

User Guide – A Visual Exploration of the employees’ behaviour in GASTech

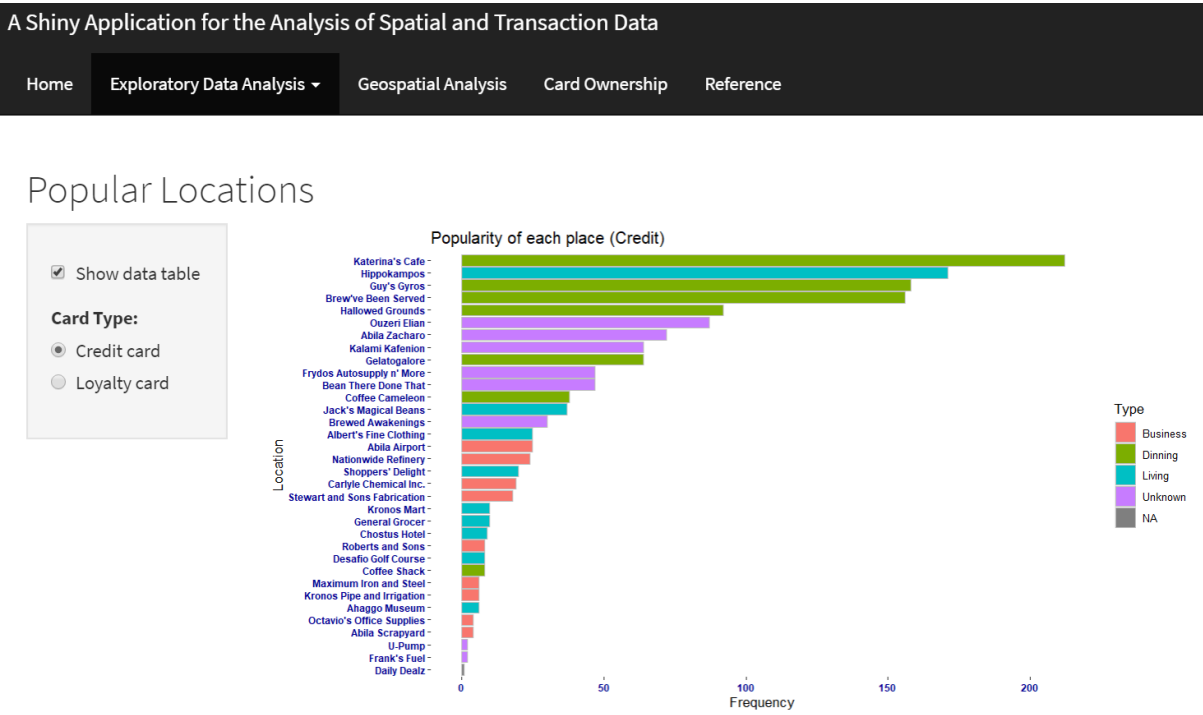
1. Introduction Page

On this page, there is a short description of the application and this whole case.

2. Exploratory Data Analysis (EDA)

2.1 Bar Chart

The bar chart showed the popularity of each location by the number of times people visit it.



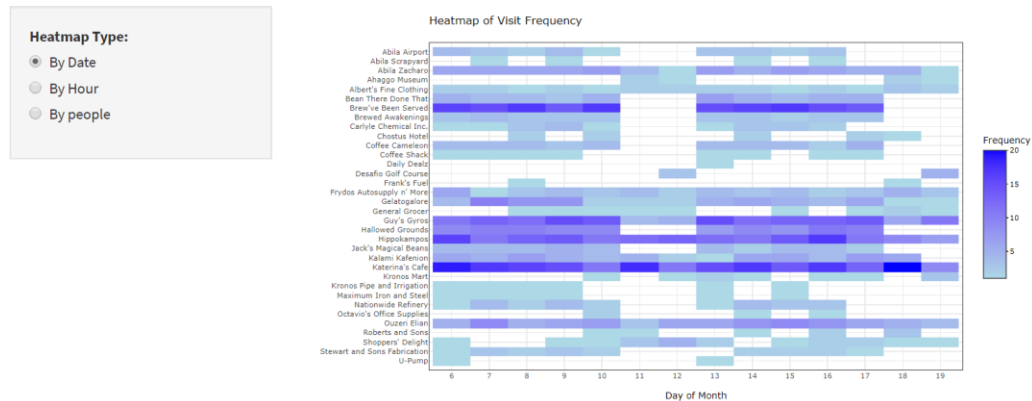
| No. | Step | notes |
|-----|--|--|
| 1 | Click “Show data table” to generate a table shown the detailed information, for example, type of location and number of times that people visit, of each location. | <div>Popular Locations</div> <div><div><input checked="" type="checkbox"/> Show data table</div></div> |

| 2 | Results | <div> Show 10 entries Search: </div> <table> <thead> <tr> <th>Location</th><th>Number_of_Times_People_Visit</th><th>Type</th></tr> </thead> <tbody> <tr><td>Abila Airport</td><td>25</td><td>Business</td></tr> <tr><td>Abila Scrapyard</td><td>4</td><td>Business</td></tr> <tr><td>Abila Zacharo</td><td>72</td><td>Unknown</td></tr> <tr><td>Ahaggo Museum</td><td>6</td><td>Living</td></tr> <tr><td>Albert's Fine Clothing</td><td>25</td><td>Living</td></tr> <tr><td>Bean There Done That</td><td>47</td><td>Unknown</td></tr> <tr><td>Brew've Been Served</td><td>156</td><td>Dinning</td></tr> <tr><td>Brewed Awakenings</td><td>30</td><td>Unknown</td></tr> <tr><td>Cartyle Chemical Inc.</td><td>19</td><td>Business</td></tr> <tr><td>Chostus Hotel</td><td>9</td><td>Living</td></tr> </tbody> </table> <div> Showing 1 to 10 of 34 entries Previous 1 2 3 4 Next </div> | Location | Number_of_Times_People_Visit | Type | Abila Airport | 25 | Business | Abila Scrapyard | 4 | Business | Abila Zacharo | 72 | Unknown | Ahaggo Museum | 6 | Living | Albert's Fine Clothing | 25 | Living | Bean There Done That | 47 | Unknown | Brew've Been Served | 156 | Dinning | Brewed Awakenings | 30 | Unknown | Cartyle Chemical Inc. | 19 | Business | Chostus Hotel | 9 | Living |
|------------------------|--|--|----------|------------------------------|------|---------------|----|----------|-----------------|---|----------|---------------|----|---------|---------------|---|--------|------------------------|----|--------|----------------------|----|---------|---------------------|-----|---------|-------------------|----|---------|-----------------------|----|----------|---------------|---|--------|
| Location | Number_of_Times_People_Visit | Type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Abila Airport | 25 | Business | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Abila Scrapyard | 4 | Business | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Abila Zacharo | 72 | Unknown | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ahaggo Museum | 6 | Living | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Albert's Fine Clothing | 25 | Living | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bean There Done That | 47 | Unknown | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Brew've Been Served | 156 | Dinning | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Brewed Awakenings | 30 | Unknown | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cartyle Chemical Inc. | 19 | Business | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Chostus Hotel | 9 | Living | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Click different button on the side bar will changed to different bar chart | <div> <div> <input checked="" type="checkbox"/> Show data table </div> <div> Card Type: <input checked="" type="radio"/> Credit card <input type="radio"/> Loyalty card </div> </div> <div> <h3>Popular Locations</h3> </div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | There are two kinds of bar charts. The first one is credit card data | <div> <h3>Popularity of each place (Credit)</h3> </div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | The second one is loyalty card data | <div> <h3>Popularity of each place (Loyalty)</h3> </div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

2.2 Heat Map

A heat map is a data visualization technique that shows magnitude of a behavior as color in two dimensions.

Visit Frequency



| No. | Step | notes |
|-----|---|---|
| 1 | Click different button on the side bar will changed to different kind of heatmap | <p>Visit Frequency</p> <p>Heatmap Type:</p> <ul style="list-style-type: none"> <input checked="" type="radio"/> By Date <input type="radio"/> By Hour <input type="radio"/> By people |
| 2 | There are three kinds of heat maps. The first one shows the visit frequency of each location by date. Users can see the detailed information when put mouse on the blocks | <p>Heatmap of Visit Frequency</p> <p>Frequency</p> <p>Day of Month</p> |
| 3 | The second one shows the visit frequency of each location by hour. Users can see the detailed information when put mouse on the blocks | <p>Heatmap of Visit Frequency</p> <p>Frequency</p> <p>Hour</p> |

| | | |
|---|---|--|
| 4 | The third one shows the visit frequency of each location by hour. Users can see the detailed information when put mouse on the blocks | |
|---|---|--|

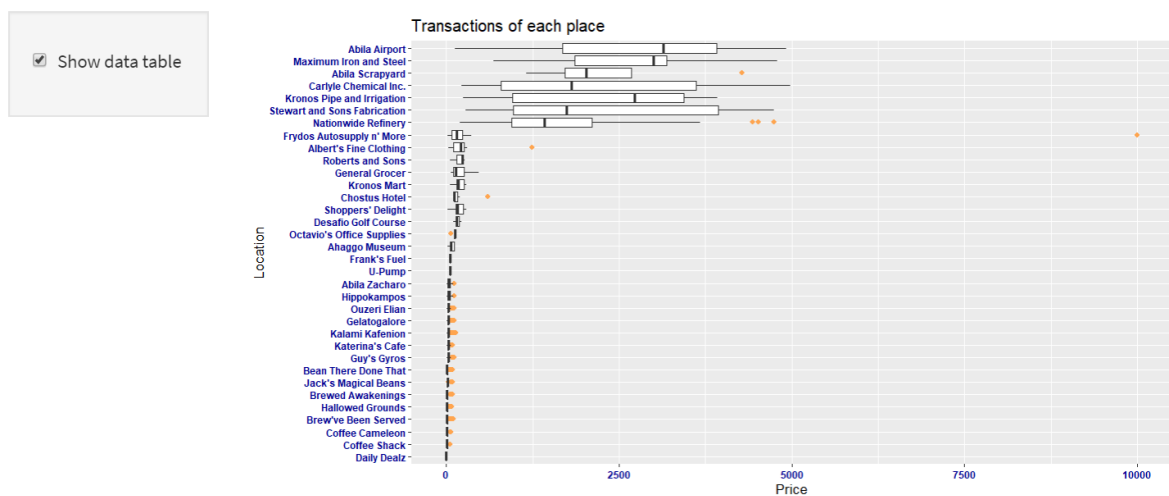
2.3 Box Plot

To explore the insights about transaction, we preferred to use boxplot, which graphically depicting groups of numerical data through their quartiles.

A Shiny Application for the Analysis of Spatial and Transaction Data

Home Exploratory Data Analysis ▾ Geospatial Analysis Card Ownership Reference

Anomalies Transaction



| No. | Step | notes |
|-----|--|--------------------------|
| 1 | Click "Show data table" to generate a table shown the suspectable transaction information, for example, date, time, price, location and card number, of each location. | <p>Popular Locations</p> |

2

Results

Price

Show 10 entries

Search:

| date | time | price | location | last4ccnum |
|------------|----------|--------|-------------|------------|
| 2014-01-12 | 03:00:00 | 147.3 | Kronos Mart | 5407 |
| 2014-01-18 | 03:13:00 | 87.66 | Kronos Mart | 3484 |
| 2014-01-11 | 03:39:00 | 277.26 | Kronos Mart | 8156 |
| 2014-01-18 | 03:45:00 | 194.51 | Kronos Mart | 9551 |
| 2014-01-18 | 03:48:00 | 150.36 | Kronos Mart | 8332 |

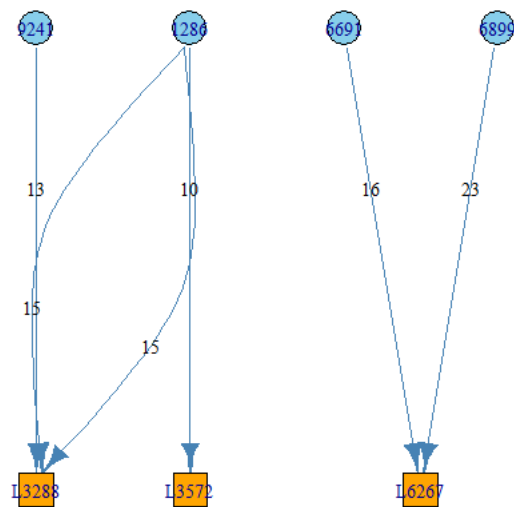
Showing 1 to 5 of 5 entries

Previous1Next

2.4 Bipartite Plot

When modelling relations between two different classes of objects, bipartite graphs very often arise naturally. Hence, we used bipartite graph to check whether there is cross used between credit card and loyalty card.

Cross used cards



3. Geospatial Analysis

We used maps extensively to uncover all suspicious relationships and movements. In this view, movements data records will be represented as route.

| | | |
|-----|------|-------|
| No. | Step | notes |
|-----|------|-------|

| 1 | <p>Select the desired date range, the dates available for plotting are colored black.</p> <p>Note : if planning to plot a path that does not change days, select the same date for both boxes</p> | <p>Select Date Range:</p> <div><div>2014-01-05</div>to<div>2014-01-19</div></div> <div><p>January 2014</p><table><tr><th>Su</th><th>Mo</th><th>Tu</th><th>We</th><th>Th</th><th>Fr</th><th>Sa</th></tr><tr><td>29</td><td>30</td><td>31</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td></tr><tr><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td></tr><tr><td>19</td><td>20</td><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td></tr><tr><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td><td>31</td><td>1</td></tr><tr><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr></table></div> | Su | Mo | Tu | We | Th | Fr | Sa | 29 | 30 | 31 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|----|---|---|----|----|----|----|----|----|----|----|----|----|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|---|---|---|---|---|---|---|
| Su | Mo | Tu | We | Th | Fr | Sa | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 29 | 30 | 31 | 1 | 2 | 3 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 6 | 7 | 8 | 9 | 10 | 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | 13 | 14 | 15 | 16 | 17 | 18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19 | 20 | 21 | 22 | 23 | 24 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 26 | 27 | 28 | 29 | 30 | 31 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | <p>Select the starting time by either clicking on the arrows for the hour and minute box or type the desired number, this input will determine the hour for the starting date.</p> <p>Note: when typing the time, keep in mind that minutes can only be selected by 5-minute intervals</p> | <p>Starting Date Time:</p> <div><div>16</div><div>05</div></div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | <p>Do the same for the end time, this input will determine the hour for the end date</p> | <p>End Date Time:</p> <div><div>16</div><div>10</div></div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <p>E.G. For the screenshots attached, it can be seen that the date range is between January 5th and January 19th while the start time and end time is 16:05 and 16:10, respectively. This means that the path that will be plotted will be travels done between January 5th 16:05 until January 19th 16:10.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | <p>Select the employees whose gps data will be plotted by checking the box of their name</p> | <p>Select Employees</p> <div><input checked="" type="checkbox"/> Nils Calixto<input checked="" type="checkbox"/> Lars Azada<input checked="" type="checkbox"/> Felix Balas<input checked="" type="checkbox"/> Ingrid Barranco<input checked="" type="checkbox"/> Isak Baza<input type="checkbox"/> Linnea Bergen<input type="checkbox"/> Elsa Orilla<input type="checkbox"/> Lucas Alcazar<input type="checkbox"/> Gustav Cazar<input type="checkbox"/> Ada Campo-Corre<input type="checkbox"/> Axel Calzas<input type="checkbox"/> Hideki Cocinaro<input type="checkbox"/> Inga Ferro<input type="checkbox"/> Lidelse Dedos<input type="checkbox"/> Loreto Bodrogi<input type="checkbox"/> Isia Vann<input type="checkbox"/> Sven Flecha<input type="checkbox"/> Birgitta Frente<input type="checkbox"/> Vira Frente<input type="checkbox"/> Stenig Fusil<input type="checkbox"/> Hennie Osvaldo<input type="checkbox"/> Adra Nubarron<input type="checkbox"/> Varja Lagos<input type="checkbox"/> Minke Mies<input type="checkbox"/> Kanon Herrero<input type="checkbox"/> Marin Onda<input type="checkbox"/> Kare Orilla<input type="checkbox"/> Isande Borrasca<input type="checkbox"/> Bertrand Ovan<input type="checkbox"/> Felix<input type="checkbox"/> Sten Sanjorge Jr.<input type="checkbox"/> Ornan Strum<input type="checkbox"/> Brand Tempestad<input type="checkbox"/> Edvard Vann<input type="checkbox"/> Willem Vasco-Pais<input type="checkbox"/> Truck 101<input type="checkbox"/> Truck 104<input type="checkbox"/> Truck 105<input type="checkbox"/> Truck 106<input type="checkbox"/> Truck 107</div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | <p>Click on the “Plot Path” button on the top right</p> | <p>Plot Path</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | | |
|---|---|----------------------------------|
| 6 | The paths of the selected employees at the selected timeframe will be generated | <p>Employee Movement Tracker</p> |
|---|---|----------------------------------|

4. Card Ownership

This is an additional table for users to check the owner of the credit card and loyalty card. Column “Likelihood” shows the credibility of the information.

0 = Cannot give any confidence of identifying a specific employee as an owner of a card

1 = Positional data or time data may not be in-sync, could be person was in the vicinity or at the exact place but outside of the time window by a few minutes without anyone else being a possible answer.

2 = Cross-check of transaction data and positional data shows person was the only possible person to use this card at that time

| No. | Step | notes |
|-----|--|-------------------------------|
| 1 | Click different button on the side bar will changed to different matching table | <p>Ownership of the cards</p> |
| 2 | There are three kinds of table. The first one shows the owner that we can fully match | <p>Ownership of the cards</p> |
| 3 | The second one shows the owner we can only approximately match because of some reasons we listed | <p>Ownership of the cards</p> |
| 4 | The third one shows owner we cannot match | <p>Ownership of the cards</p> |