

# The Battle of the Neighbourhoods - Report

IBM Data Science Professional Certificate

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# 1 Introduction

## 1.1 Problem Background

Darwin city is located in the Northern Territory of Australia. Darwin is one of the most remote cities in Australia, consisting of a very transient population and a heavy reliance on both Federal and State Government investment. Since 2012, Darwin has seen significant growth due to a very large gas project which has seen the economy boom, however the project is ending very soon and the economy is seeing the worst effects of the bust. Private investment is going to be crucial in helping Darwin and the Northern Territory transition into a new economic phase, and to soften the effects of the bust. Although the subdued economic conditions has discourage investment, and businesses around Darwin are closing or struggling to make ends meet at a rapid rate. However these economic conditions represent an opportunity for business and would be investors to prepare for the next boom.

## 1.2 Problem Description

Company XYZ Ltd (XYZ) is considering whether to open a new bar in the Darwin CBD. However, XYZ is wondering whether right now is a good time to invest and open the bar considering the economic conditions. Additionally, XYZ would like to know where in the Darwin CBD they should open the establishment if they choose to proceed.

## 1.3 Target Audience

The Target audience of this report is primarily XYZ, however any invest firm or individual thinking of opening a new nightlife establishment in Darwin CBD may be interested in this report.

## 1.4 Success Criteria

The success of this report will be based on whether XYZ can make a decision about where and when to invest in a new bar in the Darwin CBD. Given there are many other variables to consider when opening an establishment (eg availability of property, liquor license etc) this report is designed to give a base level of information to XYZ when making their decision.

# 2 Data Source

## 2.1 Data 1

The first data source will be to utilise Foursquare API data to generate a list of nightlife spots in the Darwin CBD. This data will help visualise where potential competitors are located, as well as if there are any nightlife hotspots in the Darwin CBD or areas to avoid or target. This will help XYZ choose a desired location, and therefore solving the question as to where the new establishment would be if they choose to proceed.

## 2.2 Data 2

The second data source will utilise various resources to visualise key economic indicators of Darwin and the Northern Territory. Those key indicators Australian Bureau of Statistics (ABS) are:

- State Final Demand (SFD) (How much the Northern Territory produces within a period excluding net exports)
- Unemployment Rate
- Private Wage Growth Rate
- Population

The Northern Territory has a population of approximately 247 000, and Darwin consists of about 140 000 people. Due to Darwin having such a high proportion of the Northern Territory's population, it is reasonable to use whole of Northern Territory economic statistics to paint a picture of the Darwin economy.

The data will give XYZ the opportunity to see trends and historical patterns to determine where the Darwin economy may go in the future. This will give XYZ crucial information in deciding whether to invest in the economy to see if the economy is booming or heading into a bust period.

### 3 Methodology

#### 3.1 Data 1

The first data source generated a list of nightlife hotspots from Foursquare API. The data was gathered by using the venues search method, and specified the category ID to only include nightlife spots. The data was then filtered and cleaned to ensure only applicable establishments were included. Once a full list of establishments was generated and inserted into a pandas dataframe, a map was generated (Figure 1).

To explore further, k-means clustering techniques were applied to the data to separate venues into two clusters. A map was plotted (Figure 2) which showed the clusters. This method was applied to see if there were any patterns or nightlife hotspots in the Darwin CBD.

#### 3.2 Data 2

The second data source was read from an excel file which contain all the information gathered from the ABS. From this, the data was inserted into a pandas dataframe and filtered and cleaned so that the data was usable. Each economic indicator was then plot on a line graph, in order to visualise the data and see the trends (Figures 3, 4, 5, 6).

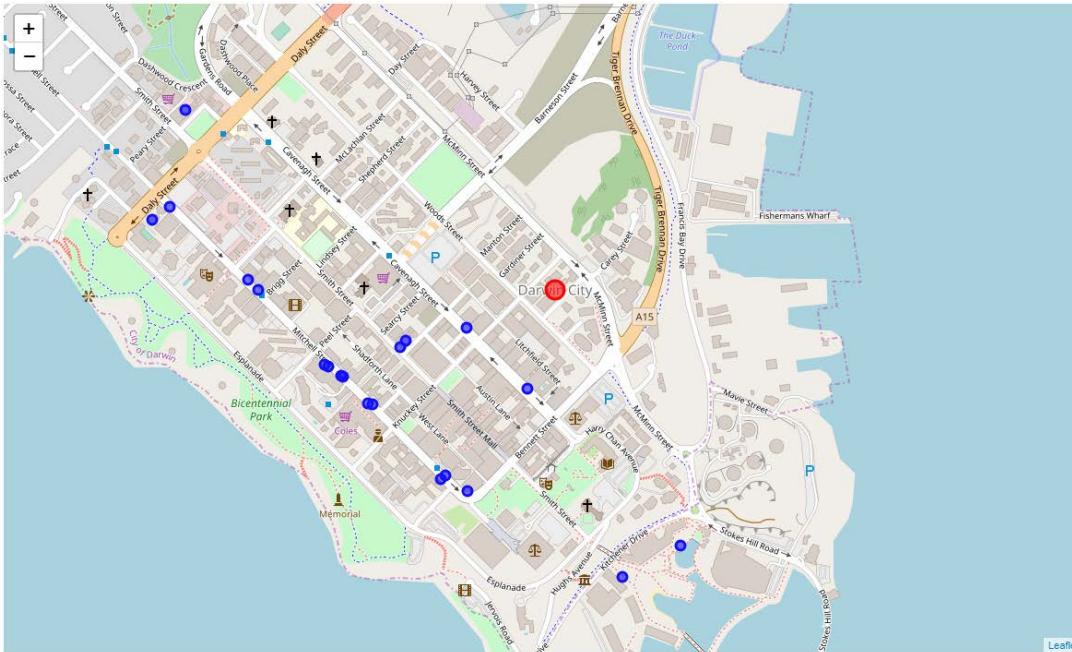
Pearson correlation techniques were then used to see if any of the indicators were linked or moved together. This analysis showed a strong relationship existed between two of the variables, and that the relationship should be taken into consideration when making the investment decision.

## 4 Results

### 4.1 Data 1

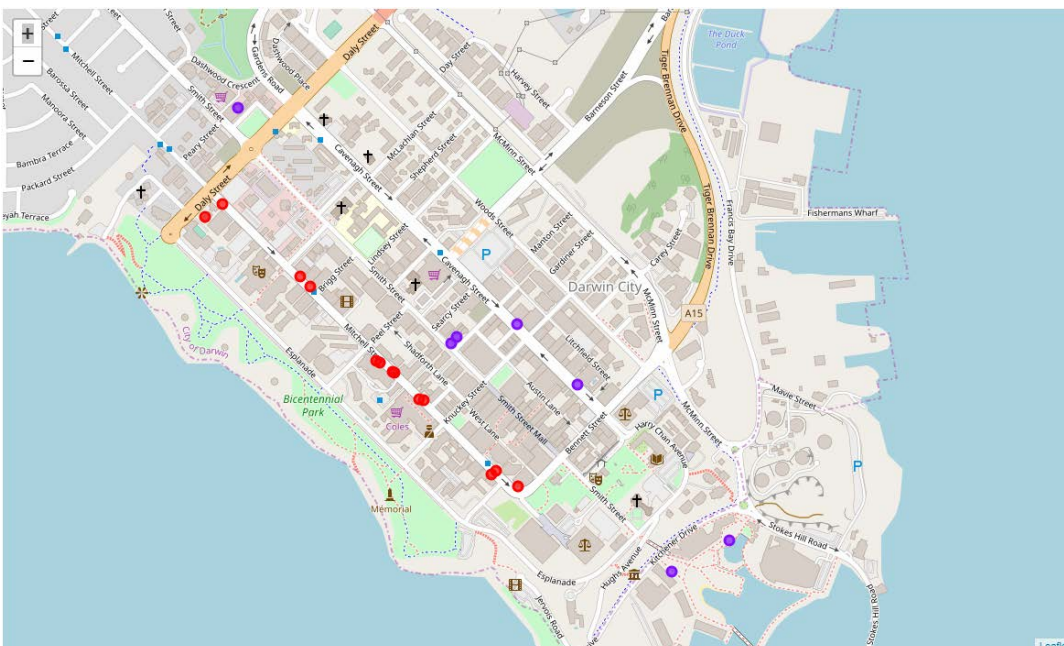
The first map (Figure 1) shows all the venues similar to XYZ's proposed bar, a total of 20 venues were plotted. From Figure 1 it is clear that there appears to be a cluster of venues located on the same street.

Figure 1:



K-means clustering techniques were applied to the data to separate venues into two clusters. The first cluster being venues that are located on Mitchell Street, and the second cluster consisted of venues that were not located on Mitchell Street. The clusters showed how many and what proportion of venues were located on Mitchell Street. A map was plotted (figure 2) which showed the vast majority of venues were in fact located on Mitchell Street.

Figure 2:



## Cluster 0: Venues on Mitchell Street

The first cluster consisted of 13 venues out of a total 20 (65%). This clearly shows most venues are located on Mitchell Street.

## Cluster 1: Venues not on Mitchell Street

The second cluster consisted of 7 venues out of a total 20 (35%). Not many venues in the Darwin CBD are outside of the main nightlife hotspot.

## 4.2 Data 2

Each economic indicator was plotted in a line graph in order to visualise each indicator, and to see if there are any apparent trends heading into the future. Figure 3 shows SFD, which has declined and remain subdued in recent years. This indicates that the economy in the Northern Territory is weak. Additionally, private wage growth has plummeted (Figure 5), unemployment has increased (Figure 4) and population growth has stalled in recent (Figure 6) years. All these indicators suggest that the Northern Territory economy is in a bust or contractionary period in the business cycle.

Figure 3:

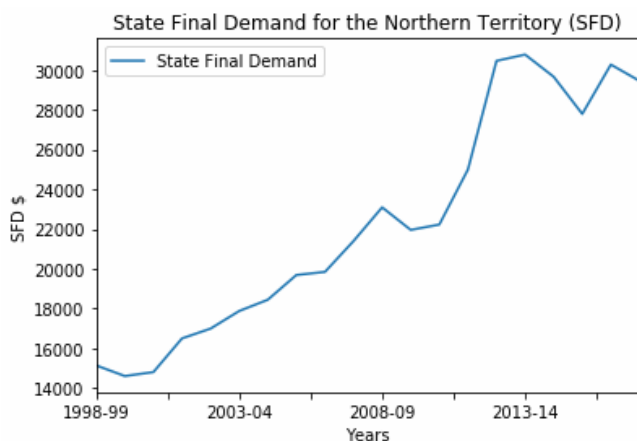


Figure 4:

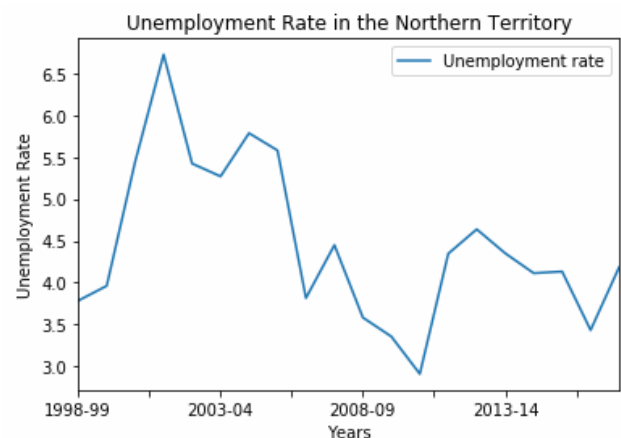


Figure 5:



Figure 6:

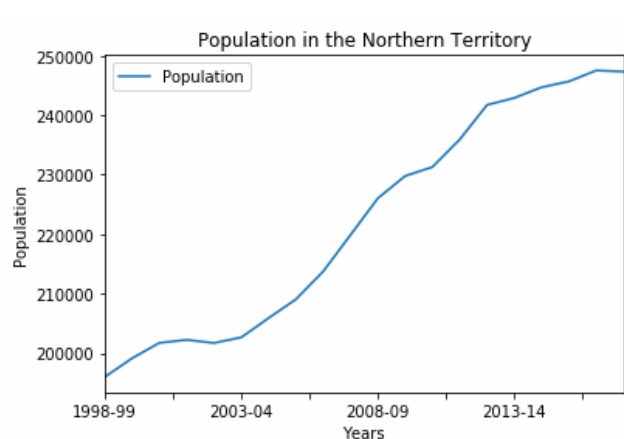


Table 1 shows the Pearson coefficients between the variables. As it shows, a very strong relationship exists between SFD and population. Therefore it is reasonable to expect that if SFD continues to flatten or decline, then population will flatten and decline as well, this would give rise to economic conditions not suiting a new bar in the Darwin CBD. A relationship does not exist between unemployment rate and private wage growth, this may be due to a large proportion of the labour force in Darwin being employed by the state government.

Table 1: Pearson Coefficients

Economic Indicators	Pearson Coefficient
Population & SFD	0.97
Unemployment Rate & Private Wage Growth	0.04

## 5 Discussion

From the results, it is clear that there is a nightlife hotspot on Mitchell Street in Darwin CBD. XYZ should seriously consider opening the new establishment on Mitchell Street if they wish to proceed, this is due to proximity of other bars and patrons.

However, the economic indicators all point to a stalling or possibly declining economy. The graphs all reflect a period of booming economic growth, this is now being followed by subdued growth and may lead to negative growth.

Having considered the results, I would recommend XYZ do not open a new bar at this point in time. It would be best to wait to see where the economic data trends over the next year or two. If the data turns around and paints a positive picture, then a new bar may be feasible. This new bar should be located on Mitchell Street in the Darwin CBD, in order to be best placed in the nightlife hotspot.

## 6 Conclusion

The report considered locational data provided by Foursquare API of venues in the Darwin CBD, as well as economic indicators to give XYZ relevant information before making their investment decision. The data showed that a nightlife hotspot exists in Mitchell Street, and that the Northern Territory economy is in a period of bust or contraction. Therefore it is recommended that XYZ delay their investment of establishing a new bar until the economy rebounds.