

## GIS – Tool for Simplifying the Collection Management System in Banks and Financial Service Organizations.

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### ABSTRACT

In today's competitive world, there is an increasing need for exploiting spatial information for effective management of enterprise in virtually every industry. Therefore solutions and applications based on Geographical Information Systems (GIS) integrated into enterprise systems provides medium to large enterprise users with the ability to make quick business decisions for better efficiency, quality and productivity. Banks and Financial Institutions thrive by the financial services that they offer like, a variety of loans, credit cards, etc. Liberalization has brought multinational players into the banking industry and recent economic trends have increased cash inflow into banks resulting in increased and fierce competition among banks to increase the number of customers who avail these financial services in order to maintain a profitability status. But in this effort to increase the customers, banks have started forgoing the multitude of checks that used to be conducted before granting any credit facility to a customer and have started setting simple authentications like salary slip and bank statements. This has drastically increased the number of credit card defaulters and defaulters in loan repayments. This has forced banks to create a separate 'Collections' department, increasing the cost of operations and decreasing the profit margins. This paper proposes ways and means through which an integrated GIS approach would enable banks to locate current defaulters, identify the shortest distance through which maximum number of defaulters can be visited by the collection officer, areas of concentration of a particular type of defaulter, identify the best location for collection boxes and ATMs in various zones, identify potential defaulters from existing customers who have availed loans, identify demographic patterns of the various types of defaulters and use it to find the probability of a customer who have applied for a loan but become a defaulter.

### The Collection Process:

When a customer avails a loan or a credit card from a Multi National Bank, he is instructed to pay the installments or the due amount via cheque or cash by either depositing it at collection boxes placed at various ATM centers, the bank's branches or at certain shopping centers. When a customer defaults the payment the Tele-Collection Officer reminds the defaulter over phone that his payment is due and fixes an appointment with the customer. The Field Collection Officer visits the defaulter to ensure that the customer repays the loan amount or the credit card due via a cheque which is deposited in the nearest collection box or branch.

### Issues of Concern in the Collection Process:

- The Bank is unable to decide in which area it has to place collection boxes so as to facilitate the deposit of cheque and cash so that the number of defaulters are reduced.
- The location of the customer can change over a period of time. Hence a collections officer who has visited the customer once again has to search for his location.
- The Bank is unable to find in which geographic location the number of defaulters is more.
- The easiest route through which a collection officer can travel so as to meet the maximum number of defaulters is not known.
- Difficult in assessing the demographic patterns of defaulters in certain regions like living within 3 km of a collection center or living more than 2 km away from all collection centers and located in one zone, etc.
- Difficulty in finding the main geographic area in which a particular type of defaulter is not present.

### Methodology

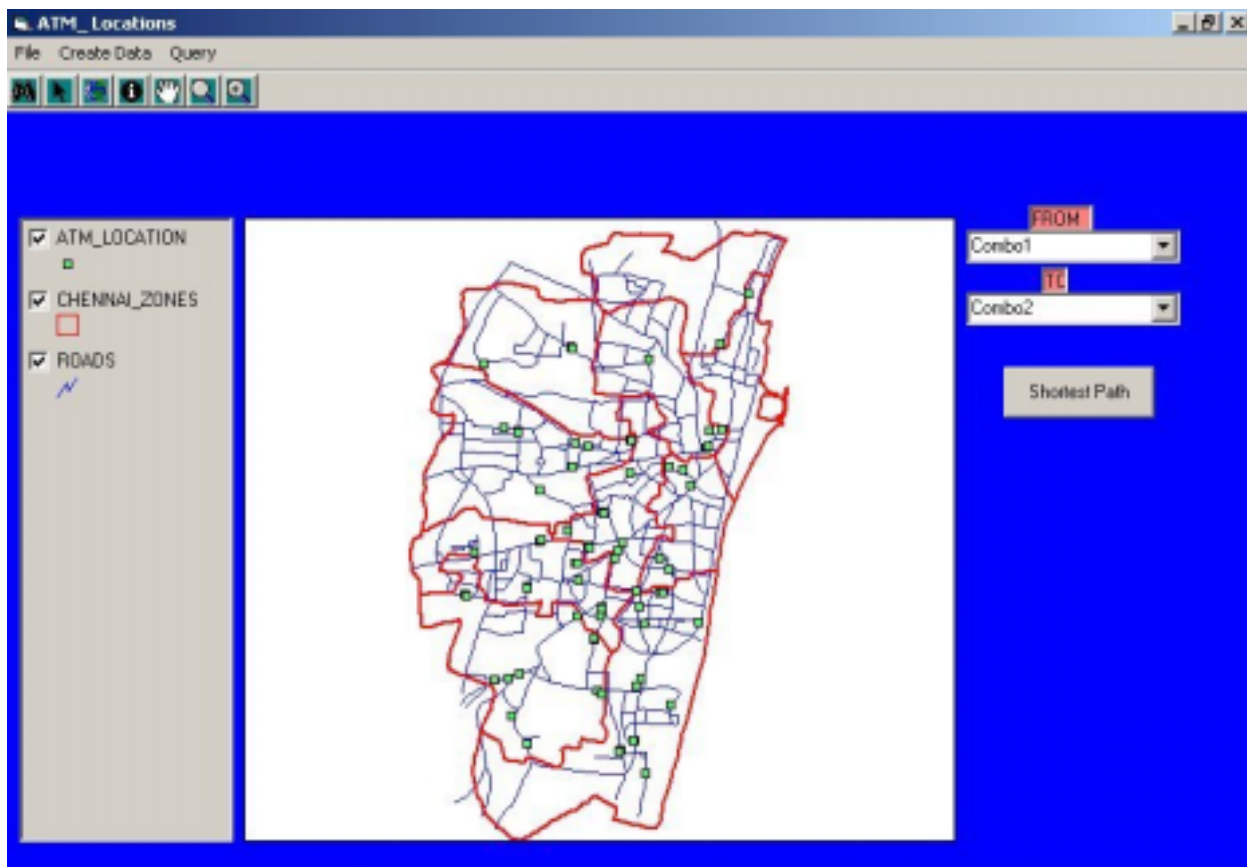
- Preparation of zonation map of Chennai City
- Preparation of road map of Chennai City
- Location of ATM Centers using GPS data
- Location of customers using Geocoding a module developed using Map Objects and VB
- Classification of defaulters based on type of defaulters viz., Credit Card, Housing Loan and Personal Loan.
- Analysis of the defaulters, to find the location of the defaulters, method of collection, with respect to the Bankers, similarly from the point of view of the defaulters suggestions are made to learn the exact location of the ATM etc.

### Preparation of Zonal and Road network map of Chennai City

The zonal map of Corporation has been utilized to prepare the zonal map of Chennai city and the road network map was digitized with zonal map as the base. The attribute data pertaining to the road map has also been updated.

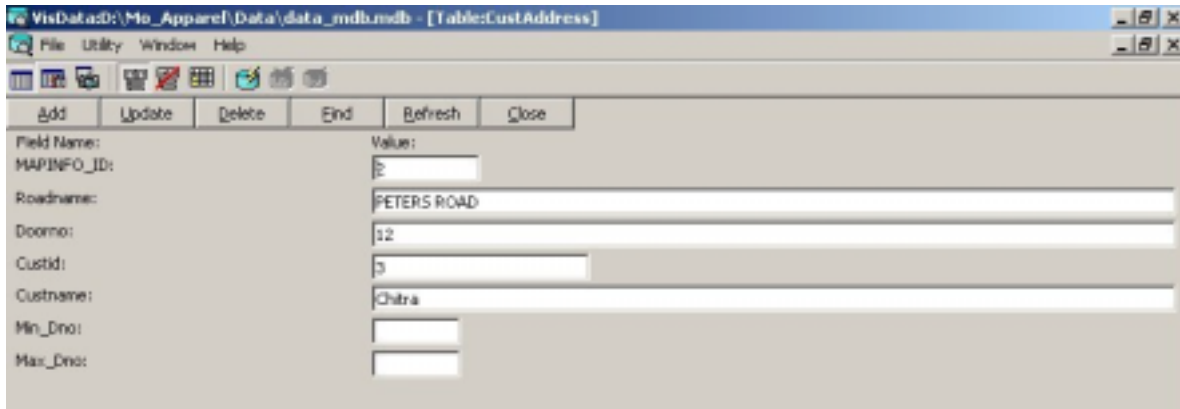
### Locating ATM Centers:

GPS has been used to find the exact location of the ATM centers of the bank as it is desired to make measurements in the study. This would also help to locate new centers



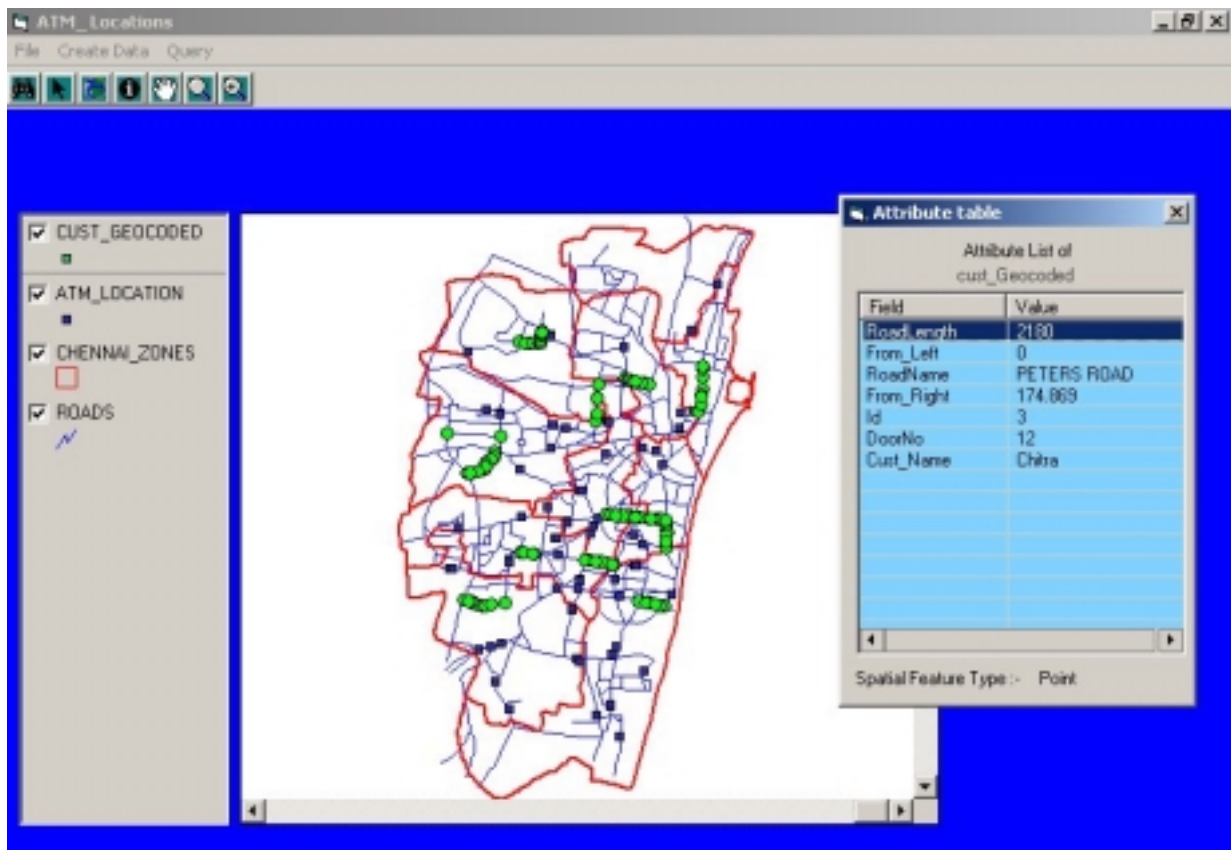
The above figure shows the various zones in the city, along with roads, and the ATM Centers.

### Customer address table

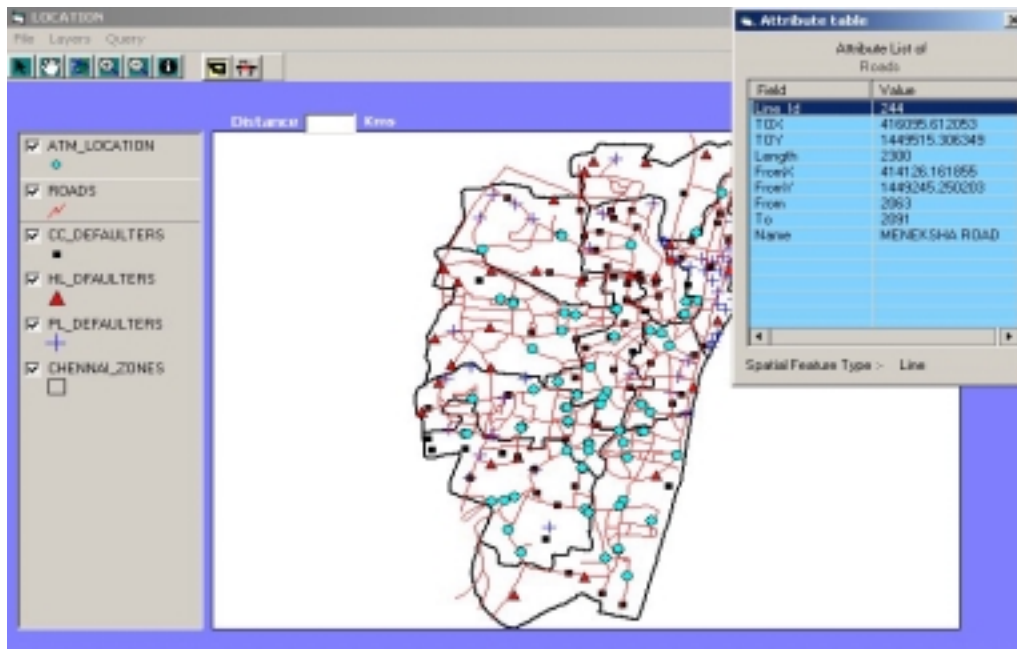


**Locating Customers:**

The number of address changes submitted to a large bank is about 95 per day. This makes the job difficult for the Collections Department which has to relocate the customer every time. An integrated GIS approach would ensure that every customer's location is geocoded so that locating a customer even after a series of address changes would be easy. This should be done atleast for persons who have obtained Loans and Credit Cards. Then the customers have been classified as loanees and account holders with the loanees further divided into different types of defaulters as well as shown in the following figure.



Map showing different types of defaulters

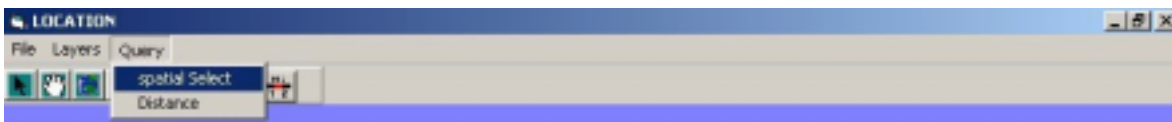


Analysis of defaulters:

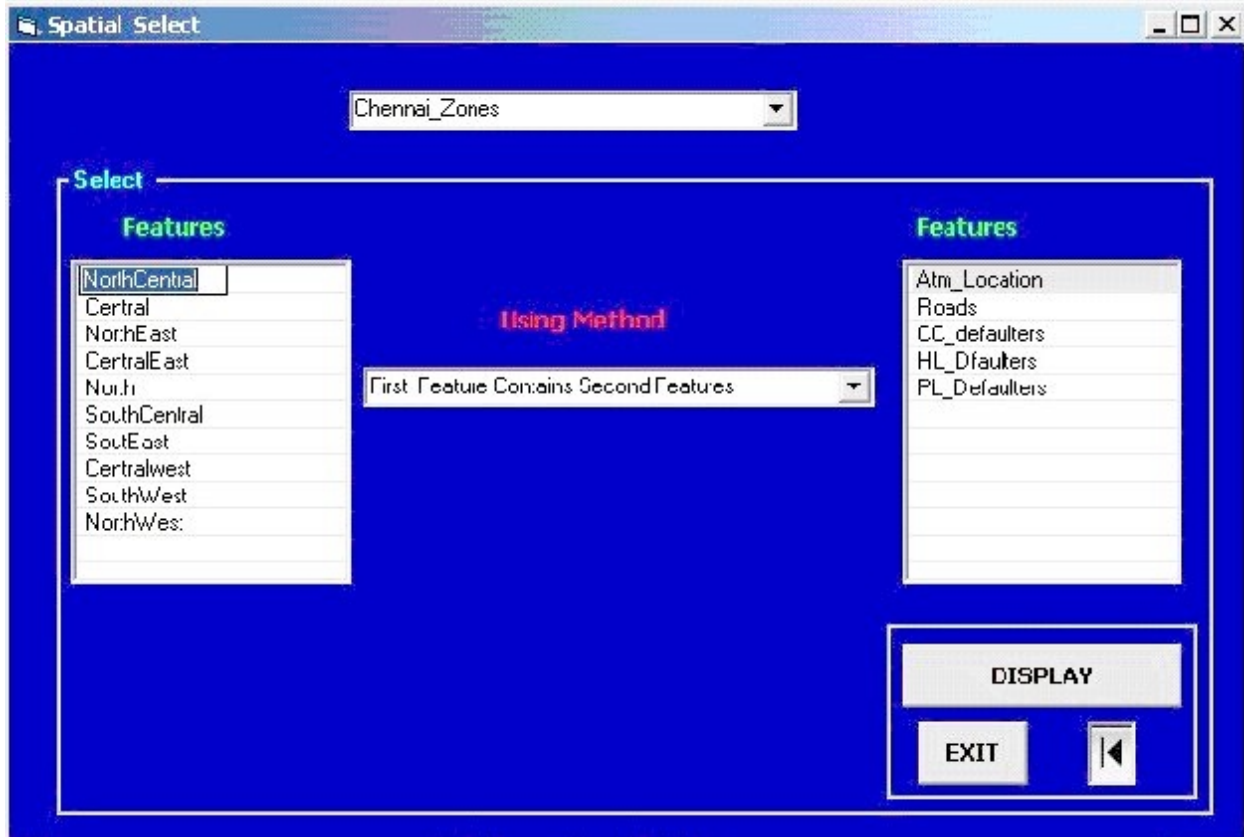
The demographic and socio economic characteristics of defaulters in a particular geographic location in comparison to other non-defaulters would throw light into some patterns that would be useful for Banks in deciding whether to grant loans to other customers who fall into a similar pattern and if granted what are the methods that they should employ to minimize risk. GIS facilitates this analysis to find finer details by enabling analysis like assessing the demographic patterns of defaulters in certain regions like living within 3 km of a collection centre or living more than 2 km away from all collection centres and located in one zone, etc.

Location Based Information

In this module the user is given an option to select the customer based on location as well as the distance.



If the user select the spatial select the following window will be displayed prompting him to select the zone, the feature using a specific method.



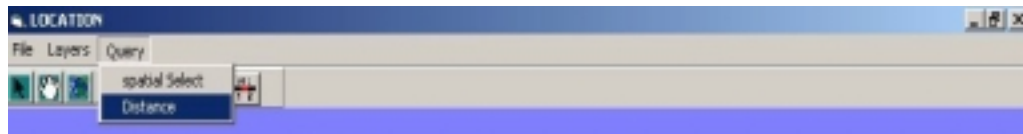
Based on the selection made that particular feature will be selected as in the above case the ATM centers in the North Central zone will be selected.

**Assessing the Geographic Concentration Areas:**

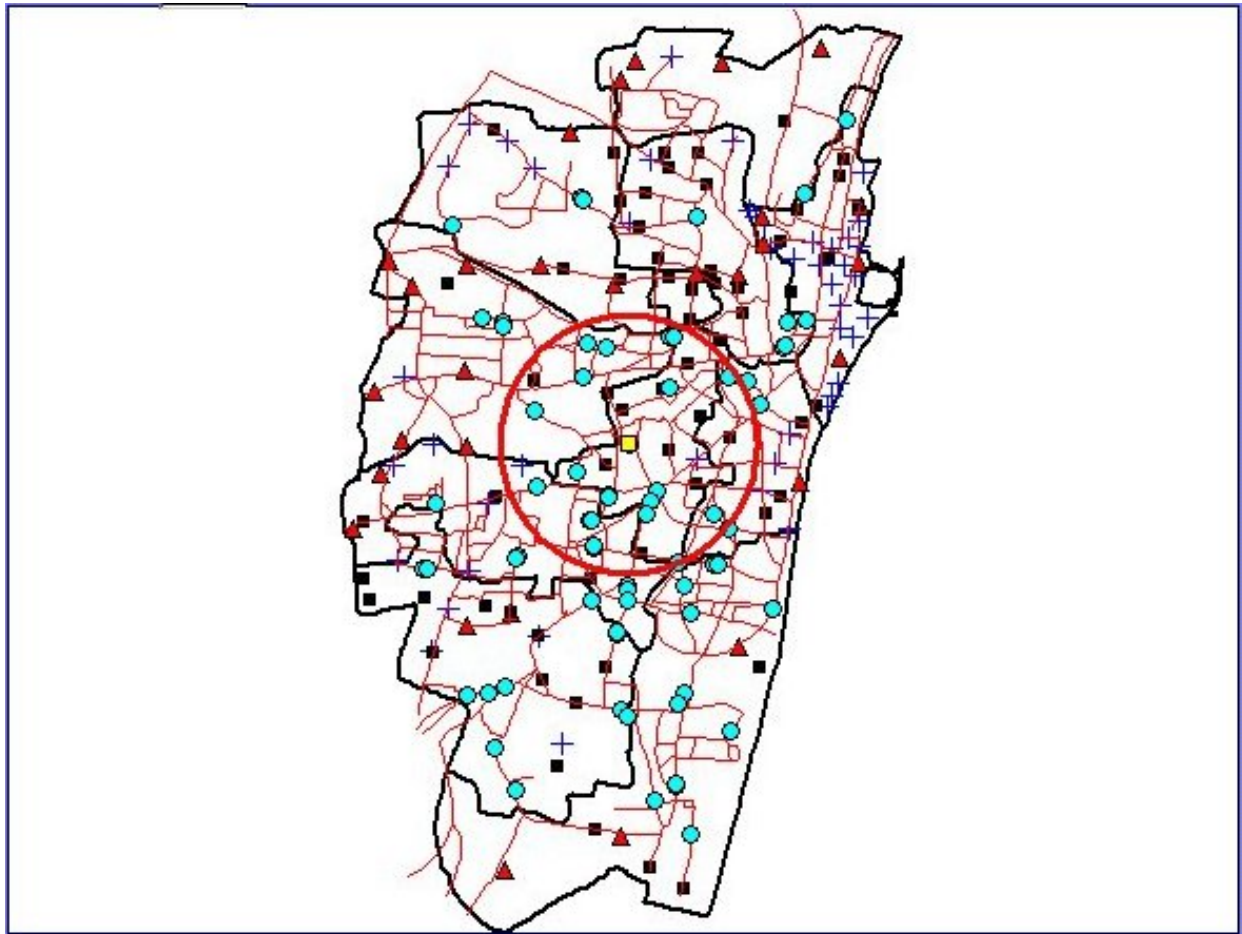
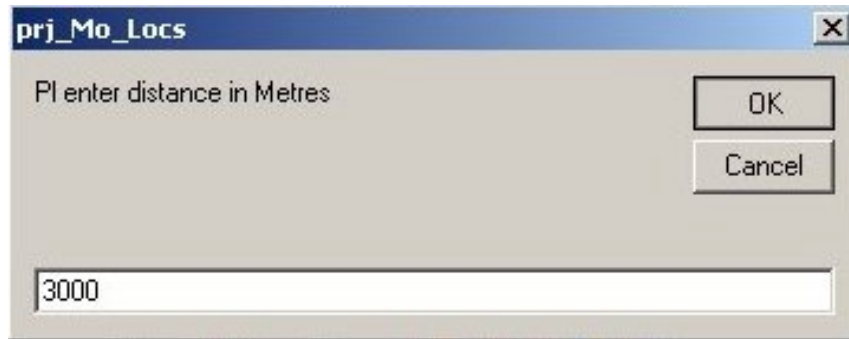
The concentration areas of a particular type of customer can be easily identified using GIS. For example the concentration area of Credit Card defaulters can easily be assessed. Even the zones in the city can be classified according to a particular theme.

**Distance based analysis of defaulters**

To select different types of defaulters depending upon the distance from an ATM, the 'distance' facility may be used.



The distance may be entered in the following window, to create a buffer around the ATM center for a distance of 3000m and using the boundary select we can select all the types of defaulters.



The above figure shows the buffer, around the ATM center (shown in yellow). The following table shows the various defaulters, which has been listed. Some more details may also be displayed if necessary, however, it requires input of data which can be done at any stage which is an added advantage in GIS.

The screenshot shows a software interface with a title bar 'DATA' and a sub-label 'Label1'. It contains six data tables arranged in a grid:

- Atm\_Location**:
 

ADDRESS	ZONE_ID	FeatureId	ID	Shape
	5	1		46
	5	2		4
	5	3		5
	5	4		44
- Roads**:
 

Line_Id	TOX	FeatureId	TOY	Length
2	282.544226	2	871.279305	307.538
3	102.442572	3	593.143336	158.253
4	951.614083	4	6545.23627	380.589
6	570.924702	6	565.662236	493.324
- CC\_defaults**:
 

FeatureId	ID	Shape	NAME
- HL\_Dfaulters**:
 

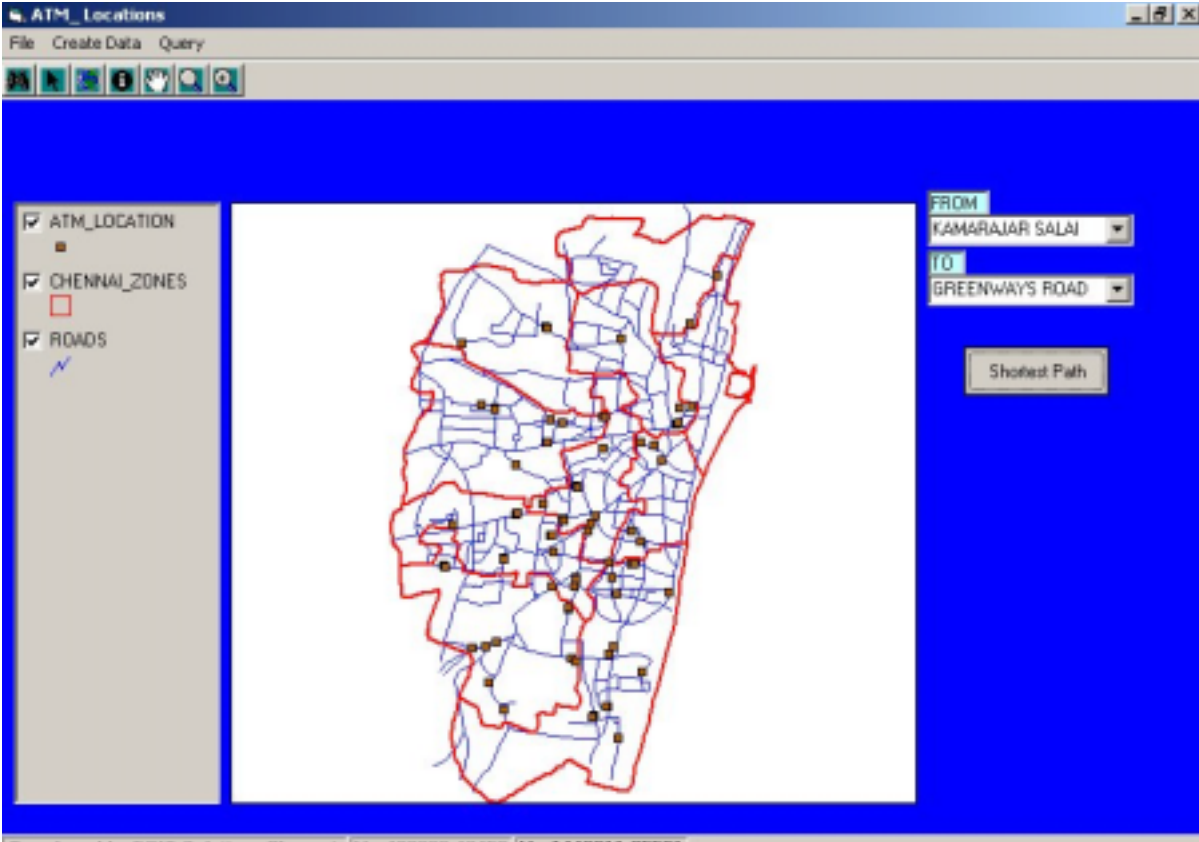
FeatureId	ID	Shape	NAME
7	9007	7	G
8	9008	8	H
10	9010	10	J
12	9012	12	L
13	9013	13	M
- PL\_Defaulters**:
 

FeatureId	ID	Shape	NAME
2	9032	2	AE
3	9033	3	AF
4	9034	4	AG
5	9035	5	AH
13	9043	13	AD
- Chennai\_Zones**:
 

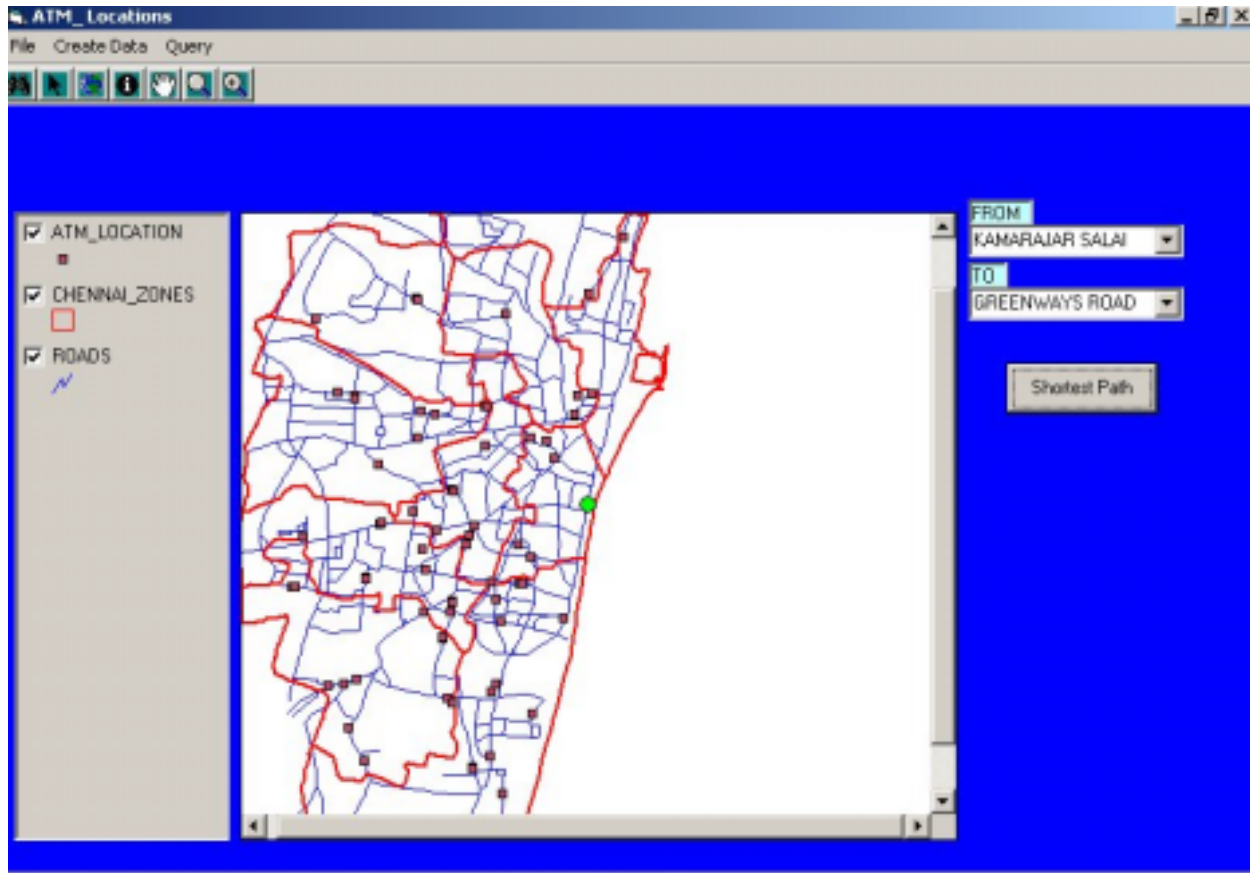
CCDEFAULT	PLDEFAULT	FeatureId	HLDEFAULT	CUSTOMER
50	20	1	30	1750
45	35	2	20	10000
44	10	3	46	30000
55	35	4	10	1500

**Finding the shortest route an ATM center given the 'from' road 'to' road.**

Many a times it will be necessary to know the shortest distance from any given ATM center for the account holder to deposit his cheque etc.



Based on the 'From' and 'To' road an ATM center is selected as shown below indicating the Center in green colour.

**Conclusion:**

From the above study it is very clear that GIS is an effective tool in any discipline with relevance to space, it can be used to identify the location of ATM centers, location of customers, classification of defaulters, and so on. This is an attempt to utilise GIS technology and Software for Banking sector.

In today's fast paced mode of operations it is totally impossible for banks to neglect even a single customer by not providing the service that he asks for. This is magnified by the fact that the switching costs have become very less and banks are not able to encash on the various differentiation strategies that they were adopting because the services provided by them are becoming more of a commodity day by day. Hence it would be considered intelligent for banks in not losing a single rupee as defaults in payments. This can be achieved only through proper strategic planning and good operations management that the collection department follows through the latest technology like GIS for revolutionizing their collection process it self.

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