Using GIS to Support University Development Efforts

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ABSTRACT

The University of Redlands Development Office seeks to cultivate relationships with alumni to secure charitable gifts to provide the most beneficial learning environment for current and future students. The development office uses several strategies to add to this process, but lacks an understanding of the spatial component of their donor database. This project will utilize a Geographic Information System to enhance our understanding of the network of donors the University of Redlands maintains by analyzing spatial statistics within the data. Adding this spatial component will aid the Development Office in using its resources more effectively.

Problem Statement

The University of Redlands Development Office maintains a rudimentary donor database in a tabular format. The problem with the tabular database is that spatial distribution of donors and potential relationships between donors and its geographic context cannot be revealed easily. Without a solid understanding of the spatial component of gift giving behavior, the development office is not maximizing its gift receiving potential across space. Therefore, the implementation of a solution that used spatial analytical methods in a GIS would help solve this problem.

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Future Considerations

In the future, the University Development Office would benefit from a more complete GIS solution. The completed system should consist of a normalized relational database that is populated with several tables, making data entry and query more effective and efficient. Building on this platform, a GIS solution should be implemented into the decision making process the University of Redlands Development Office uses to target potential donors. This GIS solution will consist of simple standalone "Alumni Data Explorer" tool that will serve as a data entry form, query tool, and update tool. In addition, the data explorer will interface with GIS software, such as ArcGIS Explorer. This will allow the user to be able to interactively view individual or multiple donors and their donor characteristics on a map.

Statistics & Spatial Analysis

With the completed shapefile in hand, the data needed to be further manipulated and explored in order to prepare the data for a meaningful descriptive statistical analysis. The initial phase of the descriptive statistical analysis involved choosing data attributes that would play an important role in the more advanced statistical analysis to come. The attributes deemed important included fraternal membership, graduation year, and distance from the University. Charts, graphs, and maps were created using ESRI software to illustrate items such as totals, averages, and standard deviations. The charts, graphs, and maps provided a synopsis of the overall distribution of the data on a nationwide scale. Following the descriptive statistical analysis, several techniques were employed to further analyze the donor data. These methods included comparing means donations of individual alumni using an independent sample T-test and one way ANOVA analysis. Finally, using socioeconomic variables influenced by geography such as race, income, and education level, linear regressions tests were conducted to create a more comprehensive profile of potential donors.

<table>
<thead>
<tr>
<th>State</th>
<th>Alumnus</th>
<th>Lifetime Giving</th>
<th>Avg. Lifetime Giving</th>
<th>Stan. Dev of Lifetime Giving</th>
<th>Percentage That Donate</th>
</tr>
</thead>
<tbody>
<tr>
<td>AK</td>
<td>61</td>
<td>27,159.62</td>
<td>445.24</td>
<td>1,233.45</td>
<td>0.43</td>
</tr>
<tr>
<td>AL</td>
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<td>8,020.63</td>
<td>218.63</td>
<td>538.84</td>
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</tr>
<tr>
<td>AR</td>
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<td>330.46</td>
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<tr>
<td>AZ</td>
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<td>1,607.73</td>
<td>4,091.98</td>
<td>0.33</td>
</tr>
</tbody>
</table>

Table 1. Sample: Alumni Statistics Categorized by State.

Figure 1. Original Raw Data in Excel Spreadsheet.

Figure 2. Geocoding Result.

Figure 3. Spatial Join of Point Data with zip codes.

Figure 4. Examples of Maps Derived from Spatial Joins.

Figure 5. Relational Database Model.

Figure 6. Geodatabase

Figure 7. Alumni Data Explorer

Figure 8. GIS Software

Figure 9. Microsoft Access

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