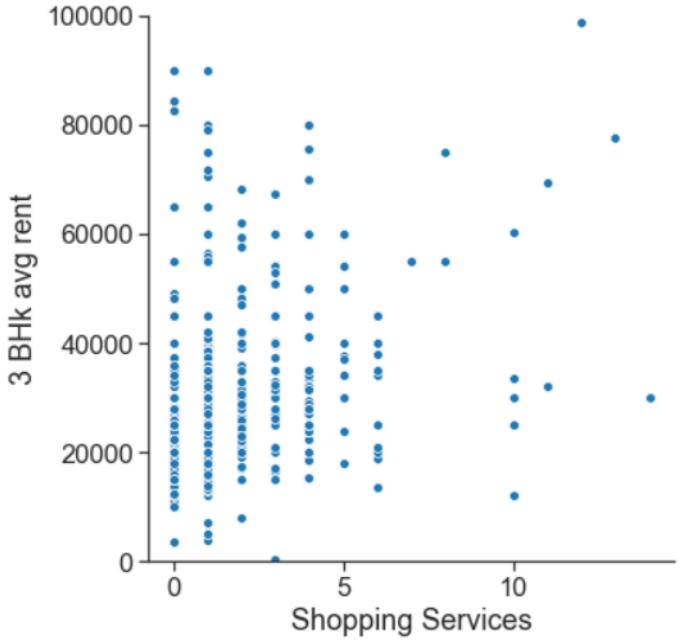
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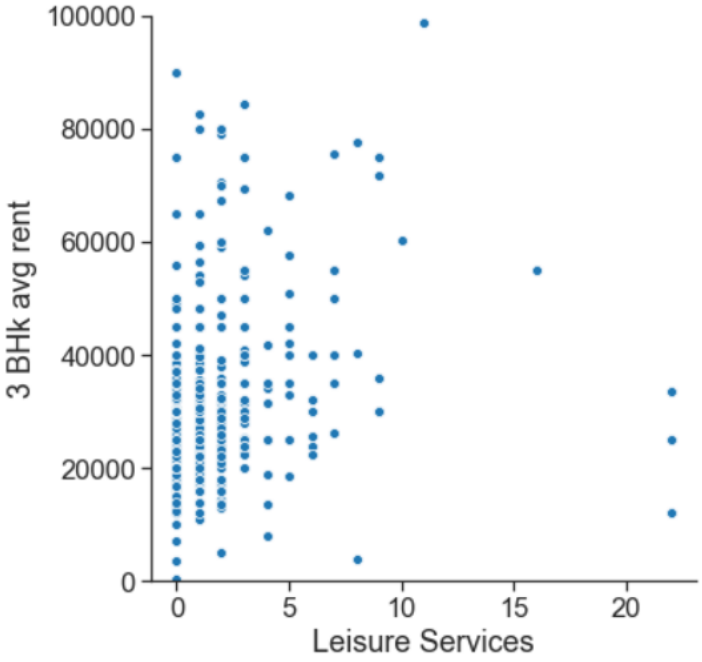
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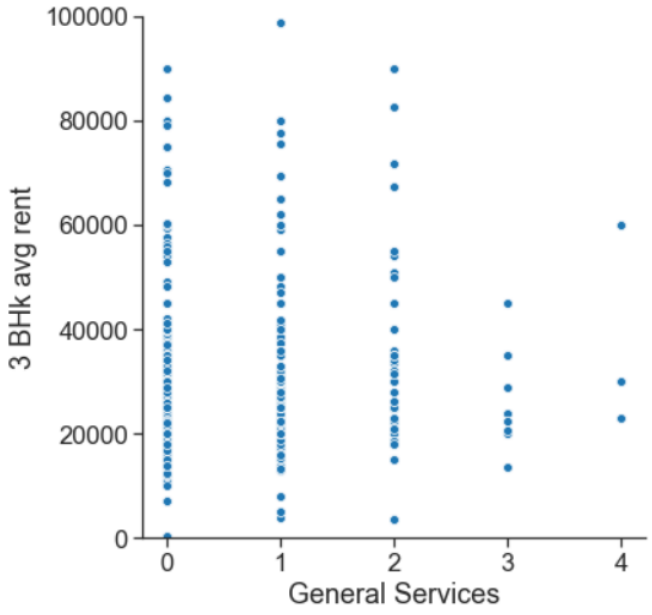
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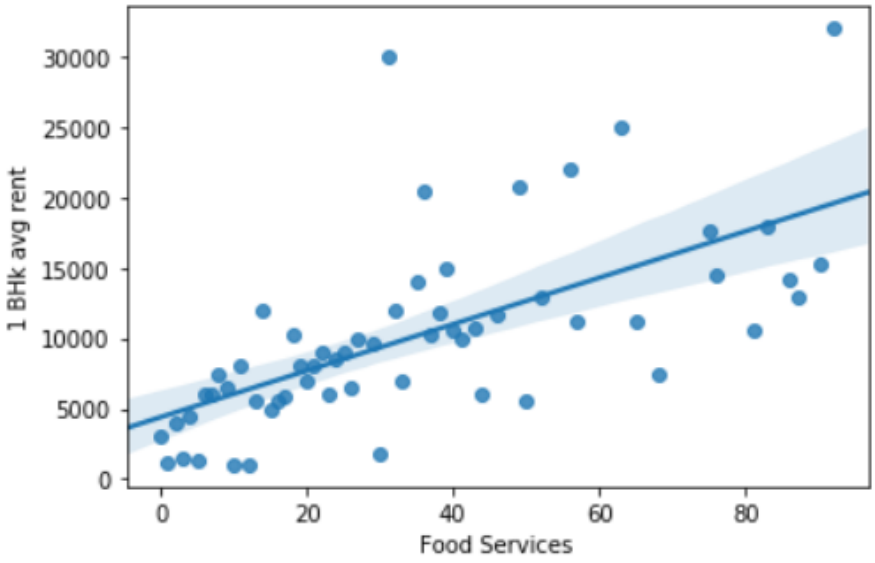
#### 4.1.2

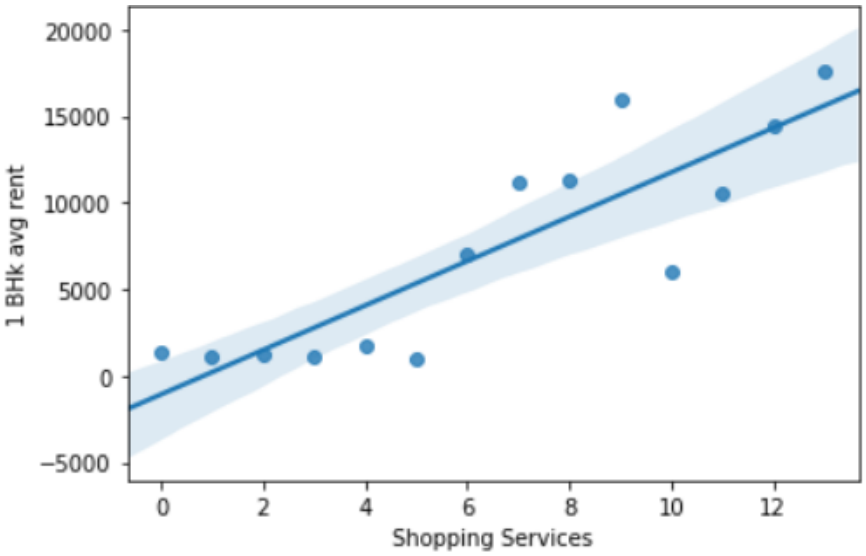
There seems to be no correlation between any of the services and the rental prices if we directly look at the scatter plots.

### 4.2

#### 4.2.1

The scatter plots we obtained are:

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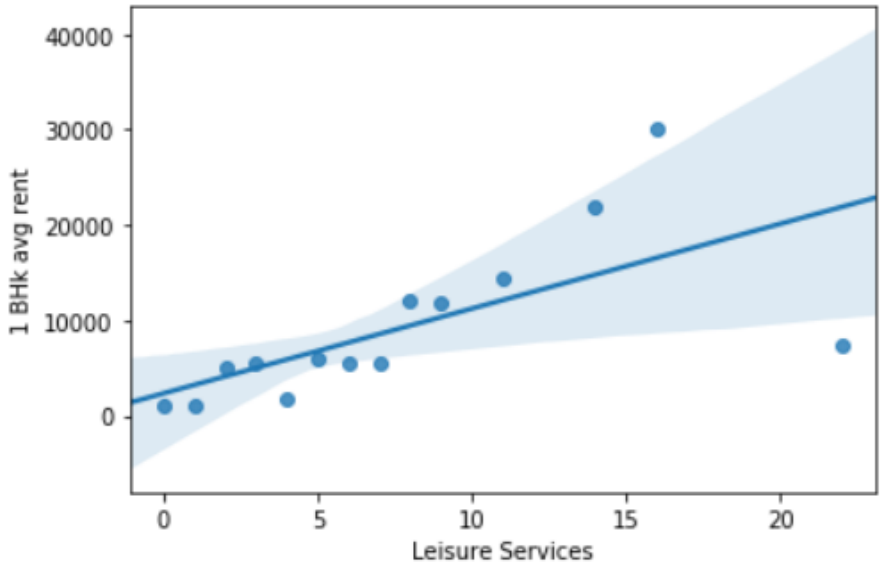
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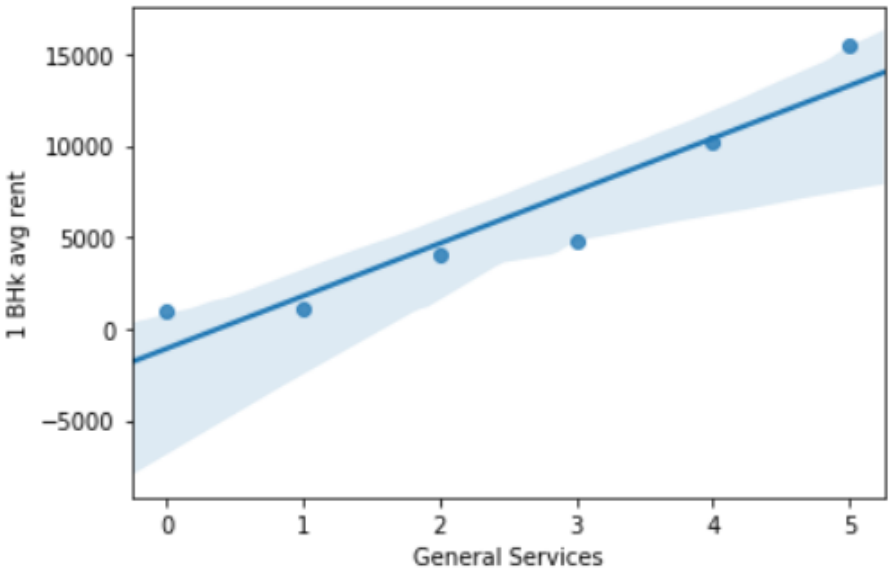
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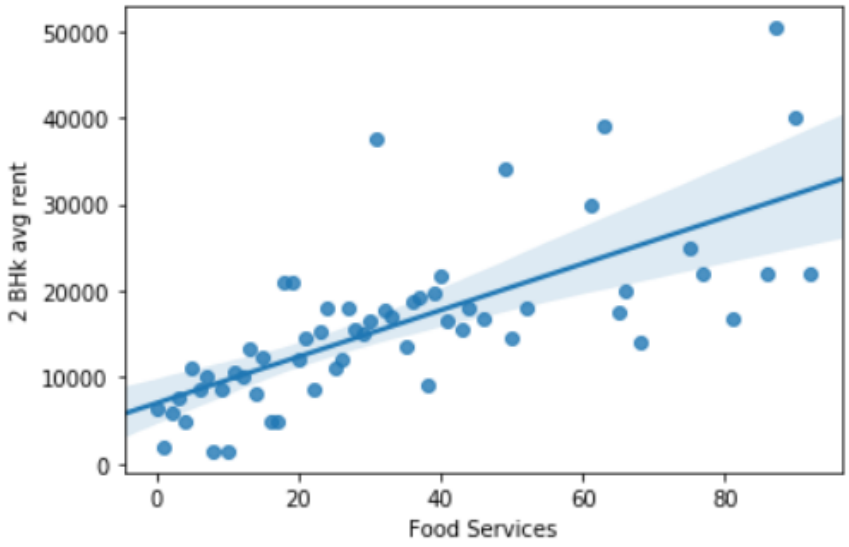
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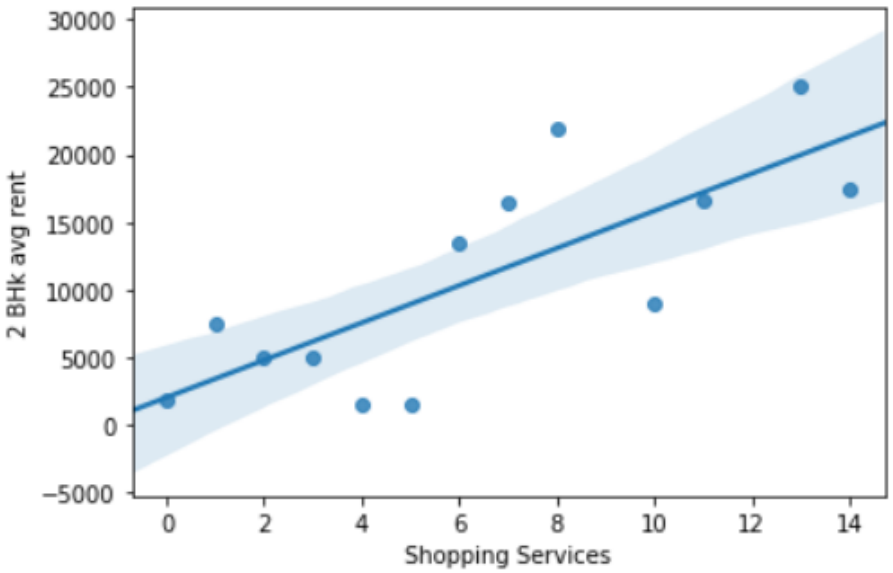
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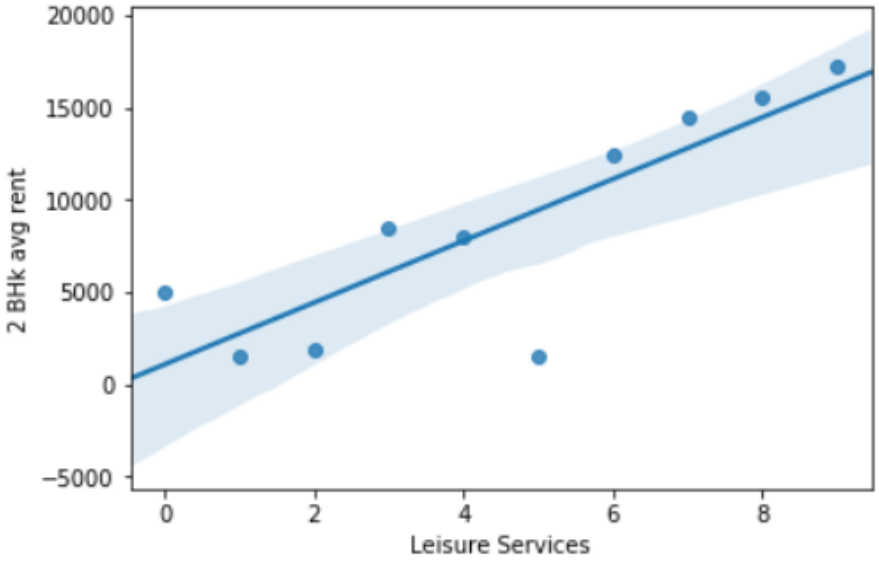
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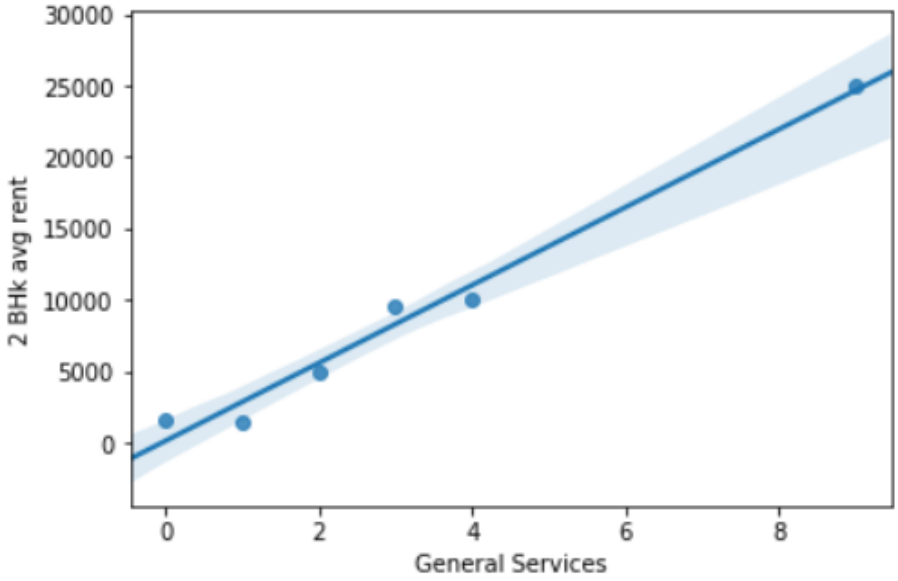
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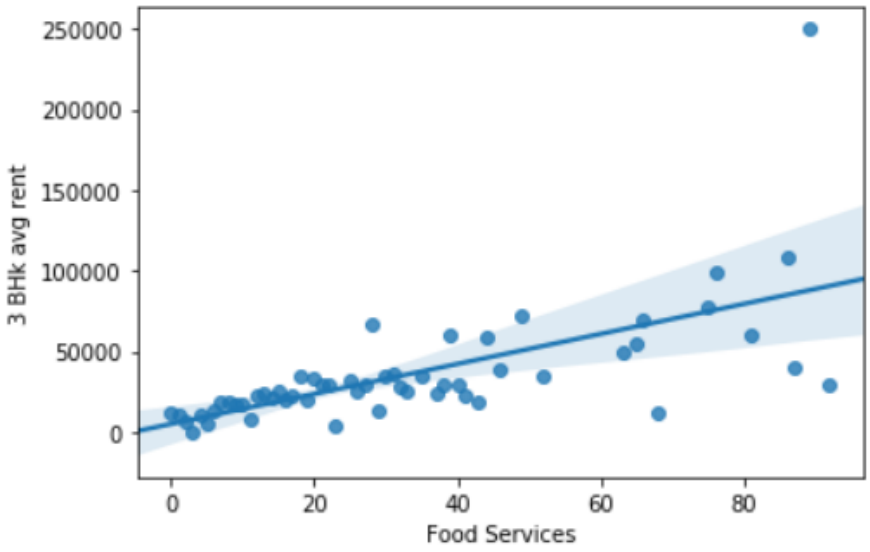
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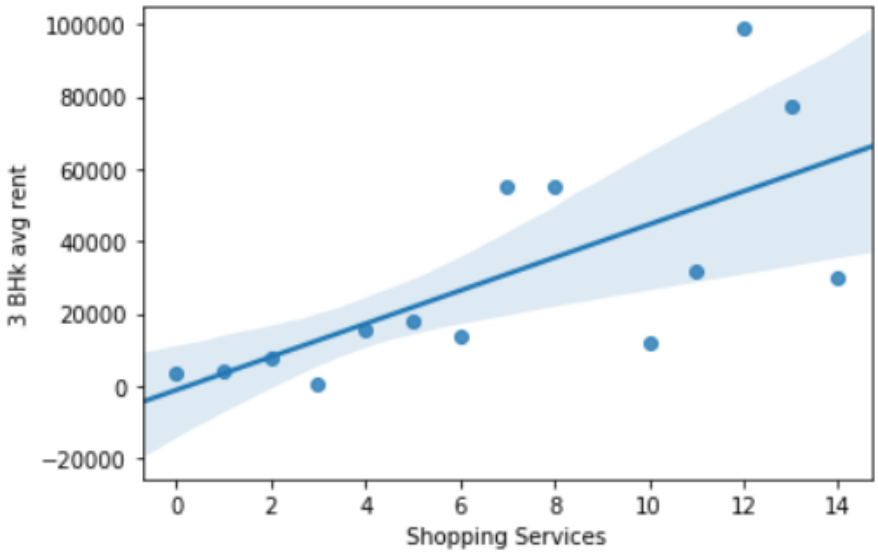
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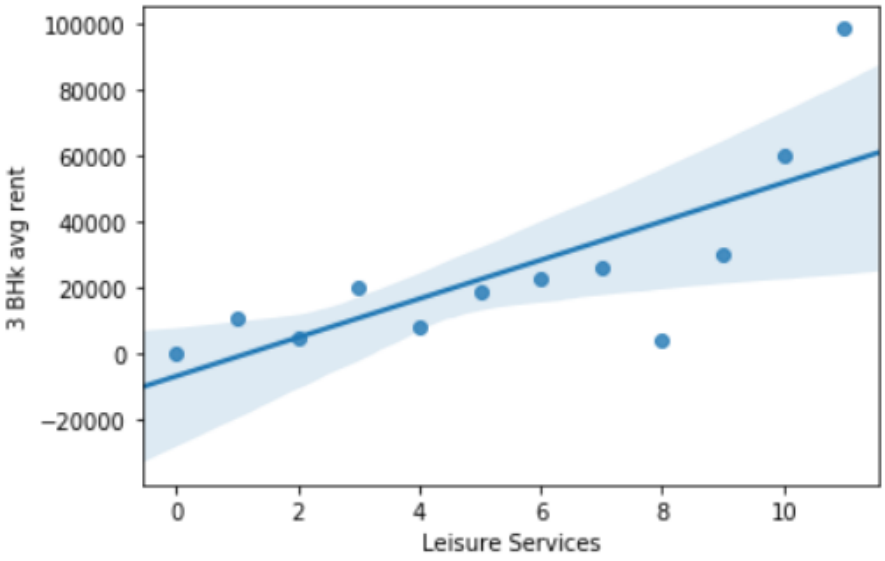
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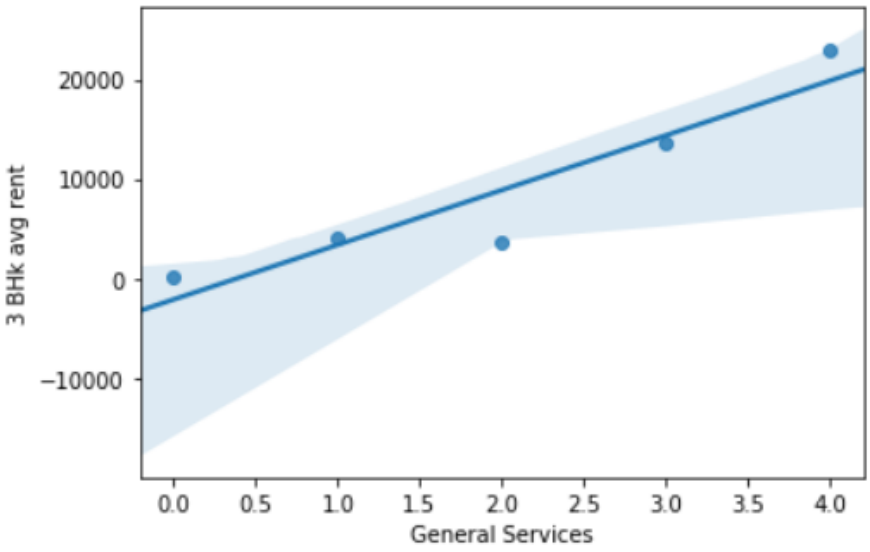


#### 4.2.2

There is a positive correlation between rental prices and the availability of each service locally. However, from the previous section of results it is clear that the effect of these services is much smaller compared to other factors which determine the rental prices. When those factors are also considered, there seems to be no correlation between rental costs and services at all.

## 5 Discussion

The results were certainly illuminating about the extent to which local services affect rental prices. The conclusions can be used to decide whether it is worth buying property for rental purposes in an area where more services are available. This study is specific to Bangalore city but the same methodology is applicable to any major city in the world.

Similar studies for other bigger cities can be made richer by incorporating housing facilities as another factor and analyzing different levels of housing separately. We didn't have specific data to determine the level of luxury of the rental properties. This data will make the analysis yield better and richer results.

## 6 Conclusions

1. There is a moderate positive correlation between availability of each service and the rental cost.

2. Other factors like housing facilities have a much greater impact on rental prices and hence, locally available services are inconsequential.

3. Thus, property dealers need not rely heavily on availability of local services while choosing rental property.