Chapter – 3

Design of Fractal Base Clustering Model to provide an Effective Customer Relationship Management System

As per the literature survey findings After studying various data mining techniques researcher found that out of all the data mining techniques, clustering techniques are such techniques where end users involvement and interaction of human being is maximum in comparison of other data mining techniques. The reason is very simple, Any clustering technique is used with graphical representation where all the available data is plotted on some graph, image or screen and then user is allowed to create a cluster, user is allowed to select the dataset indicating certain data values according to his choice / requirement. Clustering algorithm is then applied and computation is performed according to the algorithm [3,5,16]. During the entire process End user knows which data-set, kind of data he or she has selected to generate the cluster. Thus researcher studied various clustering techniques like

- K-Means
- K-Medoid
- CLARANS (Clustering Large Applications based upon RANdomized Search)

Some hierarchical clustering techniques like

- Agglomerative and Divisive
- BIRCH (Balanced Iterative Reducing and Clustering Using Hierarchies)
- ROCK, Chameleion

Some density-based methods like

- DBSCAN (Density-Based Spatial Clustering of Applications with Noise)
- OPTICS (Ordering Points to Identify the Clustering Structure)
- DENCLUE (DENsity-based CLUstEring)

Another major reason to select clustering technique is that, It is a human mentality that one can understand any concept, techniques, algorithm if it is presented in the form of some picture or graphical presentation in comparison of narrative text. One picture caters the need of 1000 of words and clustering techniques have adopted this rule and most of the clustering techniques are such where majority of the tasks are performed with visual observation. Thus for any decision maker who may be layman can also understand what’s going on while using any clustering technique. In
continuation of this researcher also studied and analyzed some of the popular data mining & data exploration tools providing clustering techniques like,

- Rapidminer
- Weka
- R
- SAS
- Antaeus

Researcher found that, Almost all the clustering tools requires vast amount of prerequisite knowledge and all the tools provides only the graphical presentation of the data where once user select some data-set, It is plotted on the graph and can be visually observed by the user [2,4,6,9]. But here cluster is automatically created and displayed on the screen by the tool. End user is not allowed to design or draw a customized cluster according to his /her choice when the data is plotted on the graph or screen. Thus an idea came into the mind of researcher “Why note to design & develop a model which acts like almost all the clustering tools, which minimize the requirement of prerequisite knowledge and also provide the flexibility to the user where he or she can draw a customized cluster and can select the data set to be clustered according to their choice and also to populate such selected data on the screen with some tabular like form.” Thus researcher decided to design & develop a model to extract the plotted data in the form of some table by taking some graphical shape as graphical selector to create a cluster. To develop a model researcher decided to use Visual Basic 6.0 to provide an interface (Graphical Tool) and Ms-Access as database to store the sample database. Thus following model was designed and prototype was developed by researcher to fulfill above specified requirements.

3.1 Clustering Model to extract plotted data in the form of table by taking a Rectangle as graphical selector.

Initially researcher design & develop a model to extract the plotted data in the form of some table by taking a Rectangle shape as graphical selector to create a cluster. Thus following model was designed and prototype was developed by researcher to fulfill above specified requirements.

3.1.1 Design of the Clustering Model to extract plotted data in the form of table by taking a Rectangle graphical selector.
As described in above define diagram process starts with (1) fetching data from the desired record-set and the database and to be provided to the graphical presentation process (2) Graphical presentation method then presents the data on the plotting area at the respective top, left coordinates corresponding to the x and y coordinates of the table or database. Here all the records are fetched from the database and plotted on the plotting area. Once the records are plotted, process is hand over to the graphical selector (3) Next process is of graphical selection of records where Rectangle shape graphical selector is provided to select the records. Here user can move this graphical selector with the fixed starting point until he/she gets the desired data within the bound of graphical selector that is use to create a Rectangle shape cluster. As per the requirement user can increase or decrease the size of graphical selector to form the cluster. (4) All the records selected by the user through graphical selector are then fetched from the database and stored in form of table or data grid like structure. At last user can view all the records graphically selected by him / her with the Rectangle graphical selector in the data grid like tabular format.

After designing model 3.1 it’s development and implementation processes were carried out which are defined in detail in 4.1 of chapter 4. Once the model was implemented, the results were generated and the features and limitations were analyzed which are discussed in 4.1 of chapter 4. After analyzing the limitations of
developed model 4.1, researcher decided to design and develop a model 3.2 that is discussed as below.

3.1.2 Sales Table to store sample records of customer’s sales transaction

Researcher created a Cluster Database as sample database to store the data related to clustering activities. Here researcher has created cluster table from which records are fetched and displayed on the Plotting area. Also all the records selected by graphical selector are first compared with the field lx and ly of cluster table and then stored into the data grid. Cluster table is having following structure.

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<tr>
<th>No.</th>
<th>Field Name</th>
<th>Data Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
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<td>Customer Number + Primary Key</td>
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<tr>
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<td>Lx</td>
<td>Number</td>
<td>X coordinates Value</td>
</tr>
<tr>
<td>3</td>
<td>Ly</td>
<td>Number</td>
<td>Y Coordinates Value</td>
</tr>
<tr>
<td>4</td>
<td>Sales</td>
<td>Number</td>
<td>Sales Taken Place at Lx and Ly Coordinates</td>
</tr>
</tbody>
</table>

<table>
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3.2 Clustering Model to extract plotted data in the form of table by taking a Circle as graphical selector.

To provide clustering process in circular way Researcher design & develop a model to extract the plotted data in the form of some table by taking a Circle shape as graphical selector to create a cluster. Thus following model was designed and prototype was developed by researcher to fulfill requirements specified above in section 3.1.

3.2.1 Design of the Clustering Model to extract plotted data in the form of table by taking a Circle as graphical selector.

As described in above define diagram process starts with (1) fetching data from the desired record-set and the database and to be provided to the graphical presentation process (2) Graphical presentation method then presents the data on the plotting area at the respective top, left coordinates corresponding to the x and y coordinates of the table or database. Here all the records are fetched from the database and plotted on the plotting area. Once the records are plotted, process is hand over to the graphical selector (3) Next process is of graphical selection of records where Circular shape graphical selector is provided to select the records. Here user can move this graphical selector until he/she gets the desired data within the bound of graphical selector that is use to create a Circle shape cluster. As per the requirement user can increase or
decrease the size of graphical selector to form the cluster. (4) All the records selected by the user through graphical selector are then fetched from the database and stored in form of table or data grid like structure. At last user can view all the records graphically selected by him / her with the Circular graphical selector in the data grid like tabular format.

After designing model 3.2 it’s development and implementation processes were carried out which are defined in detail in 4.2 of chapter 4. Once the model was implemented, the results were generated and the features and limitations were analyzed which are discussed in 4.2 of chapter 4. After analyzing the limitations of developed model 4.2, researcher decided to design and develop a model 3.3 that is discussed as below.

3.3 Clustering Model to extract plotted data in the form of table by taking a Fractal as graphical selector.

To provide clustering operations with maximum flexibility in terms of cluster shape and records to be selected, Researcher design & develop a model to extract the plotted data in the form of some table by taking a Fractal shape as graphical selector to create a cluster. Thus following model was designed and prototype was developed by researcher to fulfill requirements specified above in section 3.1.

3.3.1 Design of the Clustering Model to extract plotted data in the form of table by taking a Fractal as graphical selector.

As described in below define diagram process starts with (1) fetching data from the desired record-set and the database and to be provided to the graphical presentation process (2) Graphical presentation method then presents the data on the plotting area at the respective top, left coordinates corresponding to the x and y coordinates of the table or database. Here all the records are fetched from the database and plotted on the plotting area. Once the records are plotted, process is hand over to the graphical selector (3) Next process is of graphical selection of records where end-user is allowed to select desired records according to his / her flexibility by drawing a fractal shape cluster. Here user can draw a fractal shape that perfectly covers all the desired record from the plotting area and when user releases the mouse, a line is automatically drawn and it creates the closed fractal shape cluster. (4) All the records selected by the user through graphical selector are then fetched from the database and stored in form
of table or data grid like structure. At last user can view all the records graphically selected by him / her with the Fractal shape graphical selector in the data grid like tabular format.

![Diagram](image)

Figure 3.3 Design of the Clustering Model to extract plotted data in the form of table by taking a Fractal as graphical selector.

After designing model 3.3 it’s development and implementation processes were carried out which are defined in detail in 4.3 of chapter 4. Once the model was implemented, the results were generated and the features and limitations were analyzed which are discussed in 4.3 of chapter 4. After analyzing the limitations of developed model 4.3, researcher decided to design and develop a model 3.4 that is discussed as below.

3.4 Clustering Model to extract plotted data in the form of table by taking a Fractal as graphical selector with zoom-in, zoom-out and navigation facility.

To provide clustering operations with maximum flexibility in terms of cluster shape and records to be selected, To provide the better & perfect selection of records in case of clumsy or highly dispersed data, Also to provide navigation facility in case of zoomed plotting area, Researcher design & develop a model to extract the plotted data in the form of some table by taking a Fractal shape as graphical selector with zoom-in, zoom-out and navigation facility to create a cluster. Thus following model was
designed and prototype was developed by researcher to fulfill requirements specified above in section 3.1.

3.4.1 Design of the Clustering Model to extract plotted data in the form of table by taking a Fractal as graphical selector with zoom-in, zoom-out and navigation facility.

As described in above define diagram process starts with (1) fetching data from the desired record-set and the database and to be provided to the graphical presentation process (2) Graphical presentation method then presents the data on the plotting area at the respective top, left coordinates corresponding to the x and y coordinates of the table or database. Here all the records are fetched from the database and plotted on the plotting area. Once the records are plotted, process is hand over to the graphical selector (3) Next process is optional which is used to enlarge or shrink plotting area with zoom-in and zoom-out component for better visibility of records in case of clumsy data on plotting area or highly dispersed data on plotting area. (4) Next process is also optional where user is getting facility to move plotting area. In case of
enlargement of plotting area, some of the plotting area may not be visible and thus some of the desired records may not be visible. In such situation navigation of plotting area is highly required. Thus by navigating plotting area user can select or bound desired records perfectly. (5) Once the plotting area is perfectly settled with the zoom_in, zoom_out and navigation process, User has to click Lock_zoom to disable the zooming and navigation process. Also it is compulsory to click this component to draw a fractal shape because as user moves mouse pointer plotting area will be also moves, thus to draw a fractal shape it is mandatory to click on this component. (6) Next process is of graphical selection of records where end-user is allowed to select desired records according to his / her flexibility by drawing a fractal shape cluster. Here user can draw a fractal shape that perfectly covers all the desired record, plotting area and when user releases the mouse, a line is automatically drawn and it creates the closed fractal shape cluster. (6) All the records selected by the user through graphical selector are then fetched from the database and stored in form of table or data grid like structure. At last user can view all the records graphically selected by him / her with the Fractal shape graphical selector in the data grid like tabular format.

After designing model 3.4 it’s development and implementation processes were carried out which are defined in detail in 4.4 of chapter 4. Once the model was implemented, the results were generated and the features and limitations were analyzed which are discussed in 4.4 of chapter 4. After analyzing the limitations of developed model 4.4, an idea came into the mind of researcher to provide geographical map instead of graph so that model application can map the requirement of real life application very easily. For such the geographical map of Gujarat State was cropped/ selected which is defined in detail in 3.4.2 of the current Chapter 3. Researcher also designed 2 tables with sample records to carry out data mining operations on this model map of Gujarat state. These tables are (1) Customer Table: This table is used to identify customer with their respective location’s longitude and latitude. The table is defined with sample records in 3.4.3 of the current Chapter 3. (2) Sales Table: This table is used to define the transactions carried out with the customers. The table is defined with sample records in 3.4.4 of the current Chapter 3.

3.4.2 Model map of Gujarat state with several locations plotted within Gujarat state and nearby the Gujarat state with their longitude and latitude.
As researcher has decided to implement actual map with the model applications, a map of Gujarat state was captured from maps.google.com. For this researcher has cropped the map of 640 * 640 pixels with its top-left and right-bottom longitude and latitude. Following are the dimension of map with the view of Gujarat state [1].

(a) Top-left longitude 68.005371093750 which is x coordinate of top left corner of the map (b) Top-left latitude 26.303264239390 which is y coordinate of top left corner of the map (c) Bottom right longitude 75.036621093750 which is x coordinate of bottom right corner of the map. (d) Bottom right latitude 19.839060009305 which is y coordinate of bottom right corner of the map.

![Longitude (68.005371093750)](image)

![Latitude (26.303264239390)](image)

![Longitude (75.036621093750)](image)

![Latitude (19.839060009305)](image)

Figure 3.5 Model map of Gujarat state with its top-left (longitude, latitude) values and bottom-right (longitude, latitude) values and to be placed on plotting area in the model application.

In terms of x, y coordinates of the map image, top-left corner of the map is 0,0 where as bottom-right corner of the map is 640,640. Thus an image file of the map is captured with size of 640*640 pixels with its dimensions in x, y coordinates latitude and longitude values for top-left and right-bottom corner.
3.4.3 Customer Table to store sample records of customers location defined with longitude and latitude and to be plotted on the plotting area that is the map.

After the model map to be plotted on plotting area was defined, researcher decide to add some artificial records of customers location with their longitude and latitude values [1]. Thus designed a Customer table and inserted several artificial records in such table which is as per the follows.

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<tr>
<th>Table 3.3 : Structure of Customer Table</th>
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<tbody>
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<th>Table 3.4: Customer (Sample Records)</th>
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### 3.4.4 Sales Table to store sample records of customer’s sales transaction.

To provide more effectiveness and understandability researcher decide to add another table that can store the sales transaction with some artificial records of sales transaction carried out with customers. Structure and sample data of the sales table are as per the follows.
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After defining model map with its longitude and latitude for top-left and bottom-right corner, customer table with customers location in longitude and latitude, sales table with containing sales transaction performed with specific customers researcher decided to implement model map as plotting area and customer’s location with longitude and latitude values and sales transaction with all the models 3.1, 3.2, 3.3 and 3.4. Thus all the models were again designed and develop with actual map as plotting area and customer’s location to be plotted with its longitude and latitude values.

3.5 Clustering Model to extract plotted data from the actual map in the form of table by taking a Rectangle as graphical selector.

As researcher has decided to develop models with actual map, Clustering model 3.1 was again designed & developed to extract the plotted data from the map in the form of some table by taking a Rectangle shape as graphical selector to create a cluster. Thus following model was designed and prototype was developed by researcher.

3.5.1 Design of the Clustering Model to extract plotted data from the actual map in the form of table by taking a Rectangle as graphical selector.

![Figure 3.6 Design of the Clustering Model to extract plotted data from the actual map in the form of table by taking a Rectangle as graphical selector.](Image)
As described in above define diagram process starts with (1) fetching data from the desired record-set and the database and to be provided to the graphical presentation process (2) Graphical presentation method then presents the data on the model map at the respective top, left coordinates corresponding to the longitude and latitude coordinates of the customer location from customer table. Here all the records are fetched from the database and plotted on the model map. Once the records are plotted, process is hand over to the graphical selector (3) Next process is of graphical selection of records where Rectangle shape graphical selector is provided to select the records. Here user can move this graphical selector with the fixed starting point until he/she gets the desired data within the bound of graphical selector that is use to create a Rectangle shape cluster. As per the requirement user can increase or decrease the size of graphical selector to form the cluster. (4) All the records selected by the user through graphical selector are then fetched from the database and stored in form of table or data grid like structure. At last user can view all the records graphically selected by him / her with the Rectangle graphical selector in the data grid like tabular format.

After designing model 3.5 it’s development and implementation processes were carried out which are defined in detail in 4.5 of chapter 4. Once the model was implemented, the results were generated and the features and limitations were analyzed which are discussed in 4.5 of chapter 4. After analyzing the limitations of developed model 4.5, researcher decided to design and develop a model 3.6 that is discussed as below.

3.6 Clustering Model to extract plotted data from the actual map in the form of table by taking a Circle as graphical selector.

As researcher has decided to design develop models with actual map and to provide clustering process with circle shape, Clustering model 3.2 was again designed & developed to extract the plotted data from the map in the form of some table by taking a Circle shape as graphical selector to create a cluster. Thus following model was designed and the prototype was developed by researcher.

3.6.1 Design of the Clustering Model to extract plotted data from the actual map in the form of table by taking a Circle as graphical selector.
As described in below define diagram process starts with (1) fetching data from the desired record-set and the database and to be provided to the graphical presentation process (2) Graphical presentation method then presents the data on the model map at the respective top, left coordinates corresponding to the longitude and latitude coordinates of the customer location from customer table. Here all the records are fetched from the database and plotted on the model map. Once the records are plotted, process is hand over to the graphical selector (3) Next process is of graphical selection of records where Circle shape graphical selector is provided to select the records. Here user can move this graphical selector with the fixed starting point until he/she gets the desired data within the bound of graphical selector that is use to create a Circle shape cluster. As per the requirement user can increase or decrease the size of graphical selector to form the cluster. (4) All the records selected by the user through graphical selector are then fetched from the database and stored in form of table or data grid like structure. At last user can view all the records graphically selected by him / her with the Circle shape graphical selector in the data grid like tabular format.

![Diagram](image)

**Figure 3.7 Design of the Clustering Model to extract plotted data from the actual map in the form of table by taking a Circle as graphical selector.**

After designing model 3.6 it’s development and implementation processes were carried out which are defined in detail in 4.6 of chapter 4. Once the model was implemented, the results were generated and the features and limitations were analyzed which are discussed in 4.6 of chapter 4. After analyzing the limitations of
developed model 4.6, researcher decided to design and develop a model 3.7 that discussed as below.

3.7 Clustering Model to extract plotted data from the actual map in the form of table by taking a Fractal as graphical selector.

As researcher has decided to design & develop models with actual map and to provide clustering operations with maximum flexibility in terms of shape of cluster and records to be selected, Researcher design & develop a model to extract the plotted data in the form of some table by taking a Fractal shape as graphical selector to create a cluster. Thus Clustering model 3.4 was again designed & developed to extract the plotted data from the map in the form of some table by taking a Fractal shape as graphical selector to create a cluster. Thus following model was designed and the prototype was developed by researcher.

3.7.1 Design of the Clustering Model to extract plotted data from the actual map in the form of table by taking a Fractal as graphical selector.

As described in above define diagram process starts with (1) fetching data from the desired record-set and the database and to be provided to the graphical presentation process (2) Graphical presentation method then presents the data on the model map at

Figure 3.8 Design of the Clustering Model to extract plotted data from the actual map in the form of table by taking a Fractal as graphical selector.
the respective top, left coordinates corresponding to the longitude and latitude coordinates of the customer location from customer table. Here all the records are fetched from the database and plotted on the model map. Once the records are plotted, process is hand over to the graphical selector (3) Next process is of graphical selection of records where end-user is allowed to select desired records according to his / her flexibility by drawing a fractal shape cluster. Here user can draw a fractal shape that perfectly covers all the desired record from the model map and when user releases the mouse, a line is automatically drawn and it creates the closed fractal shape cluster. (4) All the records selected by the user through graphical selector are then fetched from the database and stored in form of table or data grid like structure. At last user can view all the records graphically selected by him / her with the Fractal shape graphical selector in the data grid like tabular format.

After designing model 3.7 it’s development and implementation processes were carried out which are defined in detail in 4.7 of chapter 4. Once the model was implemented, the results were generated and the features and limitations were analyzed which are discussed in 4.7 of chapter 4. After analyzing the limitations of developed model 4.7, researcher decided to design and develop a model 3.8 that discussed as below.

3.8 Clustering Model to extract plotted data from the actual map in the form of table by taking a Fractal as graphical selector with zoom-in, zoom-out and navigation facility.

As researcher has decided to design & develop models with actual map that can provide clustering operations with maximum flexibility in terms of shape of cluster for records to be selected, to provide the better & perfect selection of records in case of clumsy or highly dispersed data and also to provide navigation facility in case of zoomed and shrink plotting area, Researcher design & develop a model to extract the plotted data in the form of some table by taking a Fractal shape as graphical selector with zoom-in, zoom-out and navigation facility to create a cluster. Thus Clustering model 3.7 was again designed & developed as 3.8 to fulfill requirements specified above in section 3.1.
3.8.1 Design of the Clustering Model to extract plotted data from the actual map in the form of table by taking a Fractal as graphical selector with zoom-in, zoom-out and navigation facility.

As described in above define diagram process starts with (1) fetching data from the desired record-set and the database and to be provided to the graphical presentation process (2) Graphical presentation method then presents the data on the model map at the respective top, left coordinates corresponding to the longitude and latitude coordinates of the customer location from customer table. Here all the records are fetched from the database and plotted on the model map. Once the records are plotted, process is hand over to the graphical selector. (3) Next process is optional which is used to enlarge or shrink model map of Gujarat state with zoom-in and zoom-out component for better visibility of records in case of clumsy data on model map area or highly dispersed data on model map area. (4) Next process is also optional where user is getting facility to move plotting area. In case of enlargement of model map area, some of the model map area may not be visible and thus some of the desired records may not be visible. In such situation navigation of model map area is highly required.
Thus by navigating model map area user can select or bound desired records perfectly. (5) Once the model map area is perfectly settled with the zoom_in, zoom_out and navigation process, User has to click Lock_zoom to disable the zooming and navigation process. Also it is compulsory to click this component to draw a fractal shape because as user moves mouse pointer model map area will be also moving, thus to draw a fractal shape it is mandatory to click on this component. (6) Next process is of graphical selection of records where end-user is allowed to select desired records according to his / her flexibility by drawing a fractal shape cluster. Here user can draw a fractal shape that perfectly covers all the desired record, from the model map area and when user releases the mouse, a line is automatically drawn and it creates the closed fractal shape cluster. (6) All the records selected by the user through graphical selector are then fetched from the database and stored in form of table or data grid like structure. At last user can view all the records graphically selected by him / her with the Fractal shape graphical selector in the data grid like tabular format.

After designing model 3.8 it’s development and implementation processes were carried out which are defined in detail in 4.8 of chapter 4. Once the model was implemented, the results were generated and the features and limitations were analyzed which are discussed in 4.8 of chapter 4. After analyzing the limitations of developed model 4.8, an idea came into the mind of researcher to implement the model again with the availability of online geographical map and to allow user select any geographical area from the map and thus researcher decided to design and develop a model 3.9 with online map component which is defined as below.

3.9 Clustering Model to extract plotted data from the Online, Navigational & Sizable map in the form of table by taking a Fractal as graphical selector with zoom-in, zoom-out and navigation facility.

As researcher has decided to design & develop models that can provide clustering operations with maximum flexibility in terms of selection of any region /geographical area (not bounded to any city, state or country), also in terms of shape of cluster for records to be selected, also to provide the better & perfect selection of records in case of clumsy or highly dispersed data and also to provide navigation facility in case of zoomed and shrink plotting area. Thus to cater above define functionality Researcher design & develop a model 3.9 with online, navigational and sizable map to extract the
plotted data in the form of some table by taking a Fractal shape as graphical selector with zoom-in, zoom-out and navigation facility to create a cluster.

3.9.1 **Design of the Clustering Model to extract plotted data from the Online, Navigational & Sizable map in the form of table by taking a Fractal as graphical selector with zoom-in, zoom-out and navigation facility.**

![Diagram](image)

Figure 3.10 Design of Clustering Model to extract plotted data from the Online, Navigational & Sizable map in the form of table by taking a Fractal as graphical selector with zoom-in, zoom-out and navigation facility.

As described in above define diagram process starts with (1) Selecting desired region / geographical area from the online map on which clustering operation is to be performed. This map can be navigated to view desired geographical area by dragging mouse in the specific direction. Also such map can be enlarged or Zoomed In by double clicking left mouse button and shrunk or Zoom Out by double clicking right mouse button. Whenever user navigate through map or enlarge or shrink map area, Its longitude and latitude for top left corner and bottom right corner are automatically fetched and appears on the screen with respected text boxes on the screen. Thus desired geographical area can be selected from the online map very easily and accurately. (2) Graphical presentation method then presents the data on the model
map at the respective top, left coordinates corresponding to the longitude and latitude coordinates of the customer location from customer table. Here all the records are fetched from the database and plotted on the model map. Once the records are plotted, process is hand over to the graphical selector. (3) Next process is optional which is used to enlarge or shrink the desired or selected geographical area’s map with zoom-in and zoom-out component for better visibility of records in case of clumsy data on model map area or highly dispersed data on model map area. (4) Next process is also optional where user is getting facility to move plotting area. In case of enlargement of desired / selected map area, some of the selected map area may not be visible and thus some of the desired records may not be visible. In such situation navigation of selected / desired map area is highly required. Thus by navigating desired map area user can select or bound desired records perfectly. (5) Once the desired/ selected map area is perfectly settled with the zoom_in, zoom_out and navigation process, User has to click Lock_zoom to disable the zooming and navigation process. Also it is compulsory to click this component to draw a fractal shape because as user moves mouse pointer model map area will be also moving, thus to draw a fractal shape it is mandatory to click on this component. (6) Next process is of graphical selection of records where end-user is allowed to select desired records according to his / her flexibility by drawing a fractal shape cluster. Here user can draw a fractal shape that perfectly covers all the desired record, from the model map area and when user releases the mouse, a line is automatically drawn and it creates the closed fractal shape cluster. (6) All the records selected by the user through graphical selector are then fetched from the database and stored in form of table or data grid like structure. At last user can view all the records graphically selected by him / her with the Fractal shape graphical selector in the data grid like tabular format.
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