Business Startup Planning through Visual Mapping of Resources and Infrastructure

By

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National University of Sciences and Technology (NUST)

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APPROVAL

I hereby recommend that the project work carried under the supervision of:

Dr. HAMID MUKHTAR

By:

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2. Shahzaib Sohail Ali

ENTITLED: **"Business Startup Planning through Visual Mapping of Resources and Infrastructure"** has been recommended by the examining committee for the final presentation as the write up is fully according to the given standard format.

Advisor: _____
01/7/11

Co-Advisor: _____

Member: _____

Member: _____

Member: _____

DEDICATION

This Project is dedicated to our fathers, who taught us that the best kind of knowledge to have is that which is learned for its own sake. It is also dedicated to our mothers, who taught us that even the largest task can be accomplished if it is done one step at a time.

ACKNOWLEDGEMENTS

This project would not have been possible without the guidance and the help of several individuals who in one way or another contributed and extended their valuable assistance in the preparation and completion of this project. With a deep sense of gratitude, we wish to express our sincere thanks to our advisor, Dr. Hamid Mukhtar and co-advisor, Dr. Sajjad Ahmed Siddiqi for giving us the opportunity to work under them on this project. They have been great sources of inspiration to us and we thank them from the bottom of our heart. We would like to thank our department as well for giving us the opportunity and platform to make our effort a successful one.

ABSTRACT

We often have to face the problems when we start our business for example where to open a school, to build a hospital or to start a restaurant. Usually people start business at a location which is not feasible for that type of business. For example a person opens a school in a location where there is no parking area, no proper ventilation system and no playground facilities. Moreover there is no proper road infrastructure which creates problems for students and teachers who come to school from distant places. They have to face problems of vehicles to reach the school.

Similarly, the same problems also exist in other businesses like hospitals which are often built at places where there is too much noise of vehicles, industry and commercial areas etc. which create problems for patients. People also have to face problems while they are going to decide to open any shop like pizza hut. They can't decide where to open the shop because they have no statistical data about people living in that area. For example they don't know the ratio of children, younger, men and women and old people living at that place. They also don't know the economic position of people.

We developed a web portal which helps users to locate best suitable location for their business i.e. school, hospital or shop etc. It uses geographical pattern, population density, economic positions of inhabitants etc. With the help of easily understandable visualization, users may locate infrastructure and resources properly.

TABLE OF CONTENTS

LIST OF ABBREVIATIONS

Abbreviations	Meaning
AND	Automotive Navigation Data
OSM	Open Street Map
USGS	U.S. Geological Survey
SVT	Static Visualizations Techniques
DVT	Dynamic Visualizations Techniques
JQL	Java Query Language
JS	Java Script
HTML	Hypertext Markup Language
GMap	Google Map
API	Application Programming Interface
JSP	Java Server Pages
DAG	Directed Acyclic Graph

Chapter 01

1 INTRODUCTION

1.1 Problem

Now-a-days we often have to face the problems when we start our business for example where to open a school, build a hospital or start a restaurant. Usually people start business at a location which is not feasible for that type of business. For example a person opens a school at a location where there is no parking area, no proper ventilation system and no playground facilities. Moreover there is no proper road infrastructure which creates problems for students and teachers who come to school from distant places. They have to face problems of vehicles to reach the school.

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1.2 Solution

An application is required which helps users to locate the best suitable location for their business i.e. school, hospital or shop etc. We are going to develop an application which uses geographical patterns, population density, economic positions of inhabitants etc. Our application will be a an online web portal so users will be able to access it at any place.

Chapter 01

1 INTRODUCTION

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An application is required which helps users to locate the best suitable location for their business i.e. school, hospital or shop etc. We are going to develop an application which uses geographical patterns, population density, economic positions of inhabitants etc. Our application will be a an online web portal so users will be able to access it at any place.

1.3 Expected Results

- User friendly visualization of data and resources.
- No survey will be required for business planning.
- Easily extensible application for more business dimensions.

1.4 Technology Used

- Asp.NET , JSP, AJAX and XML,HTML
- Java Script, JQuery and CSS, Silverlight
- Google Maps API and related APIs
- Web Designing and Data analysis
- SQL Server 2008 for Database

1.5 Site Selection Parameters

Site selection criteria are different for different types of business because some parameters might be different in every business. For example in case of school playground facility is required which is not necessary for opening shop. Here is detail of parameters for different businesses.

1.5.1 Hospital parameters

In case of hospital, following parameters may be used.

Geographical location: The hospital must be accessible to people from all walks of life. Unlike certain industries that cater to the rich who can afford their own mode of transportation, hospitals must be accessible to everyone.

Existing hospitals: The application will tell us how many hospitals already exist in a particular location. Base on existing hospital application will provide information how much the probability of location is feasible.

Land cost: It will provide the price of the location for information

Land expansions: Sometimes more departments may be required to accommodate the patients as the number of patient increases with the passage of time. New services may be added for example cardiology, podiatry, and oncology according to demand.

Vehicle parking: There should be enough parking to accommodate all the seats in your new hospital. Ideally, a new restaurant location should have its own parking lot.

Building: Building is another major area that one needs to look at carefully before setting up a hospital. The facility for outpatients must be different from those of the in-patients.

1.5.2 Restaurant parameters

In case of a restaurant, following parameters may be used

Location: A restaurant's location is as crucial to its success as great food and service. It will influence many parts of your restaurant, including the menu. There are four crucial elements to consider when looking at a potential restaurant location.

Population base: There should be enough people in the area to support your business for example, either the restaurant location in the heart of a shopping area, or along a busy freeway.

Parking: There should be enough parking to accommodate all the seats in your new restaurant. Ideally, a new restaurant location should have its own parking lot.

Accessibility and visibility: The restaurant should be easily accessible and visible to the people.

Economic position of people: A restaurant should be according to the economic position, salary or pay scale of the people living in the area.

Housing value: If houses are going cheap, that is an indicator that incomes are lower. If houses are expensive, than it is a good indication that incomes are high and people have extra money to dine out.

Nearby institutions and attractions: The restaurant should be established in the area having big businesses or attractions that will bring lots of people into the area. For example, a sports stadium or major medical facility will attract hundreds, even thousands of visitors from outside the local area.

Size of restaurant: The next thing you will need to take into account is the size of the restaurant you plan to open. As you can well imagine, a small restaurant with 25 seats will cost you a lot less than a larger restaurant with 175 seats.

Type of food: The type of food you plan to serve can have a huge impact on your expenses. For example some people like Chinese Food, some may like Continental or fast food etc.

1.5.3 Schools/Colleges parameters

In case of an educational institute, following parameters may be used

School location: Schools should be conveniently located for the student populations they serve. Schools should be located in areas that minimize busing while promoting student, parent, and community access to the school.

Utility availability: Utilities must be available or readily accessible and they must meet funding and time constraints established by the District.

Traffic analysis and access: Whenever possible, the site should be located so as to safeguard the children from arterial highways, heavily traveled streets, traffic and congestion, especially at the elementary level.

Environmental hazards: The site should be a safe and secure environment for the student population served.

Government services: Gov't services also necessary for choosing best location like

- Police and fire service
- Garbage collection
- Childcare and other government services
- Impact on revenue, taxes, permit and license fees

Crime rate: Crime rate also affect in selection of best location as describe below

- Defensive (how powerful are anti-development forces?)
- Neutral (what social costs does the project impose?)
- What are the benefits to the locality?
- Is the project in the public interest?
- Offensive (what are the local attitudes towards growth and how can they be used to help shape, refine and specify the project to be built?)

Chapter 2

2 LITERATURE REVIEW

2.1 Introduction

In this chapter we will provide an overview of some existing applications which are related to our project work. Some examples with detail are given below.

2.2 Conterminous States

The U.S. Geological Survey (USGS) National Seismic Hazard Maps display earthquake ground motions for various probability levels across the United States and are applied in seismic provisions of building codes, insurance rate structures, risk assessments, and other public policy. The resulting maps are derived from seismic hazard curves calculated on a grid of sites across the United States that describe the frequency of exceeding a set of ground motions. [3]

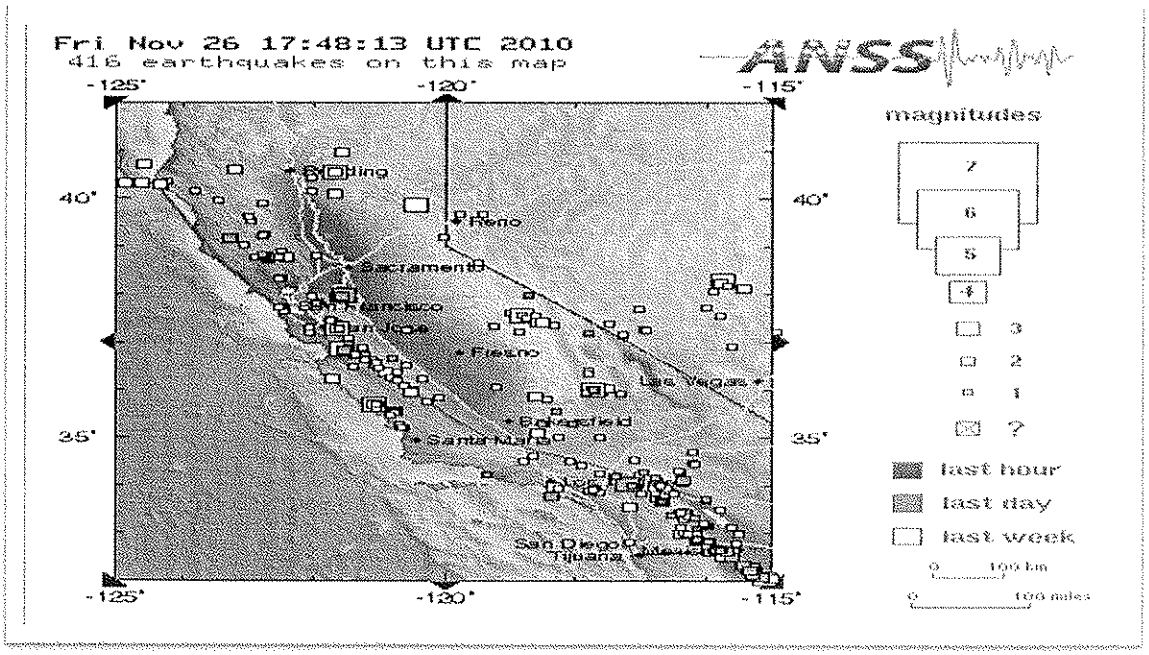


Figure 2.1: Earthquake Location Mentioned in Google Map

Above figure shows the locations of earthquake. Red color shows the location of earthquake hit within an hour. Blue and yellow colors show the locations of earthquake took place for previous last day and last week respectively. [3]

2.3 Open Street Map

It a collaborative project to create a free editable map of the world. The maps are created using data from portable GPS devices, aerial photography, other free sources or simply from local knowledge. [4]

Open Street Map was inspired by sites such as Wikipedia; the map display features a prominent 'Edit' tab and a full revision history is maintained. Registered users can upload GPS track logs and edit the vector data using the given editing tools. [4]

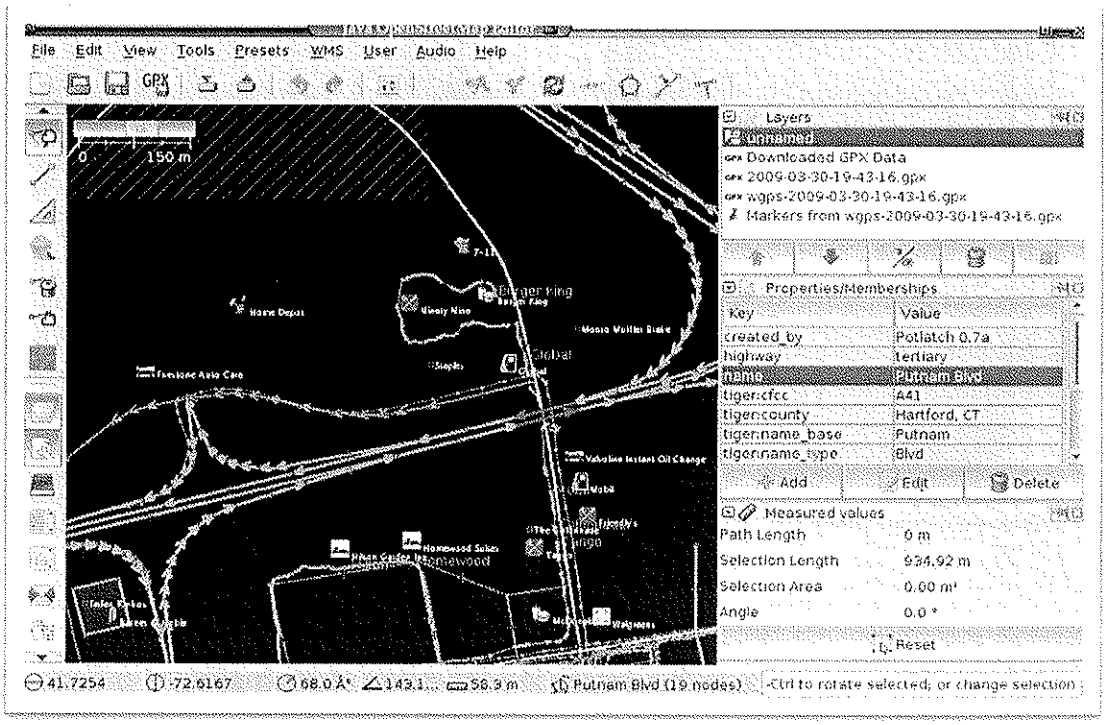


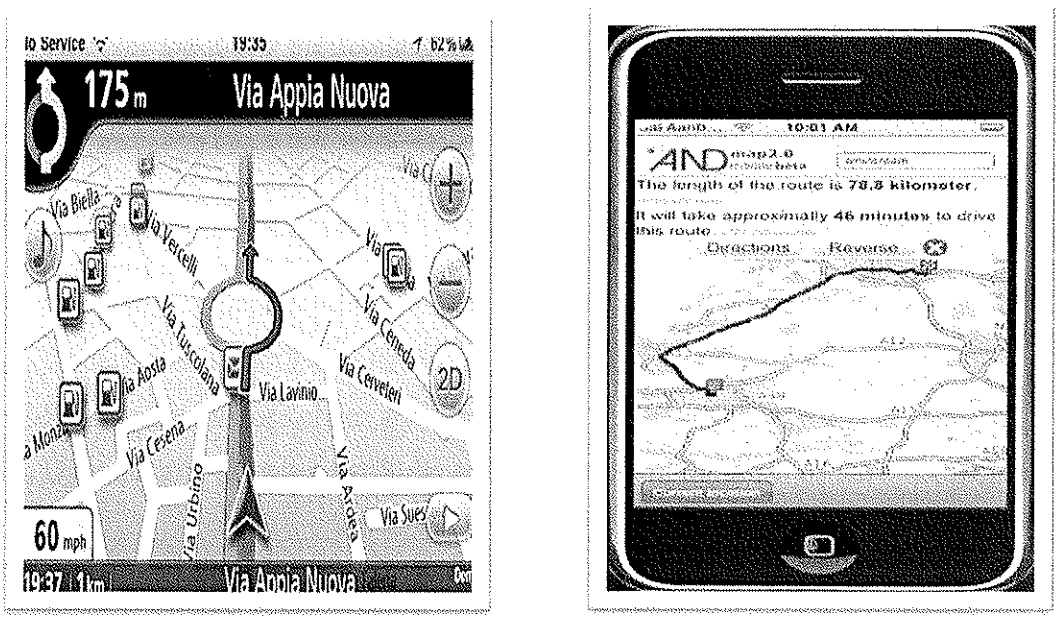
Figure 2.2: Open Street Map Editor

2.4 Automotive Navigation Data (AND)

AND Automotive Navigation Data is leading provider of digital mapping data used for navigation and location-based services. AND Automotive Navigation Data focuses on the development of digital mapping data in Europe, North-Africa, Central and South America and Australia. The digital maps are used in personal and 'in-car' navigation, Internet-based mapping, fleet management and more. Figure 2.3(b) is the best example of AND. [5]

2.4.1 IMaps Haiti

Application for the Phone, which locates yourself on a map and plans a route in Haiti and a fun Android application to find out where you go today, available via the Android Market. [5]



(a) (b)

Figure 2.3: Automotive Navigation Data (AND)

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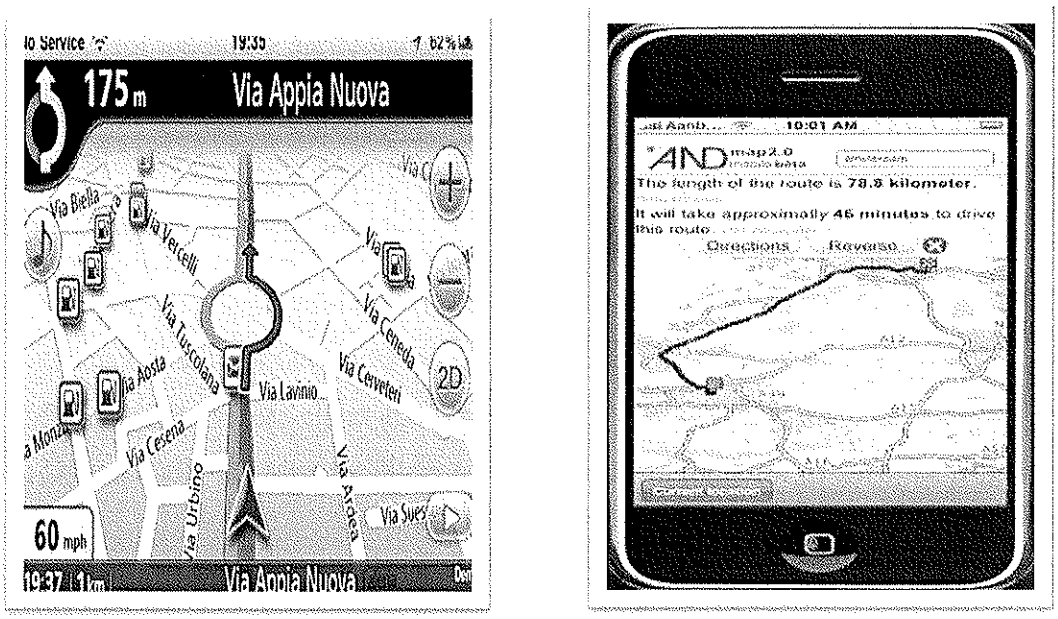

(a) (b)

Figure 2.3: Automotive Navigation Data (AND)

Chapter 3

3 METHODOLOGY AND WORK PLAN

3.1 Project objectives

Create a tool based upon probabilistic logic for identification of areas and communities on a map for developing business startup planning. With the help of this portal, business persons may be able to find more feasible place for their business.

3.2 Approach followed

- Used SQL Server database for storing and retrieving data
- JQuery for drawing network Diagram
- Ajax for Updating particular part of page without updating the entire page
- C# for Database Connectivity and logic

3.3 Challenges Encountered

- Generalizing application for more business domains
- Understanding of GMap API
- Passing data across client and server sides
- Dynamically drawing the Flow of Information in the form of network diagram

3.4 Future Plan

- Generalize Bayesian network for all kinds of businesses
- Development of Same application in Android Phone
- Graphically representation of collected statistics of Particular region

3.5 Progress on Project

Following is the detail of progress we have made on our project.

3.5.1 Bayesian network

A Bayesian network, belief network or directed acyclic graphical model is a probabilistic graphical model that represents a set of random variables and their conditional dependencies via a directed acyclic graph (DAG). Figure 3.1 is the example of Bayesian network.

Initially we have developed the partial Bayesian network which calculates the probability. Based on the calculated probability we can tell whether a particular location is suitable or not for establishing restaurant. To achieve all this we find all those variables which can affect anyway. After collecting variables we made nodes and store probability of each node in tables.

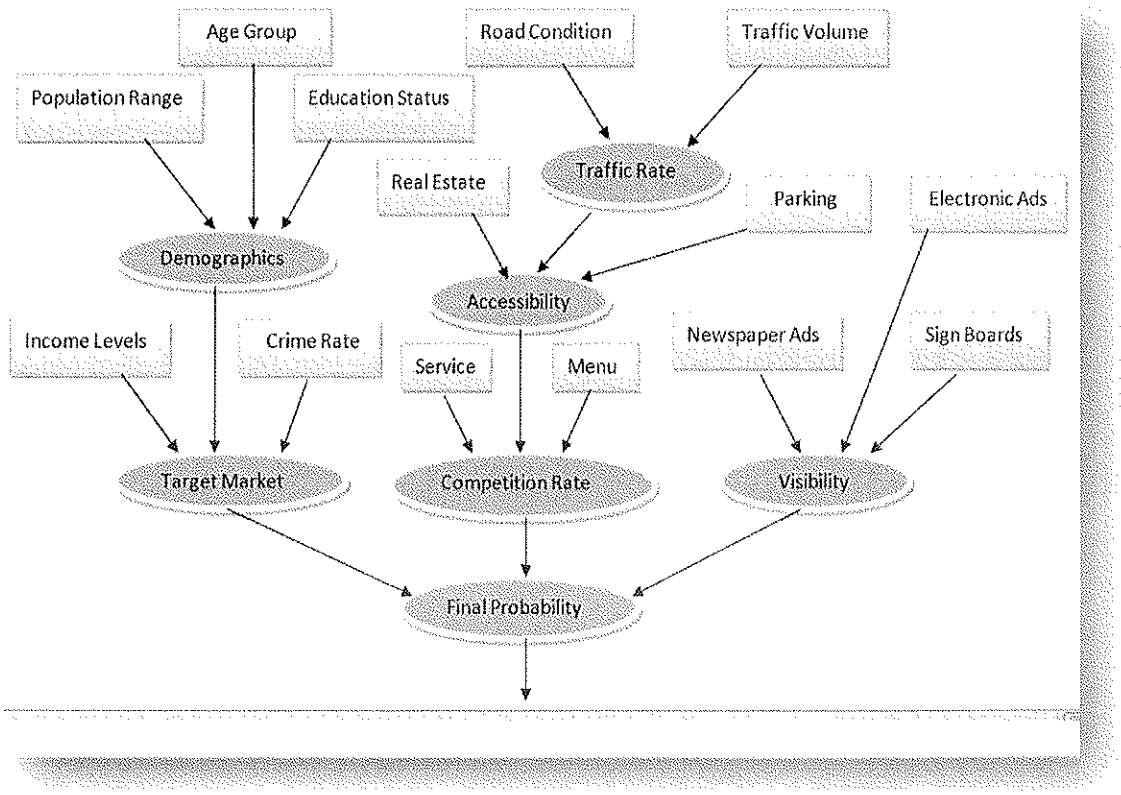

Figure 3.1: Bayesian Network Diagram for Restaurant

3.5.2 Interface of web portal

Figure 3.2 shows the interface of our web portal. Interface of web portal contains GMap and dropdown lists for user's selection options. There are statistics of different regions are also provided for users information. Statistics about a particular region is shown in the form of pie charts and bar charts etc.

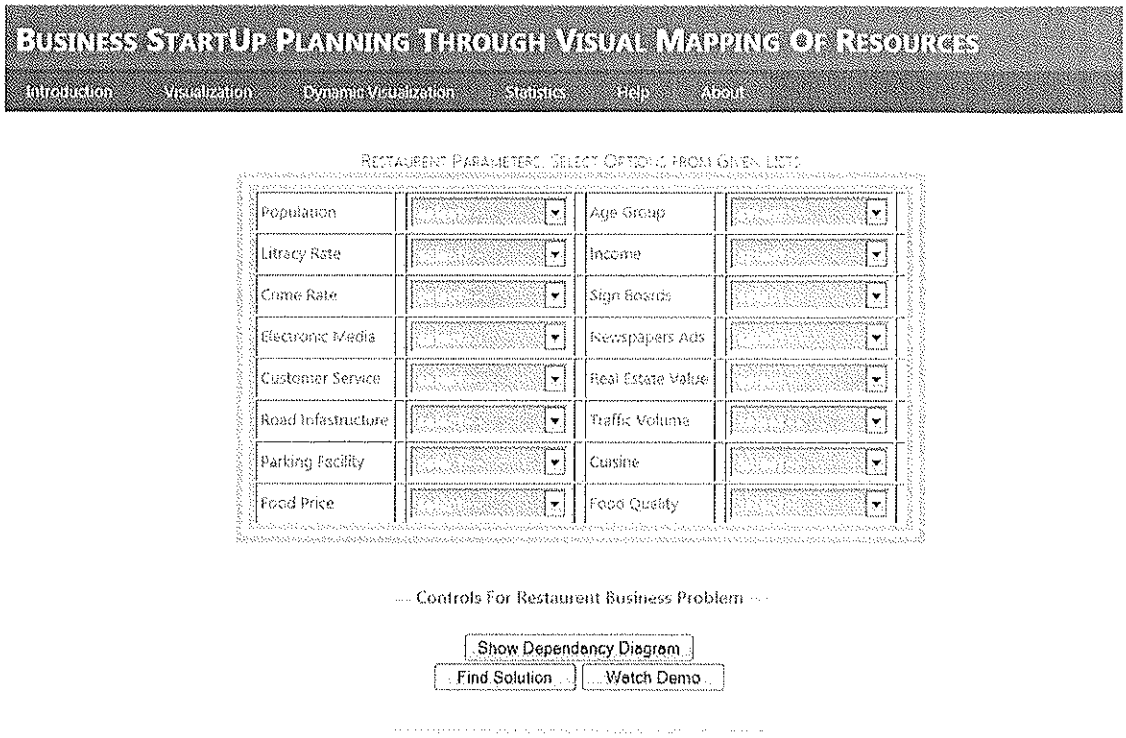

Figure 3.2: Web Interface

3.5.3 Probability tables

There are eight tables each have different combinations based on input variable. If there are three input variables and each variable has three options then total combination will be twenty seven as shown in the tables below.

Population Range	Age Group	Education Status	Demographics (Good)	Demographics (Average)	Demographics (Bad)
10-15K	Youngsters	Literate	0.3	**0.5**	0.2
10-15K	Youngsters	Illiterate	0.1	0.3	**0.6**
10-15K	Middle Aged	Literate	0.3	**0.5**	0.2
10-15K	Middle Aged	Illiterate	0.1	0.3	**0.6**
10-15K	Old Aged	Literate	0.3	**0.5**	0.2
10-15K	Older Aged	Illiterate	0.1	0.3	**0.6**
16-20K	Youngsters	Literate	0.3	**0.6**	0.1
16-20K	Youngsters	Illiterate	0.2	**0.5**	0.3
16-20K	Middle Aged	Literate	0.3	**0.6**	0.1
16-20K	Middle Aged	Illiterate	0.2	**0.5**	0.3
16-20K	Old Aged	Literate	0.3	**0.6**	0.1
16-20K	Older Aged	Illiterate	0.2	**0.5**	0.3
21-25K	Youngsters	Literate	**0.6**	0.3	0.1
21-25K	Youngsters	Illiterate	0.2	**0.5**	0.3
21-25K	Middle Aged	Literate	**0.6**	0.3	0.1
21-25K	Middle Aged	Illiterate	0.2	**0.5**	0.3
21-25K	Old Aged	Literate	**0.6**	0.3	0.1
21-25K	Older Aged	Illiterate	0.2	**0.5**	0.3

Table 3.1: Demographics probability calculation table

Real Estate Value	Traffic Rate	Parking	Accessibility (Good)	Accessibility (Average)	Accessibility (Bad)
High	High	Large	**0.6**	0.3	0.1
High	High	Medium	**0.5**	0.3	0.2
High	High	Small	**0.3**	**0.6**	0.2
High	Average	Large	**0.5**	0.3	0.2
High	Average	Medium	0.3	**0.6**	0.1
High	Average	Small	0.3	**0.5**	0.2
High	Low	Large	0.3	**0.6**	0.1
High	Low	Medium	0.3	**0.5**	0.2
High	Low	Small	0.3	**0.4**	0.3
Average	High	Large	**0.5**	0.3	0.2
Average	High	Medium	0.3	**0.6**	0.1
Average	High	Small	0.3	**0.5**	0.2

Average	Average	Large	0.3	**0.6**	0.1
Average	Average	Medium	0.3	**0.5**	0.2
Average	Average	Small	0.3	**0.4**	0.3
Average	Low	Large	0.3	**0.5**	0.2
Average	Low	Medium	0.3	**0.4**	0.3
Average	Low	Small	0.2	0.3	**0.5**
Low	High	Large	0.3	**0.6**	0.1
Low	High	Medium	0.3	**0.5**	0.2
Low	High	Small	0.3	**0.4**	0.3
Low	Average	Large	0.3	**0.5**	0.2
Low	Average	Medium	0.3	**0.4**	0.3
Low	Average	Small	0.2	0.3	**0.5**
Low	Low	Large	0.3	**0.4**	0.3
Low	Low	Medium	0.2	0.3	**0.5**
Low	Low	Small	0.1	0.3	**0.6**

Table 3.2: Accessibility probability calculation table

Cuisines	**Price**	**Food Quality**	**Menu(Good)**	**Menu(Average)**	**Menu(Bad)**
Continental	High	Good	**0.6**	0.3	0.1
Continental	High	Average	**0.5**	0.3	0.2
Continental	High	Bad	**0.3**	**0.6**	0.2
Continental	Average	Good	**0.5**	0.3	0.2
Continental	Average	Average	0.3	**0.6**	0.1
Continental	Average	Bad	0.3	**0.5**	0.2
Continental	Low	Good	0.3	**0.6**	0.1
Continental	Low	Average	0.3	**0.5**	0.2
Continental	Low	Bad	0.3	**0.4**	0.3
Chinese	High	Good	**0.5**	0.3	0.2
Chinese	High	Average	0.3	**0.6**	0.1
Chinese	High	Bad	0.3	**0.5**	0.2
Chinese	Average	Good	0.3	**0.6**	0.1
Chinese	Average	Average	0.3	**0.5**	0.2
Chinese	Average	Bad	0.3	**0.4**	0.3
Chinese	Low	Good	0.3	**0.5**	0.2
Chinese	Low	Average	0.3	**0.4**	0.3
Chinese	Low	Bad	0.2	0.3	**0.5**
Others	High	Good	0.3	**0.6**	0.1
Others	High	Average	0.3	**0.5**	0.2
Others	High	Bad	0.3	**0.4**	0.3
Others	Average	Good	0.3	**0.5**	0.2
Others	Average	Average	0.3	**0.4**	0.3

Others	Average	Bad	0.2	0.3	**0.5**
Others	Low	Good	0.3	**0.4**	0.3
Others	Low	Average	0.2	0.3	**0.5**
Others	Low	Bad	0.1	0.3	**0.6**

Table 3.3: Menu probability calculation table

Income Level	**Demographics**	**Crime Rate**	**Target Market (Good)**	**Target Market (Average)**	**Target Market (Bad)**
High	Good	High	**0.6**	0.3	0.1
High	Good	Average	**0.5**	0.3	0.2
High	Good	Low	**0.3**	**0.6**	0.2
High	Average	High	**0.5**	0.3	0.2
High	Average	Average	0.3	**0.6**	0.1
High	Average	Low	0.3	**0.5**	0.2
High	Bad	High	0.3	**0.6**	0.1
High	Bad	Average	0.3	**0.5**	0.2
High	Bad	Low	0.3	**0.4**	0.3
Average	Good	High	**0.5**	0.3	0.2
Average	Good	Average	0.3	**0.6**	0.1
Average	Good	Low	0.3	**0.5**	0.2
Average	Average	High	0.3	**0.6**	0.1
Average	Average	Average	0.3	**0.5**	0.2
Average	Average	Low	0.3	**0.4**	0.3
Average	Bad	High	0.3	**0.5**	0.2
Average	Bad	Average	0.3	**0.4**	0.3
Average	Bad	Low	0.2	0.3	**0.5**
Low	Good	High	0.3	**0.6**	0.1
Low	Good	Average	0.3	**0.5**	0.2
Low	Good	Low	0.3	**0.4**	0.3
Low	Average	High	0.3	**0.5**	0.2
Low	Average	Average	0.3	**0.4**	0.3
Low	Average	Low	0.2	0.3	**0.5**
Low	Bad	High	0.3	**0.4**	0.3
Low	Bad	Average	0.2	0.3	**0.5**
Low	Bad	Low	0.1	0.3	**0.6**

Table 3.4: Target market probability calculation table

Service	Accessibility	Menu	Competition Rate(Good)	Competition Rate (Average)	Competition Rate (Bad)
Good	Good	Good	**0.6**	0.3	0.1
Good	Good	Average	**0.5**	0.3	0.2
Good	Good	Bad	**0.3**	**0.6**	0.2
Good	Average	Good	**0.5**	0.3	0.2
Good	Average	Average	0.3	**0.6**	0.1
Good	Average	Bad	0.3	**0.5**	0.2
Good	Bad	Good	0.3	**0.6**	0.1
Good	Bad	Average	0.3	**0.5**	0.2
Good	Bad	Bad	0.3	**0.4**	0.3
Average	Good	Good	**0.5**	0.3	0.2
Average	Good	Average	0.3	**0.6**	0.1
Average	Good	Bad	0.3	**0.5**	0.2
Average	Average	Good	0.3	**0.6**	0.1
Average	Average	Average	0.3	**0.5**	0.2
Average	Average	Bad	0.3	**0.4**	0.3
Average	Bad	Good	0.3	**0.5**	0.2
Average	Bad	Average	0.3	**0.4**	0.3
Average	Bad	Bad	0.2	0.3	**0.5**
Bad	Good	Good	0.3	**0.6**	0.1
Bad	Good	Average	0.3	**0.5**	0.2
Bad	Good	Bad	0.3	**0.4**	0.3
Bad	Average	Good	0.3	**0.5**	0.2
Bad	Average	Average	0.3	**0.4**	0.3
Bad	Average	Bad	0.2	0.3	**0.5**
Bad	Bad	Good	0.3	**0.4**	0.3
Bad	Bad	Average	0.2	0.3	**0.5**
Bad	Bad	Bad	0.1	0.3	**0.6**

Table 3.5: Competition rate probability calculation table

Sign Board Ads	Electronic Ads	News Papers Ads	Visibility (Good)	Visibility (Average)	Visibility (Bad)
Large	High Budget	High Budget	**0.6**	0.3	0.1
Large	High Budget	Low Budget	**0.5**	0.3	0.2
Large	High Budget	No Ads	**0.3**	**0.6**	0.2
Large	Low Budget	High Budget	**0.5**	0.3	0.2
Large	Low Budget	Low Budget	0.3	**0.6**	0.1
Large	Low Budget	No Ads	0.3	**0.5**	0.2

Large	No Ads	High Budget	0.3	**0.6**	0.1
Large	No Ads	Low Budget	0.3	**0.5**	0.2
Large	No Ads	No Ads	0.3	**0.4**	0.3
Medium	High Budget	High Budget	**0.5**	0.3	0.2
Medium	High Budget	Low Budget	0.3	**0.6**	0.1
Medium	High Budget	No Ads	0.3	**0.5**	0.2
Medium	Low Budget	High Budget	0.3	**0.6**	0.1
Medium	Low Budget	Low Budget	0.3	**0.5**	0.2
Medium	Low Budget	No Ads	0.3	**0.4**	0.3
Medium	No Ads	High Budget	0.3	**0.5**	0.2
Medium	No Ads	Low Budget	0.3	**0.4**	0.3
Medium	No Ads	No Ads	0.2	0.3	**0.5**
Small	High Budget	High Budget	0.3	**0.6**	0.1
Small	High Budget	Low Budget	0.3	**0.5**	0.2
Small	High Budget	No Ads	0.3	**0.4**	0.3
Small	Low Budget	High Budget	0.3	**0.5**	0.2
Small	Low Budget	Low Budget	0.3	**0.4**	0.3
Small	Low Budget	No Ads	0.2	0.3	**0.5**
Small	No Ads	High Budget	0.3	**0.4**	0.3
Small	No Ads	Low Budget	0.2	0.3	**0.5**
Small	No Ads	No Ads	0.1	0.3	**0.6**

Table 3.6: Visibility probability calculation table

Target Market	**Competition Rate**	**Visibility**	**Final Probability (Good)**	**Final Probability (Average)**	**Final Prop (Bad)**
Good	Good	Good	**0.6**	0.3	0.1
Good	Good	Average	**0.5**	0.3	0.2
Good	Good	Bad	**0.3**	**0.6**	0.2
Good	Average	Good	**0.5**	0.3	0.2
Good	Average	Average	0.3	**0.6**	0.1
Good	Average	Bad	0.3	**0.5**	0.2
Good	Bad	Good	0.3	**0.6**	0.1
Good	Bad	Average	0.3	**0.5**	0.2

Good	Bad	Bad	0.3	**0.4**	0.3
Average	Good	Good	**0.5**	0.3	0.2
Average	Good	Average	0.3	**0.6**	0.1
Average	Good	Bad	0.3	**0.5**	0.2
Average	Average	Good	0.3	**0.6**	0.1
Average	Average	Average	0.3	**0.5**	0.2
Average	Average	Bad	0.3	**0.4**	0.3
Average	Bad	Good	0.3	**0.5**	0.2
Average	Bad	Average	0.3	**0.4**	0.3
Average	Bad	Bad	0.2	0.3	**0.5**
Bad	Good	Good	0.3	**0.6**	0.1
Bad	Good	Average	0.3	**0.5**	0.2
Bad	Good	Bad	0.3	**0.4**	0.3
Bad	Average	Good	0.3	**0.5**	0.2
Bad	Average	Average	0.3	**0.4**	0.3
Bad	Average	Bad	0.2	0.3	**0.5**
Bad	Bad	Good	0.3	**0.4**	0.3
Bad	Bad	Average	0.2	0.3	**0.5**
Bad	Bad	Bad	0.1	0.3	**0.6**

Table 3.7: Final Result calculation table

3.5.4 Architecture of Web Portal

Architecture of our web portal is basically client-server architecture. The **client–server model** of computing is a distributed application structure that partitions tasks or workloads between the providers of a resource or service, called servers, and service requesters, called clients. Often clients and servers communicate over a computer network on separate hardware, but both client and server may reside in the same system. A server machine is a host that is running one or more server programs which share their resources with clients. A client does not share any of its resources, but requests a server's content or service function. Clients therefore initiate communication sessions with servers which await incoming requests **[6].**

In our case administrator will provide the statistics for web portal. Users can only fill basic information in their request. On the base of these request server will calculate the probability and return the required results to the users again. Figure 3.3 is architecture diagram of web portal.

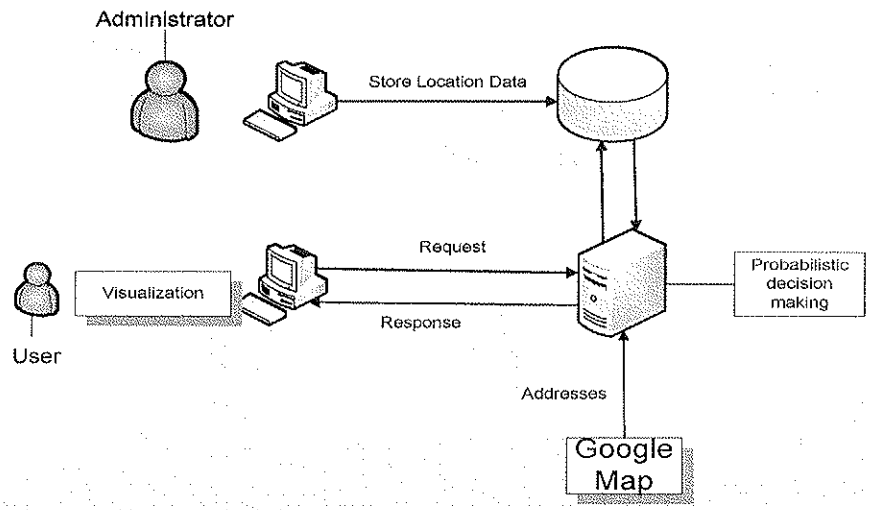

Figure 3.3: Architecture Diagram

3.6 Conclusion

With the help of this portal, business persons may be able to find more feasible place for their business. People will easily track particular place and understand the demographics of a particular region.

Chapter 04

4 RESULTS

4.1 Static Visualization

We used Static networks for restaurant, Schools/Colleges and hospitals for users. In these networks users only provide us very basic information about given parameters by selecting from two to three options on the base of these options, our system calculate the probability of entire network and return the results.

4.1.1 Parameters of restaurants

Below is the list of parameters for restaurant network. Each parameter contains three options from which users have to select an option.

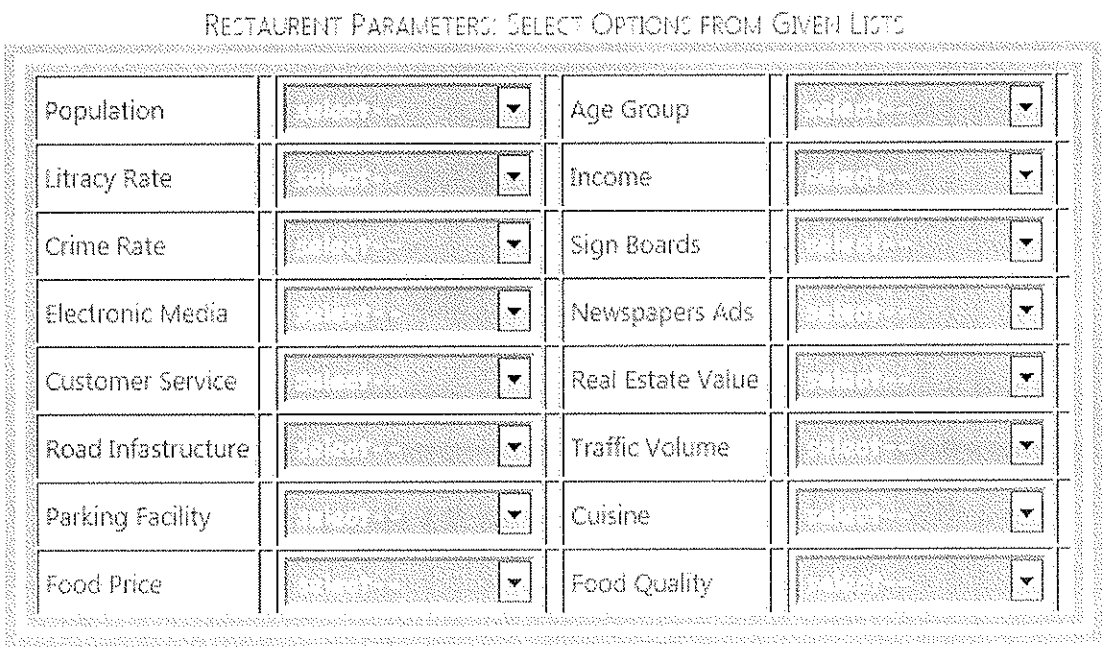

Figure 4.1: Restaurant Parameter List

4.1.2 Network diagram for restaurant

Now a logical network is generated and final probability is obtained after calculating the probability at each node of the network. Fig 4.2 shows the network for restaurant. In this diagram orange color nodes are internal nodes while sky blue color nodes are child nodes. User puts input at child level nodes and the system calculate the probability of internal nodes and return results to root node.

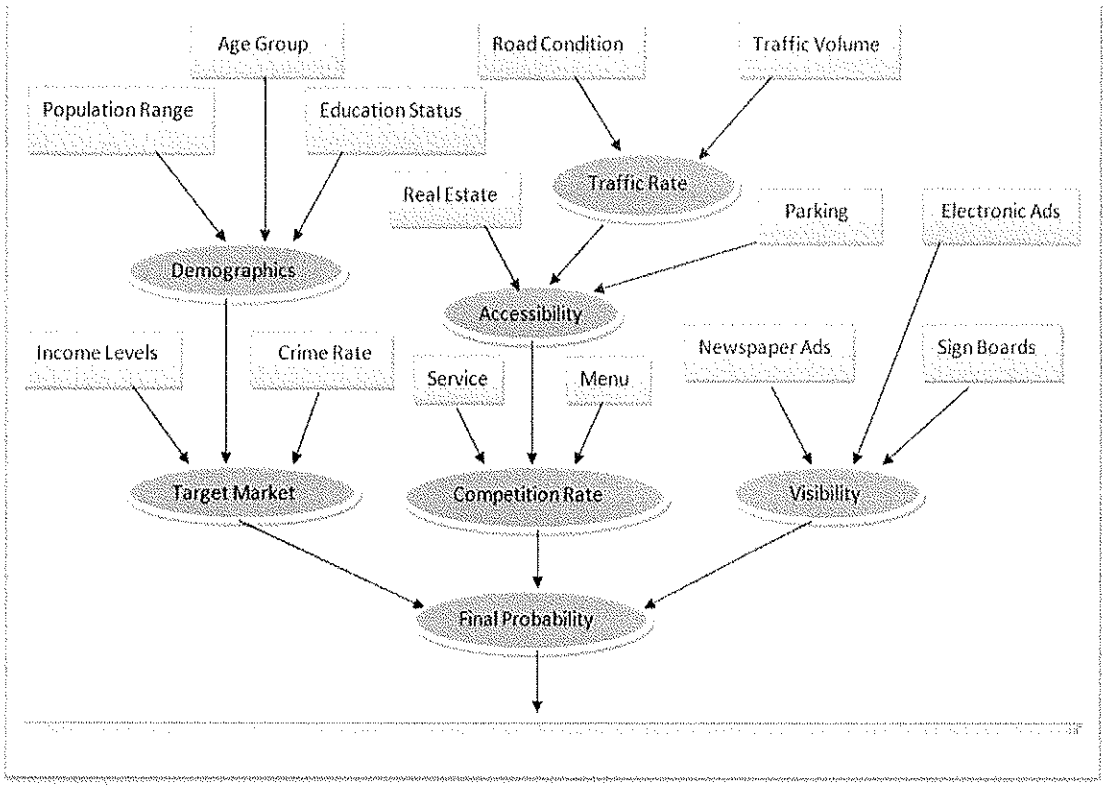

Figure 4.2: Network for Restaurant

4.1.3 Parameters for schools/colleges

Following is the list of parameters for Schools/Colleges network. Each parameter contains three options from which users have to select an option. After

selecting particular option user just click on the find solution button and get the required results based on given parameters.

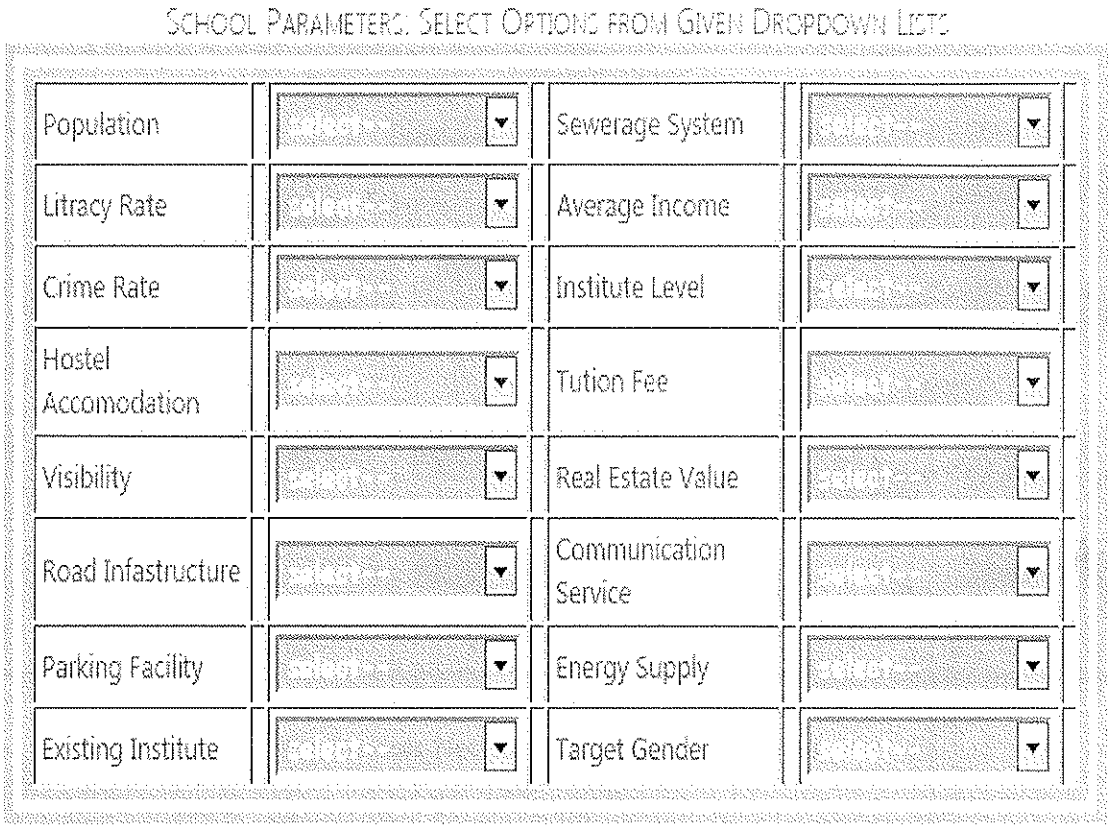

Figure 4.3: Parameters for Schools/Colleges

4.1.4 Network diagram for school/colleges

Now a logical network is generated and final probability is obtained after calculating the probability at each node of the network. Fig 4.4 shows the network for schools/colleges. In this diagram orange color nodes are internal nodes while sky blue color nodes are child nodes. User puts input at child level nodes and the system calculate the probability of internal nodes and return results to root node.

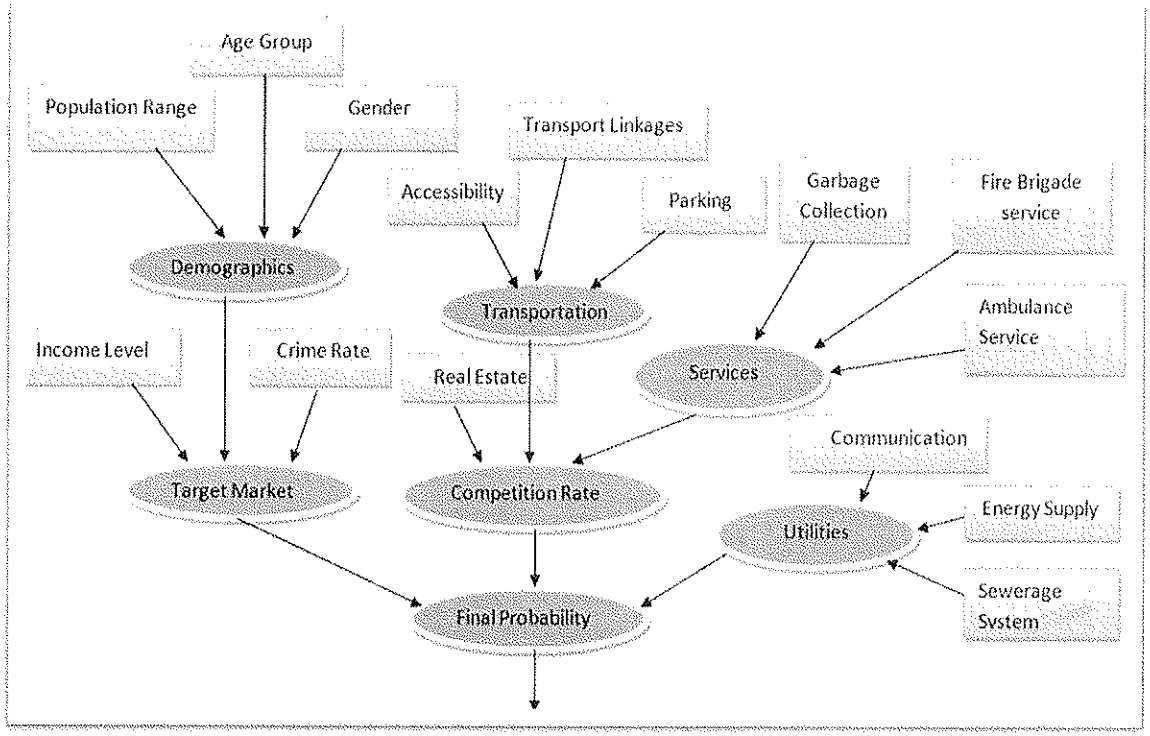

Figure 4.4: Network for Schools/Colleges

4.1.5 Parameters for hospitals

Figure 4.5 shows the list of parameters for Hospitals network. Each parameter contains three options from which users have to select an option. After selecting particular option user just click on the find solution button and get the required results based on given parameters.

Access to a properly functioning public hospital is crucial for the overwhelming majority of members of the community. A good hospital complements other public infrastructure such as city halls, sports grounds, swimming pools, entertainment centers, schools and universities, fire and ambulance stations, libraries, parliaments and local council chambers, parks and gardens, rail, road and air networks and government service centers.

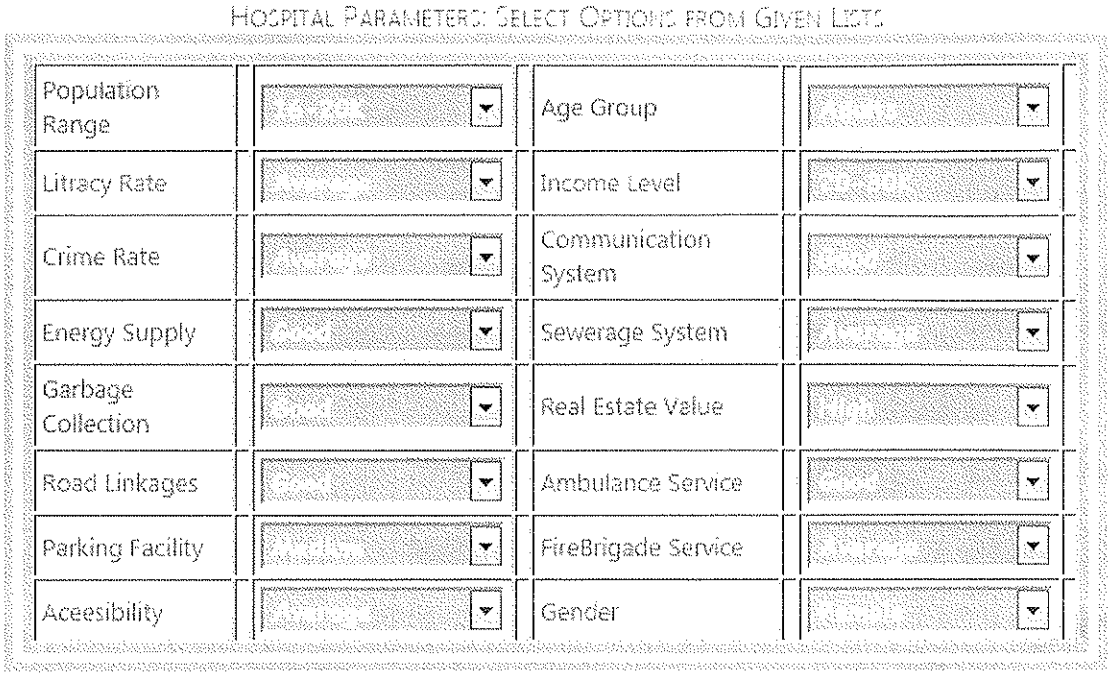

Figure 4.5: Parameters for Hospital

4.1.6 Network diagram for hospitals

Now a logical network is generated and final probability is obtained after calculating the probability at each node of the network. Fig 4.6 shows the network for hospitals. In this diagram orange color nodes are internal nodes while sky blue color nodes are child nodes. User puts input at child level nodes and the system calculate the probability of internal nodes and return results to root node.

The redevelopment of a major public hospital is a unique opportunity to improve health outcomes for the community. It is the government's responsibility to select the highest and best use of land that is available to satisfy the ultimate users of the new hospital. In this regard our system can help Government for selection of best location suitable location for hospital or clinics. Diagram shown in the next page is parameters list which can determine the best location.

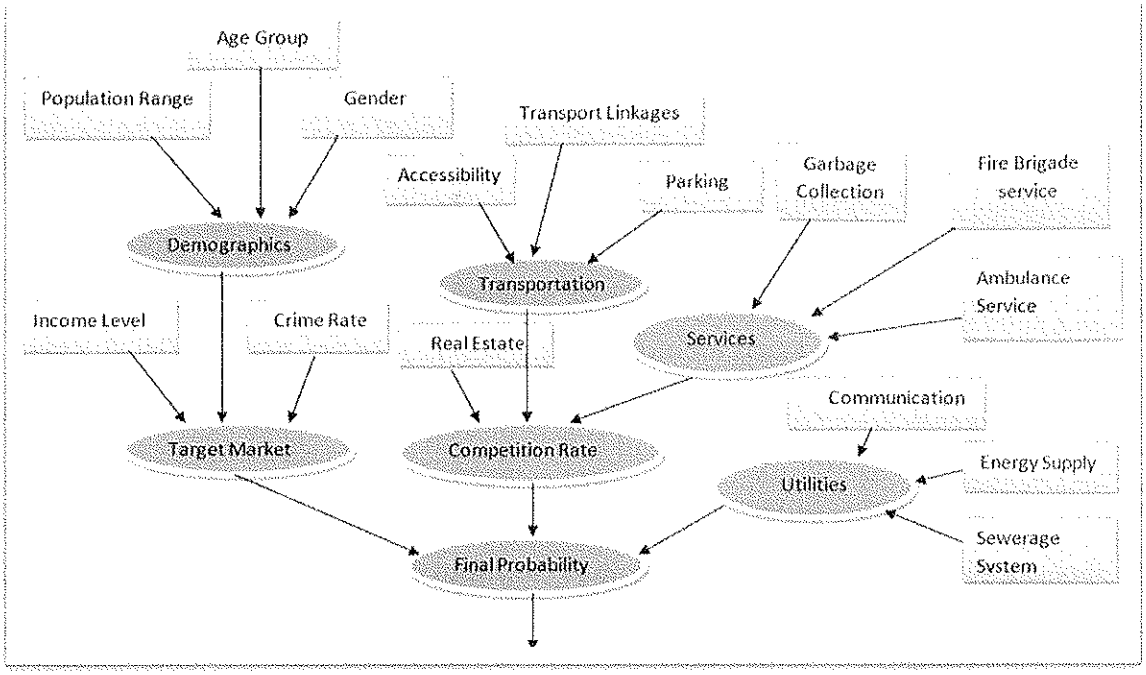

Figure 4.6: Network Diagram for Hospitals

4.2 Dynamic Visualization

The purpose of dynamic visualization is to make application more general purpose i.e. it will provide solution for any kind of business like any shop like pizza hut, jewelry shop or cloth house etc. Our system will tell business man about best suitable location for their business. It is used for expert business man who can create network and provide options on each node to calculate the results.

After creating network user will save it on client machine so that he can again use it for future purposes. He will use then upload option to upload the file which contains the network information. After uploading the network, the system will calculate the probability based on provided information and will return the result. Result will carry both the probability of success of business and also the

best suitable location in the given city so that business man can use best location for his startup business.

4.2.1 Working of dynamic networks

Following is the interface of dynamic network generation and a small network is generated for showing detail of working of dynamic network generation. Editing, deletion, reset and save option are available for users. Instruction for how to generate network are provided line by line for the ease of users.

A video demo is also given for new users so that they may be able to create network for their general purpose business. User will just click on the canvas the node will be generated automatically and a pop up window will be opened which is actually a property window to reset the properties of nodes.

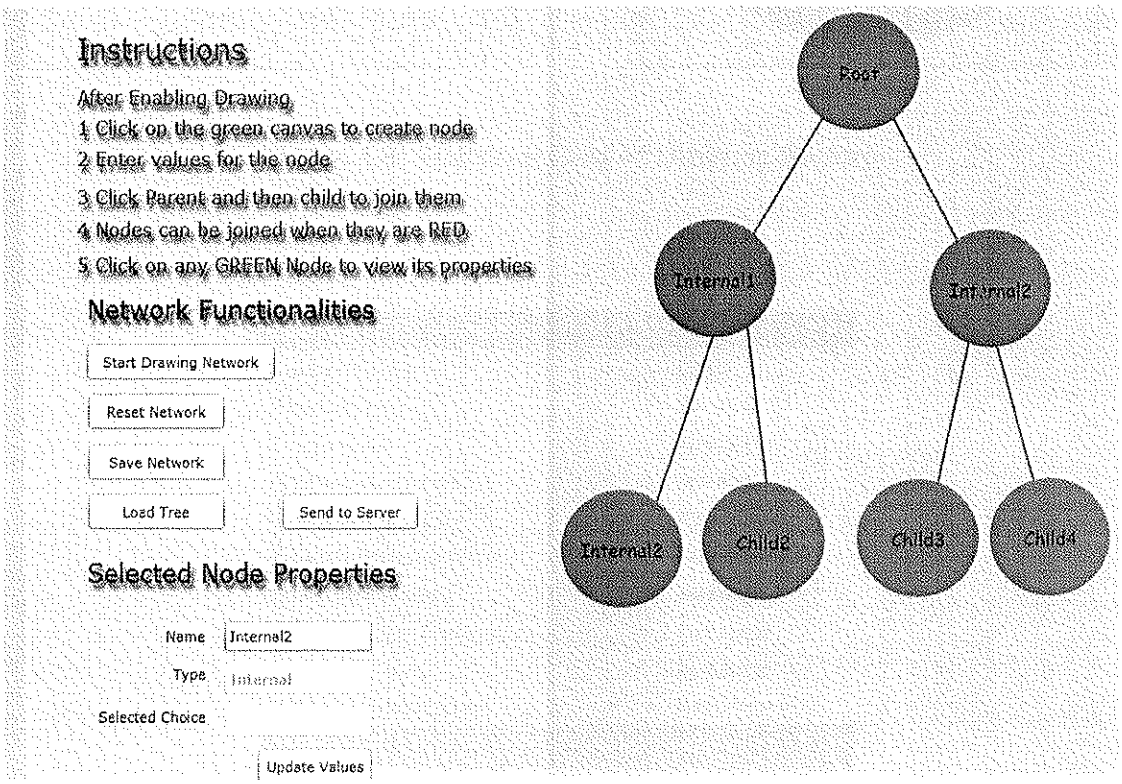

Figure 4.7: Dynamic Network for general purpose

4.3 Statistics of different areas

Statistical data like population, average income, gender ratio, literacy rate and other facilities of every area is provided for user information so that user can check the statistical data before filling the basic information to calculate probability and best suitable location for their business.

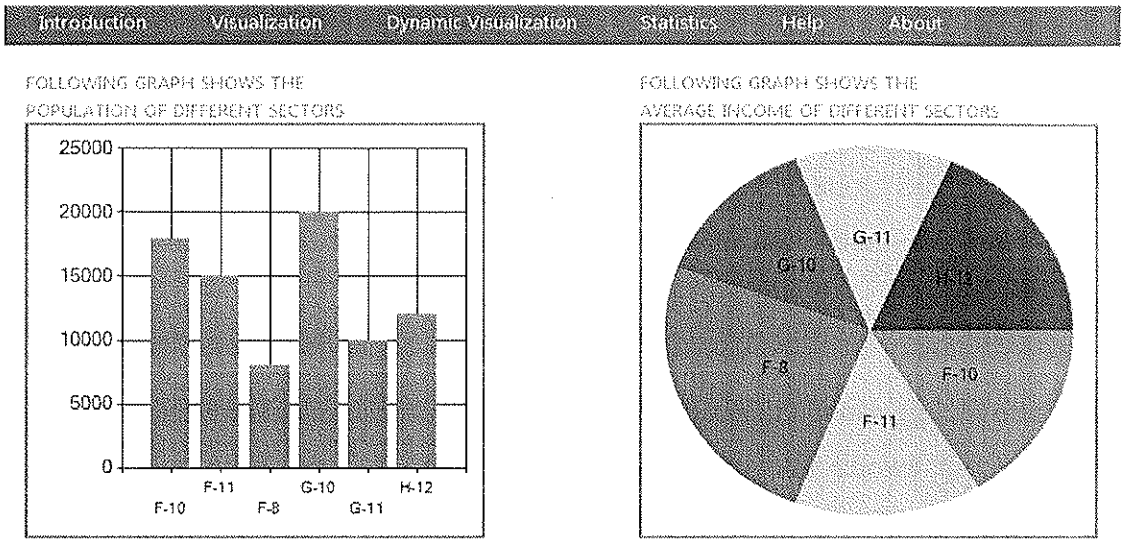

Figure 4.8: Statistical Data of Different Sectors

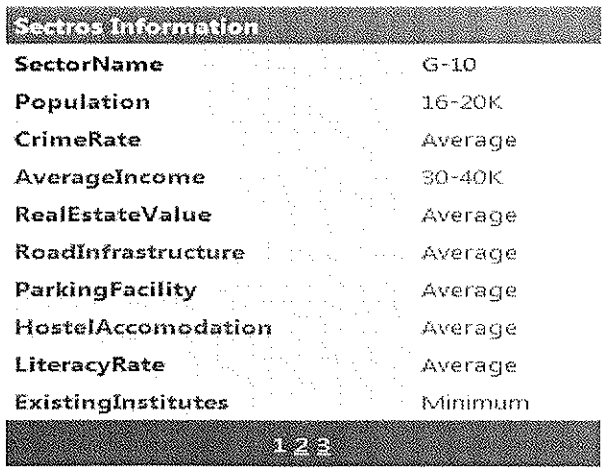

Figure 4.9: Statistical Data of Different Sectors

Chapter 5

5 DISCUSSIONS

5.1 Importance of statistics

Statistics plays a vital role in every fields of human activity. Statistics has important role in determining the existing position of per capita income, unemployment, population growth rate, housing, schooling medical facilities etc in a country. Now statistics holds a central position in almost every field like Industry, Commerce, Trade, Physics, Chemistry, Economics, Mathematics, Biology, Botany, Psychology, Astronomy etc , so application of statistics is very wide.

5.1.1 Importance of statistics in business

Statistics play an important role in business. A successful businessman must be very quick and accurate in decision making. He knows that what his customers wants, he should therefore, know what to produce and sell and in what quantities. Statistics helps businessman to plan production according to the taste of the costumers, the quality of the products can also be checked more efficiently by using statistical methods. So all the activities of the businessman based on statistical information. He can make correct decision about the location of business, marketing of the products, financial resources etc.

5.1.2 Statistics provided by our application

We already discussed the importance of statistics for businesses purpose so to make an application which require statistical data about different locations also require a research work to collect statistics about different areas of Pakistan. Due to time constraints and lack of fund we were almost unable to collect the exact statistics about different part of the country. So for most of the cases we used dummy data for our application. However, our application is quite compatible to work for original data

when it will be provided to our application. We can expect for better results if we have original data.

For users' understanding, we presented data in the form of graphs so that users can check the trend of different kind of data in different areas. For this purpose we use pie charts, bar charts and tables as well. A sample table of statistics of different area is given below.

Sectros Information	
SectorName	G-10
Population	16-20K
CrimeRate	Average
AverageIncome	30-40K
RealEstateValue	Average
RoadInfrastructure	Average
ParkingFacility	Average
HostelAccomodation	Average
LiteracyRate	Average
ExistingInstitutes	Minimum
1 2 3	

Figure 5.1: Statistics of Different Sectors

5.2 Help for Users

We provided help how to use our application. For this purpose we took help of videos, files and demos. Sine our application is an online so all user can be benefited by provided help at server. To draw network, a video is available which elaborate each step of drawing of network. So it will be quite helpful for new users. We also explain step by step each point to make user quite clear. All this information is also available in the form of text file. So user can download it on their personal computer for future purposes.

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5.3 Limitations of our Application

There are few limitations in our applications. We are fusing only on the sectors of Islamabad. More scalability is required to use it in other cities of Pakistan. For this purpose we can fill dummy data for different cities to get results but these results will carry no weight if real data will not be provided.

Chapter 06

6 CONCLUSION

6.1 Getting Rid of Survey

When a person wants to start a business, it is very difficult for him to decide the location for the business. He has to conduct surveys to know about the target market, socio-demographics conditions of the area and also the economic and ecological conditions of that particular region. It is a time consuming process for an ordinary person to conduct these types of surveys.

If people don't consider these issues then they may start their business in a location which is not suitable for that business e.g. a hospital or school near a commercial market. Another example is that a person opens a school in a location where there is no parking area, no proper ventilation system and no playground facilities. Moreover there is no proper road infrastructure which creates problems for students and teachers who come to school from distant places. They have to face problems of vehicles to reach the school.

However to overcome these kinds of problems we have developed this tool for the business starters to help them in taking decision about the location for their business. This tool has very user friendly interface and its use is also very easy. You just need to select values from the list for a particular type of business then by entering values of your choice you can know the best suitable location for your business in no time.

It shows the result on Google map for better understating of the location. The basic methodology which is being used is Bayesian Networks here. It calculates the estimated probability of the success of particular business in a region according to the requirements and preferences provided by the user. It also tells the second and third choices and user may pick any option according to his choice.

6.2 Visualization in Our Application

This tool has both static and dynamic functionalities i.e. static are the predefined list of businesses and their parameters from which a user can select the specific and then parameters' values. User may also see the dependency diagrams of the parameters. After selecting the business and then its values user can see results on the Google map used in the tool.

In the dynamic type of business there is an application named **Build Tree Application** created in Microsoft Silverlight 4.0 which increases the enhancement of the application by adding more functionalities in the tool. User can create network of his own choice and preference then by setting the values of the created parameters, result is calculated using those values and dependencies created by user. The main advantage of the dynamic network is that now user is not bound on the number of businesses provided by the system, but now he can create any network of any type of business. Hence this tool helps is more business dimension and domains.

The use of dynamic network creating application is very easy and user friendly, though basic knowledge of trees is required. However to facilitate user a list of important instructions is also given, following which he may use this application easily. User can store his incomplete network on his local machine and then he can re-open it for further working. There is also a video tutorial provided with the tool helping user to create business network.

There is also some data regarding the regions of Islamabad provided with the tool so that users can view and get a perception about the areas and hence it helps them to decide about the best suitable location for their business. Data is also represented in graphical form so that user can easily check the trend of different parameters in different areas. Users can easily determine which place is more suitable if they prefer a particular parameter.

Chapter 07

7 RECOMMENDATIONS

7.1 Efficiency of Project

Though the system works efficiently in both the parts, but there is need to make the visualization more attractive and interactive. Right now the results are shown in Google maps i.e. most suitable location is showed as point on the map in the region of Islamabad. After taking values form the user they are sent back to the server for processing and calculation of the best suitable location and probability of the success according to the network dependencies and selection of parameters in that region. Finally when results are calculated, they are sent to client and hence showed on the Google maps used in the system. Best location is shown as a marker on the map and other less efficient choices are represented by circles on the map for various areas.

More work should be done in visualization part i.e. making it more user-friendly and interactive, so that users may work with the tool more easily without being confused about the Tree data structure and other technical stuff. With more interactive Google maps it may be more useful to show results and work with the tool.

7.2 Adequacy of Statistical Data

In statistics part the tool uses some charts and other visualization techniques to show the available data in the region. However tool is working well in this part but there should be a mechanism through a user can add business in the system so that other users can benefit from it. If there could also be an option for adding new data to the system then it would be more flexible however there could be a risk that whether user in entering true and realistic data or not. To manage that data and making it in standard format could also be a difficult task.

This tool uses its own Build Tree Application to create dynamic networks for enhancing the functionalities of the tool. More features can also be added in it to

make it more usable and productive. There is also an option to add an already made network creating tool like SAMIAM to facilitate user.

Since this tool is all about data and statistics of the particular region so it is an important issue to gather enough sufficient data to fulfill user needs and demands. To gather data several surveys can be conducted or simply collect it from the regarding authorities of the area.

By increasing scope of this tool, more regions could be covered so that users from various regions can take benefit from it. Since only Islamabad is being covered in this tool, but by adding more data and statistics more considerable regions can be added in the system to utilize it for the benefit of the new business persons.

8 APPENDEX A

8.1 Location Selection Criteria

There are two types of site selection criteria are described. One is general location selection criteria and second is Government site selection criteria. Both are discussed in detail below.

8.2 General Site Selection Criteria

8.2.1 Zoning

- Restrictions on density and layout
- Contiguous land uses
- Likelihood of obtaining variances

8.2.2 Physical features size

- Soils (adequate load bearing capability)
- Topography
- Hydrology (floodplains, subsurface water)

8.2.3 Utilities sewerage

- Water supply
- Storm water management
- Energy supply (electricity and natural gas)
- Communications (including fiber-optic)

8.2.4 Transport linkages and transportation

- Traffic
- Availability of public transport
- Access (ingress, egress and viability of alternative sites)

8.2.5 Parking

Usually needed on site, therefore it competes with the building for land. If site cost per m^2 is less than cost of structured parking, surface parking is warranted (and vice versa)

8.2.6 Environmental impact

- Adverse impacts on air, water and noise levels
- Amount and type of waste generated
- Other areas of concern including historic and heritage
- Considerations, parks, open space, trees and landscaping

8.2.7 Government services

- Police and fire service
- Garbage collection
- Schools, childcare and other government services
- Impact on revenue, taxes, permit and license fees

8.2.8 Crime rate

- Defensive (how powerful are anti-development forces?)
- Neutral (what social costs does the project impose?)
- What are the benefits to the locality?
- Is the project in the public interest?
- Offensive (what are the local attitudes towards growth and how can they be used to help shape, refine and specify the project to be built?)

8.2.9 Real estate value

- Price of land Cost of land
- Cost of acquisition and site development

8.2.10 Demand and supply

- Population growth, trends and projection
- Employment
- Income distribution and probable change
- Existing and planned supply
- Competitive environment

8.3 Government Site Selection Criteria

8.3.1 Site access

Road network, emergency vehicles, public and staff parking, aero transfers (helicopter), public transport, pedestrian/bicycle access

8.3.2 Proximity

Proximity to current locations of allied health and community services, institutes, shops, cafes, doctor surgeries, staff residences etc.

8.3.3 Economic

Impact on business activity through relocations of services and trade-offs with other development or land use options

8.3.4 Social and cultural environment

Suitability in relation to surrounding uses, streetscapes, "fit" (architecture and height), impacts on and by neighboring development (e.g. noise, traffic, view impacts, hours of operation), attractiveness to staff/patients, safety or persons)

8.3.5 Natural environment

Impact on the environment and making the most of natural features

8.3.6 Statutory

Existing planning, zoning, building height limitations, heritage etc

8.3.7 Sustainability service

Ability to function efficiently during the redevelopment process

8.3.8 Size

Of sufficient size to include optimum design, parking, potential collocation of private hospital, commercial opportunities, public open space and ongoing development potential

8.3.9 Financial cost

Cost of property purchase, site demolition/preparation, infrastructure upgrades (water, sewerage, electricity, gas, communications) roadways etc

9 REFERENCES

[1] Royal Hobart Hospital

Redevelopment .www.dhhs.tas.gov.au/__data/assets/pdf.../NewHosp_news2310.pdf

[2] Bayesian Networks.www.en.wikipedia.org/wiki/Bayesian_network

[3] Earth Quick Hazards.http://earthquake.usgs.gov/hazards/products/conterminous

[4] Open Street Map.wiki.openstreetmap.org/wiki/WikiProject_Haiti

[5] Automotive navigation data .www.linkedin.com/company/and-automotive-navigation-data

[6] Client-Server Architechture.http://en.wikipedia.org/wiki/Client%E2%80%93server_model