Name: BENNET JACOB VARGHESE
Student ID: 15505447

University of Canterbury

GISC422-20S1 - Foundations of Geographic Information Systems

Project: Buffer Zone and Bus route

Submitted by:

Bennet Jacob Varghese (15505447)

Name: BENNET JACOB VARGHESE
Student ID: 15505447

Abstract

The main aim of this project is to find the bus stops near to the airport which can be accessed easily by the public without walking long to catch a bus and second was the best route from bus interchange to the airport so that the time travel will be reduced and secondary route if some barrier is there in the primary route.

Introduction

The metro bus in Christchurch was started in the year 2000 and on the 8th December 2014 a new network of bus service stared which consisted of three types of services these were metro lines, city connector and suburban link service. Five colour coded bus route connect people to popular destination. It runs through Christchurch major corridors and connects to the suburbs. The major concern is that though the city has public transport the number of personal vehicles is more. This brings to our research question of why people are not using public transport(Metro bus) as compared to the personal vehicles. Is it due to long routes which bus takes to travel from one place to other or is it the less number stops which makes the public walk 1-2 kms to reach their destination after getting down from bus or to take the bus.

Literature Review

The route of the bus was recently changed in the year 2014 for the proper access of bus for the public. Suburban link allows people to connect between inner suburbs while avoiding the central city. City connector allows public to connect to outer suburb and satellite town direct to the city. For the convenience of the student studying at university major bus stops where built around all the corner of the university. Bus time showing the time of bus arrival and departure was also provided outside the libraries of the university. To reduce the use of personal vehicles many sort of offers such as free rides on the weekends and other metro card benefit where also provided. However, this has barely reduced the personal vehicle use.

Dataset and resource

Considering the metro bus route of Christchurch, it was important to get a map of Christchurch which was clipped from the New Zealand map. Additionally, the road parcel to show the road name and how it is routed. Then to find the buffer zone for the bus stops the dataset of the bus stop is also required. Focusing on the bus route from Bus interchange to the Airport and buffer zone in a 500-metre radius to find a new bus stop. The dataset related to the airport points and road centreline was also used. The most important dataset was to city boundary dataset which was used to properly clip Christchurch according the proper shape. All the dataset was either in shapefile format or a CSV.

Name: BENNET JACOB VARGHESE
Student ID: 15505447

Method for Buffer Zone(Spatial analysis)

- The dataset is been filtered and the required is been put into a single folder which is then used as the home for the Catalog in the ArcGIS. Then the ArcMap is been opened.
- Next, the Christchurch area from the New Zealand Map. So, the New Zealand was clipped with the help of clipped in the Geoprocessing->Clip. For a proper clip, the city boundary dataset was used.
- Now as the Christchurch city was created our focus the destination that is the Airport. Using the same clip option, the aerodrome i.e. the runway was removed and just the airport was marked with an airplane symbol in a polygon shape.
- Now one by one all the shape file where added to the map. First came the road parcel which was clipped and then the rad was labelled which provided an information that Durbey road is the nearest road to the airport.
- For a proper direction and equal division of the road centreline was also clipped. The most important parameter in the buffer zone was bus stops. First the by selecting and exporting the bus interchange data set i.e. according to the Platform Name the bus interchange was clipped. The expression used was :
  'PlatformNa' = A OR 'PlatformNa' = B OR 'PlatformNa' = C OR 'PlatformNa' = D OR 'PlatformNa' = L.
- All the bus stops were also located. In a total there are 1774 bus stops in Christchurch. Investigating the bus stop near to the Airport which is **Memorial Ave near Spitfire Square** which is approximately 1 km away from the airport and is 12 min walk from the airport. This is not convenient for the public.
- Then two buffer zone using the Multiring buffer option from the toolbox -> analysis toolbox -> Proximity was created. The input for the buffer zone was airport and the distance taken was 500 and 1000 meters.
- This concluded that the nearest road to the airport is airport is **Durbey Road**. This will be convenient for the public as it is near, many food junctions are present on this road and Bank is there on the road. The Durbey road surrounds the airport from almost all the corners except one. The fig.1. below shows the buffer zone and road.
- In this ways many other destination can be taken and with the help of buffer zone nearest places can been found with to increase the number of stops for the convenient of the public as shown in **Fig.1.**

Method for Best Route(Network analysis)

- To get the best route study about the present route was done. The Christchurch metro bus route is been dragged to the ArcMap. The origin point is the bus Interchange Platform A and the destination is the is **Memorial Ave near Spitfire Square bus stop** which is the nearest stop from the airport.
- The bus interchange and **Memorial Ave near Spitfire Square bus stop** is been clipped separately. To do a Network analysis Feature dataset and inside that a feature class is required. A feature dataset known as Routes and inside that a feature class was created
- Next a Network dataset known as Route_ND was created which had a data imported from the bus route dataset.

- Then the Network analysis is been enabled from the customise toolbar. After dragging the Route_ND the stops are been loaded. Two stops are added one is the origin point i.e. Bus interchange Platform A and destination i.e. Airport bus stop.
- After solving the direction is been noted which shows that the route takes 10 km after analysis which is better than the present route which is 13 km. A point barrier on the Riccarton Avenue is been added to give a second route if the primary route has some barrier.
- Similarly, a line barrier is also been added on Fendalton Road. In this way best route is been found as shown in **Fig.2.**
- The **Fig.3.** shows the Map Layout of the project done.

Graphics

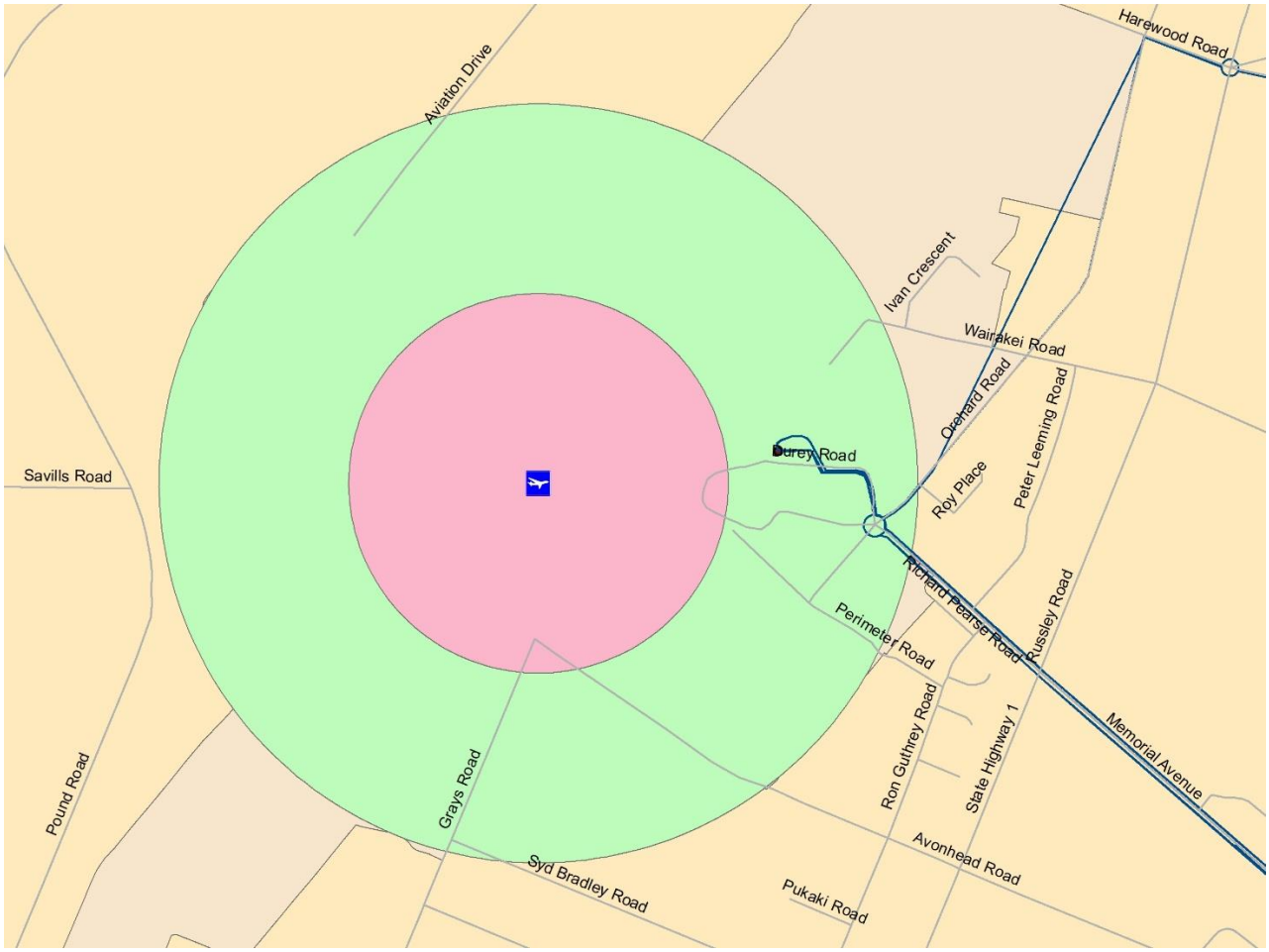

Fig.1. Buffer Zone

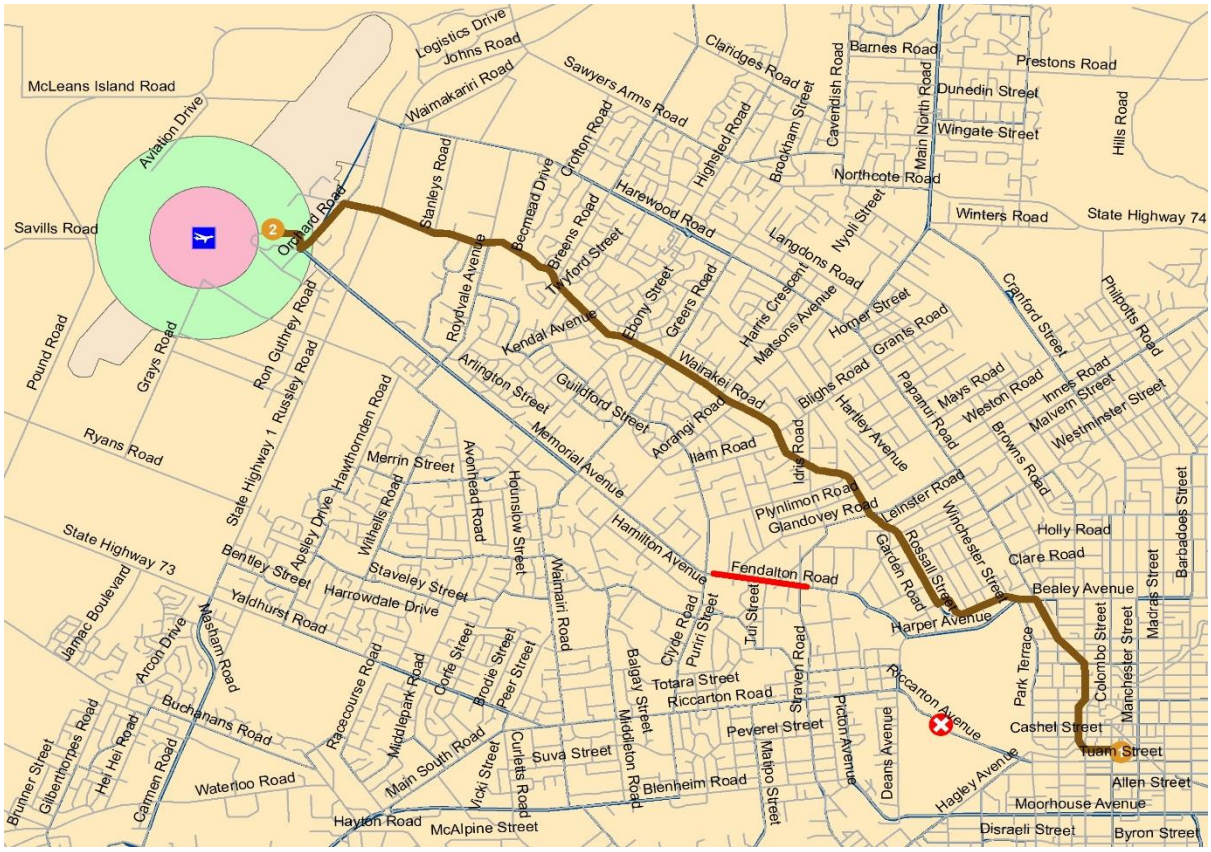

Fig.2. Best Route

Buffer Zone And Best Route

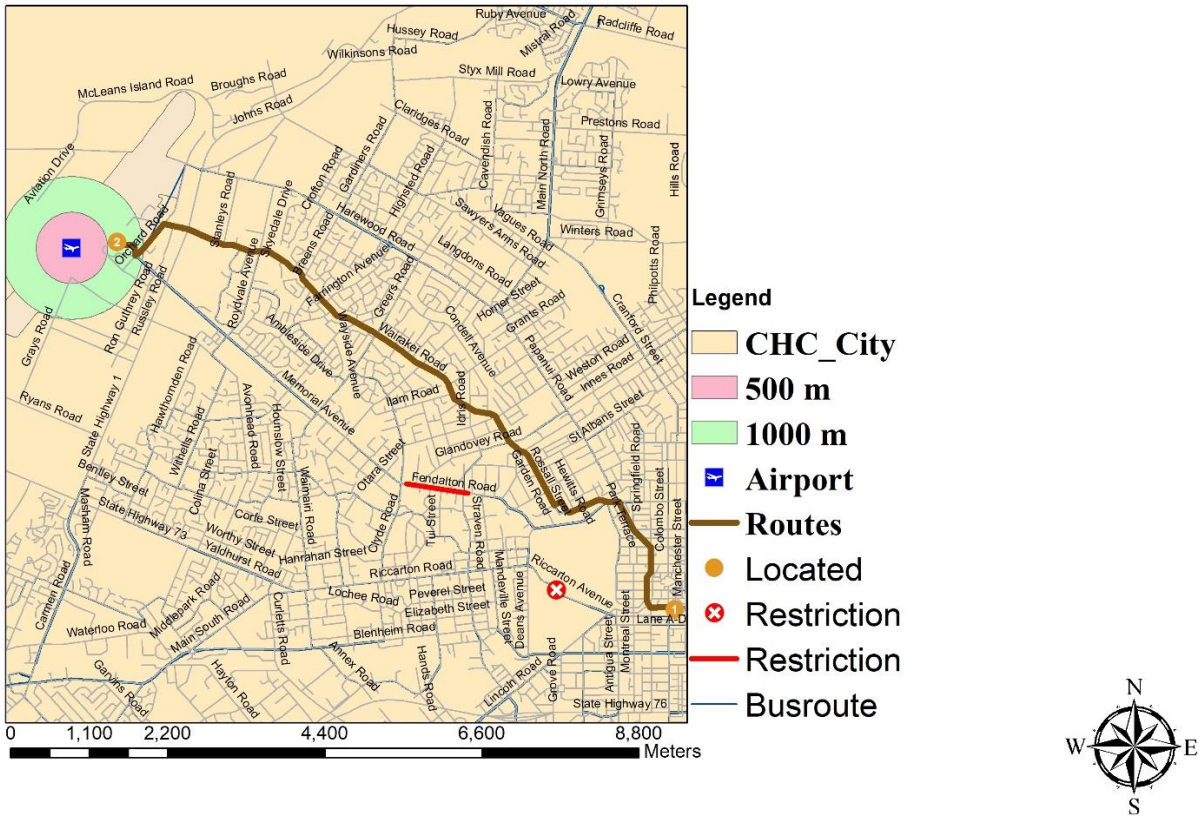

Fig.3. Buffer Zone and Best Bus Route

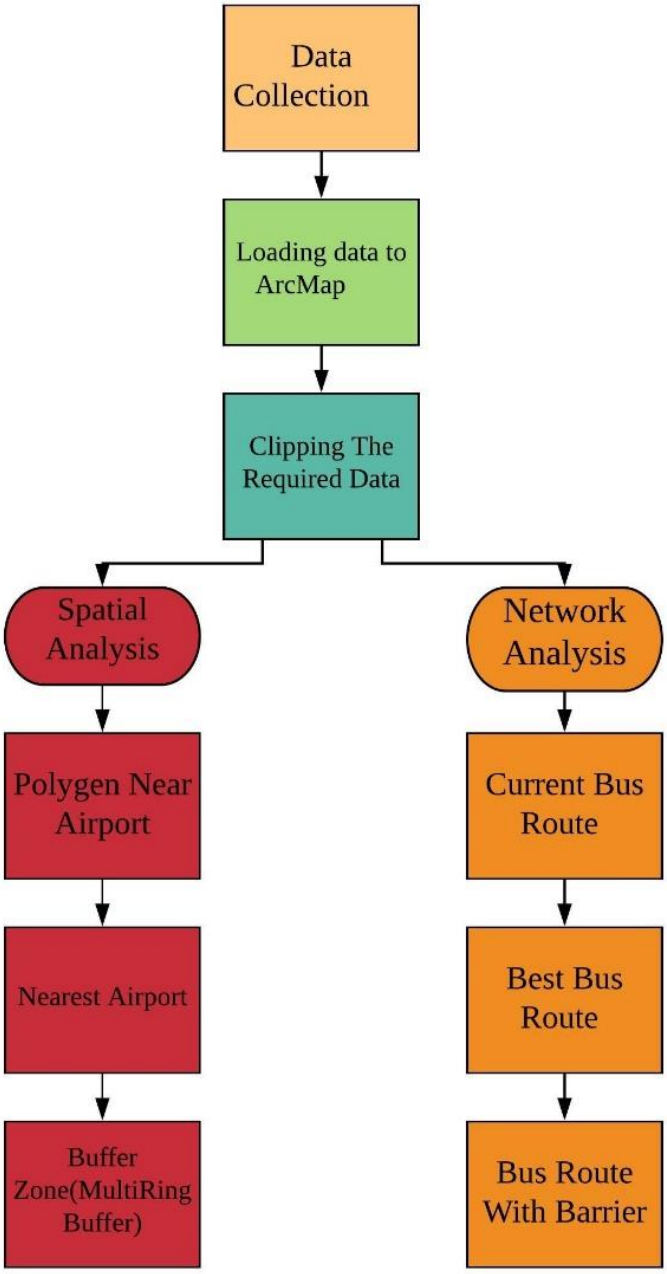

Fig.4. Data Flow Diagram

Limitation

Finding the specific data was a major limitation. While finding the best route the stops where a concern as there where a total of 1774 stops/location so clipping was require doing so. Creating a network dataset was also a major problem as a selected feature class and dataset was required.

Conclusion

To Conclude, the buffer zone was found and got the nearest Bus Stand on the Durbey Road for the convenience of the public and the best route was found from the Bus Interchange to the Airport Bus Stop which was 10.3 km. Another route including the point and line Barrier was also found which was 10.6 km. These both routes are better than the present route which is 13km.

Reference

1. https://opendata.canterburymaps.govt.nz/datasets/-bus-route-directions/geoservice
2. https://data.linz.govt.nz/data/global/oceania/new-zealand/canterbury/
3. https://en.wikipedia.org/wiki/Public_transport_in_Christchurch
4. Lab Material and Lecture Notes