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Advanced Location Analytics Using Demographic Data from Esri and SAS® Visual Analytics

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ABSTRACT

Location information plays an important role in business data. Everything that happens in a business happens somewhere, whether it's the sales of products in different regions of a country or crimes that happened in a city. Business analysts typically use the historic data that they have gathered for years for analysis. One of the most important pieces of data that can help answer more questions qualitatively, is the demographic data combined with the business data. An analyst can use demographic details like gender, age groups, family income, race, and other pieces of information, for better insight. This paper focus on importing custom shape files and how a business analyst can bring the demographic and lifestyle data from Esri into SAS® Visual Analytics and join the data with business data. The integration of SAS Visual Analytics with Esri facilitate this to happen. We also cover the new geo based capabilities in the 8.1 release of SAS® Visual Analytics.

INTRODUCTION

Location information is an important dimension of any Business Intelligence (BI) data. Most often the focus in BI is on business data visualization with traditional objects like tables and graphs. These visualizations though serve the purpose, limit the ability to see the big picture of how the business happens geographically. If the data is presented in the geo map, it will help to visualize where things are happening and the scale of the happenings.

Using data on geo maps is just a beginning of using location for analytics and better understanding of business data with location context. But the journey to a more advanced location analytics does not stop here. The vision and goal of SAS and SAS Visual Analytics is to enable customers to use location visualization on maps with business data and analytics seamlessly. SAS Visual Analytics plans to enrich the location analytics by integrating mapping with SAS analytics seamlessly, so business users can analyze their data using mapping as an input and conversely use analytical output to be visualized on maps.

Going beyond traditional mapping, SAS Visual Analytics plans to provide more advanced analytics. For example "Drive time Analysis", "Drive distance Analysis", Geo enrichment for analysis.

To enrich the business data for more precise insights, SAS Visual Analytics will facilitate the access and use of demographic data from Esri. The process and plan is shared in this paper.

To visualize data on the maps you may need to geo code the needed data columns or import the shape files to represent the tiles on a map. The process and the plan of importing of custom shape files and Geo coding are discussed in this paper.

SAS has signed a partnership with Esri, a global leader in GIS systems. Combining the strength of SAS analytics and Esri GIS capabilities, customers can get a unified solution for ad-hoc data exploration, reporting, and location based analytics.

The functionality that is describe below is only available in the Visual Analytics 8.1 and future releases of Visual Analytics. Please check with the product documentation for specific features and details available in that release.

Some parts of this paper are the features planned in the future release of the SAS® Visual Analytics and some are in the upcoming release 8.1 of Visual Analytics. I will call them out.

SAS VISUAL ANALYTICS INTEGRATION WITH ESRI ARCGISONLINE

The partnership of SAS and Esri is reflected in the integration of SAS Visual Analytics with Esri ArcGIS Online. In the Visual Analytics 8.1 release of Visual Analytics, administrators can make Esri ArcGIS Online their default mapping provider. Users can enter their Esri ArcGIS online credentials The first step to using the ArcGIS Online through Visual Analytics is to login. For this, the users need to be added to the "ESRI Users" group in EV (Environment Manager) by the Admin. Each user need to user the settings UI and accept the ESRI EULA and enter their ArcGIS Online credentials. These two steps will enable users to access and use the premium functionality supported through the Visual Analytics and ArcGIS Online integration.

ACCESSING DIFFERENT LEVELS OF FUCTIONALITY

The integration of Visual Analytics with Esri ArcGIS Online allows Visual Analytics users to access different levels of functionality from Esri. Some features are free for all users. Some features are called premium features.

Free features:
These are features that SAS Visual Analytics work with Esri and are provided to all the users, customers do not need any special license.

- Unlimited base maps from Esri. Any base maps from Esri.
- Geo search. There is a search interface exposed on the map. Users can do a search similar to our experience with google search on google map.
- Ad-hoc selection of data points on a map. Users will be able to use the three selection options like "circle, rectangle or a polygon" and highlight any area on a map.

Premium feature:
Some features are not free from Esri. The features that require license and credits from Esri are called premium features. SAS Visual Analytics provides the integration so from SAS there is not special licensing required but the customers using Visual Analytics will require licensing and credits from Esri.

Some examples that Esri consider as premium features are:

- Drive time analysis: Ability to find all data points on a map that are certain driving time from a given point. A drive time polygon is rendered on the map. Users can select more than one drive time.
- Drive distance analysis: Ability to find all data points on a map that are certain driving distance from a given point. Users can select more than one drive time.
- Geo coding: Importing geo coded data and custom shapes from Esri
- Demographic data

Different login levels:

Since there are different levels of functionality that can be accessed from Esri, SAS Visual Analytics will support the ability to enter the credentials of an individual user. Users can provide their credentials so that when they use certain mapping functionality, they will be validated for access to the approved functionality.

IMPORTING SHAPE FILES INTO VISUAL ANALYTICS

[Note: This feature is planned in the future releases of SAS® Visual Analytics 7.4 & 8.3 and above]

Very often there is a need for representing the territories or areas on a geo map. This is done by using shape files. These files represent what a customer wants to address a specific business problem. For example Police department may want to represent the police Beat areas, Sales managers may represent the sales territories, and government bodies may want to represent electoral territories on the maps, and so on.

SAS® Visual Analytics plans to offer two methods to import shape files. One through Esri server by referencing featured services and the other by users from their file system.

IMPORTING THROUGH ESRI FEATURED SERVICES

Many customers of SAS, may already have license with Esri. If not, they can obtain license for Esri ArcGIS Online. Either way customers can access the custom shape files in Esri ArcGIS Online and retrieve them, register and make available these files to be used on the geo maps in Visual Analytics.

SAS uses the Esri features services and REST API's to access and retrieve the shape files.

IMPORTING FROM CUSTOMER FILE SYSTEM

Often business users in the middle of exploration or report creation may need to import shape files to use them on the maps. The plan is to provide a UI that will allow users to select the shape files. The shape files upon selection need to be registered so they can be identified in the UI and used to associate with a data item. For example a data item like Sales territories can be associated with the shape files imported.

Following are some UI mockups for future.

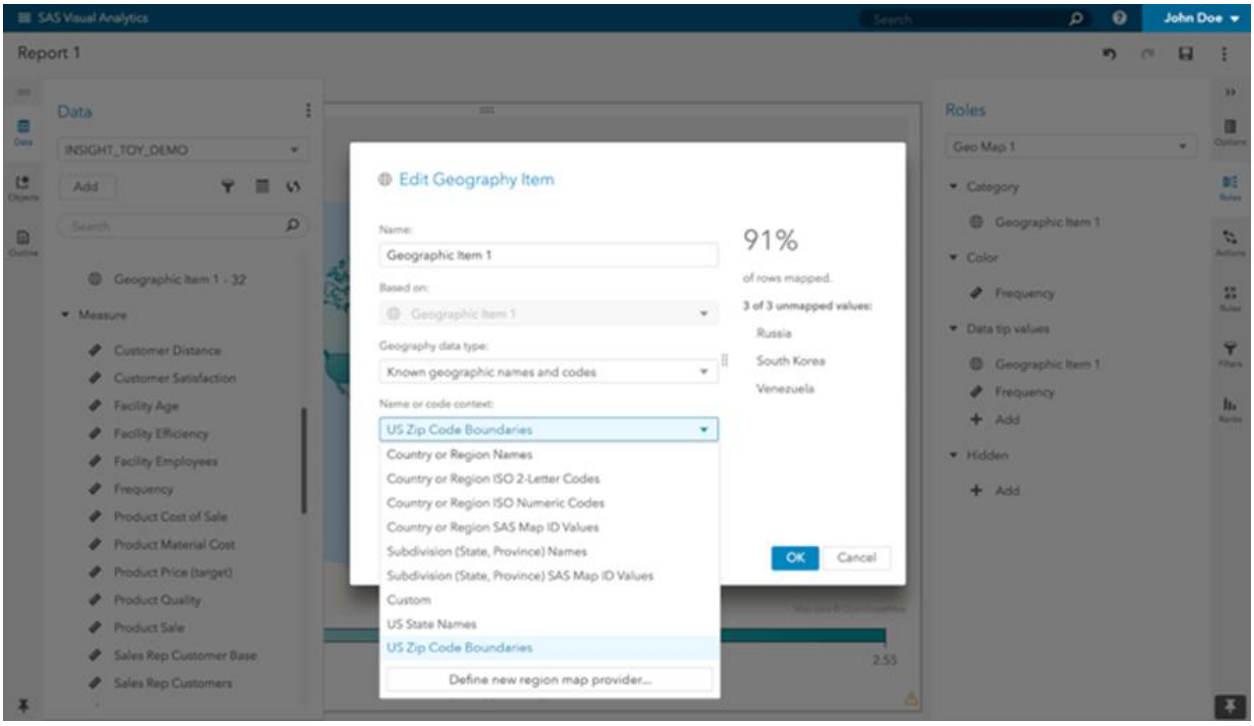

Figure 1: (Mockup) Once registered, the data item can be assigned to the custom region

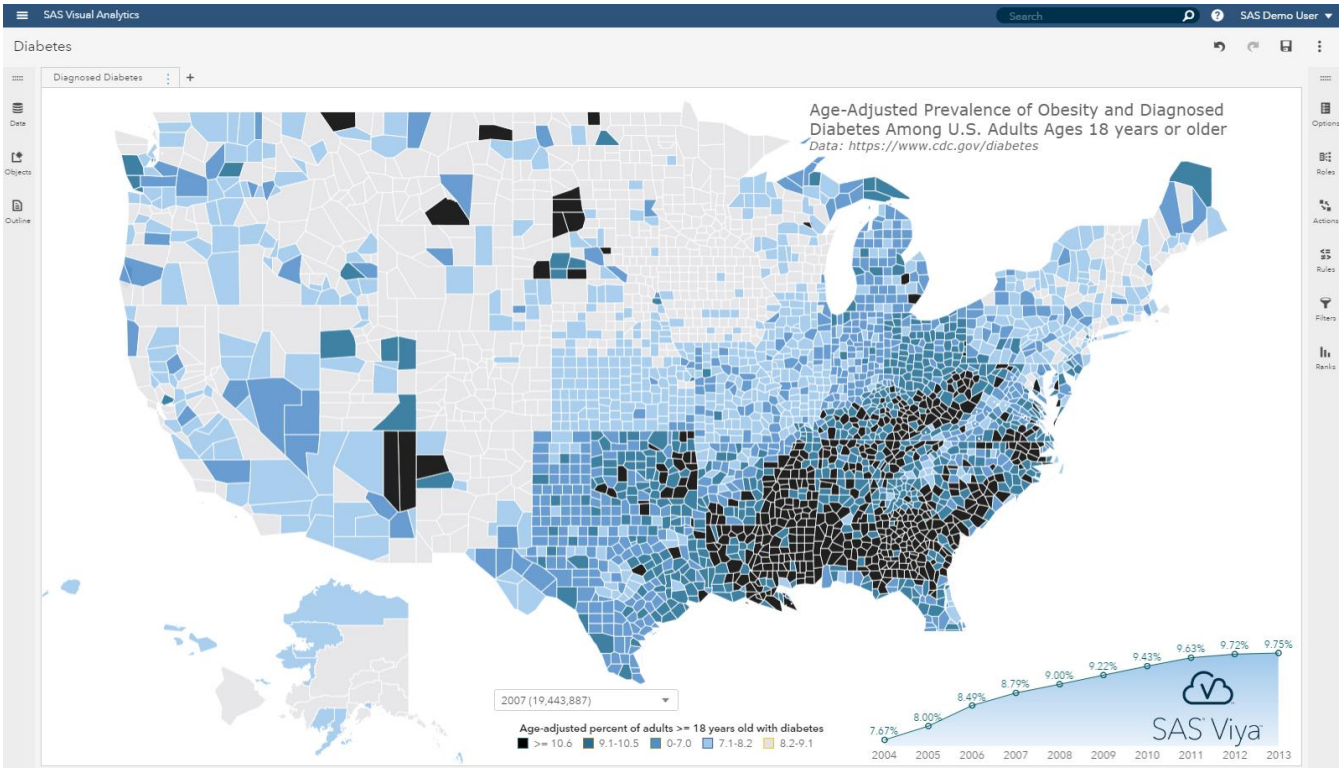

Figure 2: Here is an example of a geo map in SAS Visual Analytics, which is rendering the counties of USA using the shape files imported to Visual Analytics.

IMPORTING DEMOGRAPHIC DATA FROM ESRI

[Note: This feature is planned in the future release of Visual Analytics, post 8.1 release]

When you are analyzing a business problem you may have some data from the company business data which the company may be focusing. But your company may not have all the data necessary to look at the big picture and develop insights.

For example, when you are looking at the health care data for analyzing the prevalence of diabetes, you may have data acquired by the organization over time. Since diabetes is correlated to the life style of a person, it is important to look at the lifestyle and demographic data along with the company data from the company data base.

Another example is, when law enforcement is analyzing data on the crimes in a city, they may have data associated to the different crimes happed in the city. To improve the analysis and get the real picture of the crimes, the analyst may need to combine the crimes data with the demographic data to get a full picture.

Here is the demographic data available from Esri,

http://www.Esri.com/data/Esri_data/explore-data

Figure 3: Demographic data in Esri ArcGIS online for USA

http://doc.arcgis.com/en/Esri-demographics/

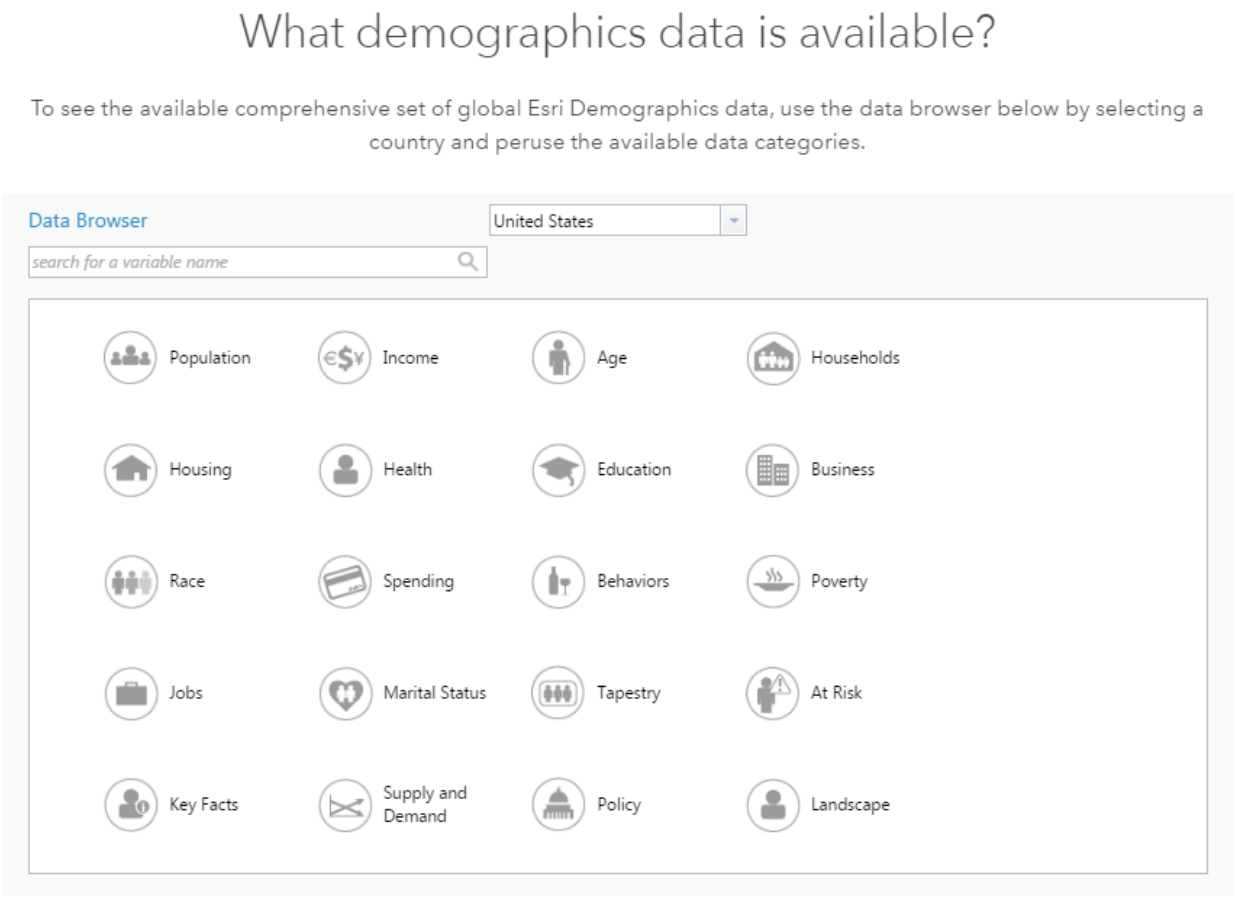

Figure 4: Some of the groups of demographic data available in Esri ArcGIS Online

In SAS Visual Analytics, the plan is to provide an seamless way to look-through to the Esri demographic data and extract the data into Visual Analytics so you can continue the exploration, analysis and visualization of the data.

Travel analytics

[Note: This feature is in 8.1 release of Visual Analytics]

Travel time analysis implies the ability to cover all the points on the map which are certain distance from a given selected point on a map. If you select a point on the map, and try to do drive-time analysis, a polygon will be drawn on the map that reflects the distance coved by road. This polygon information comes back from Esri and is drawn in Visual Analytics.

There are three types of analysis that can be done.

- Drive by distance
- Drive by time
- Distance as a straight line

Refer to figure 5

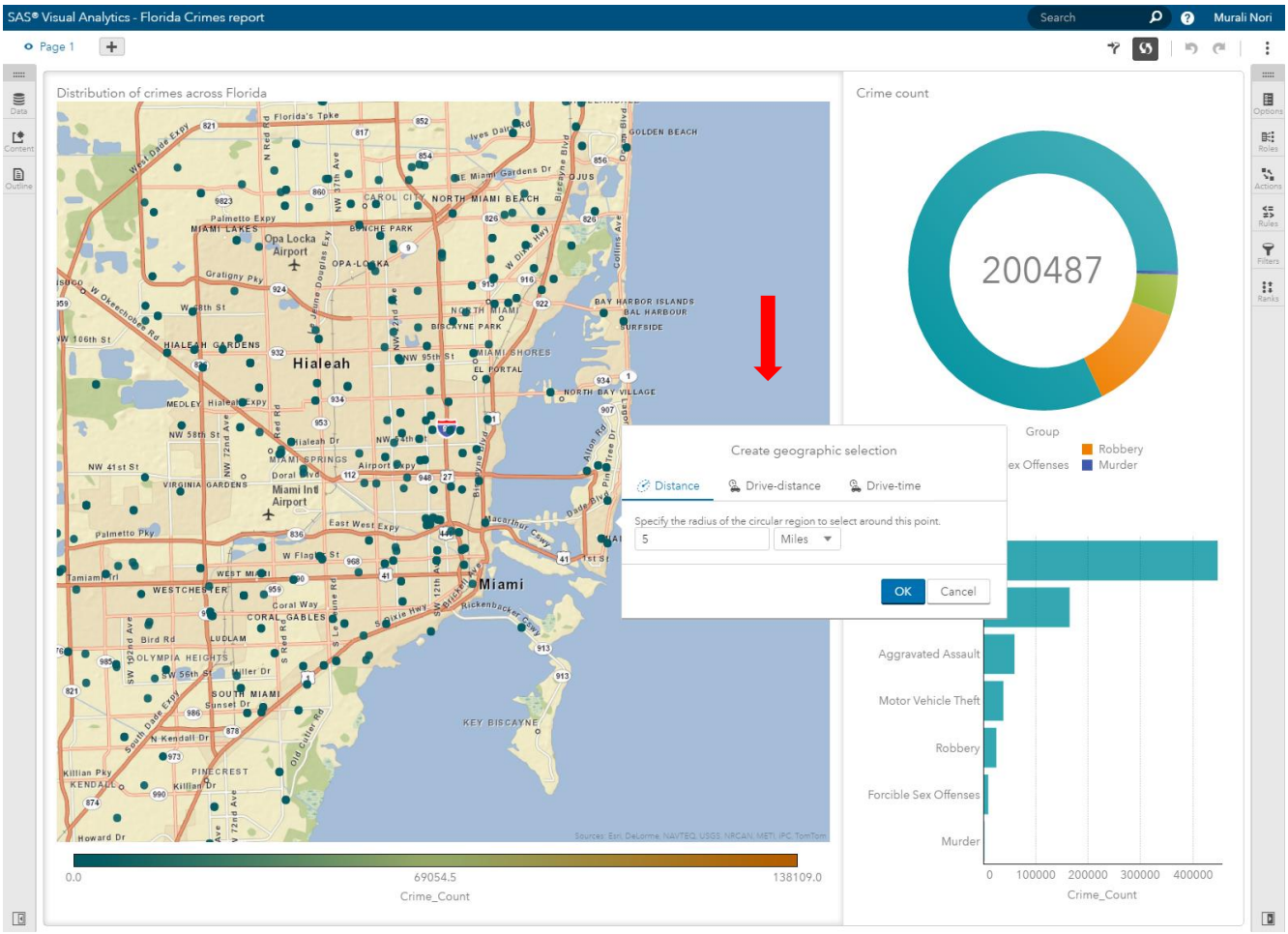

Figure 5: Travel time analysis options – Drive by Time, Drive by Distance, Distance

Drive by time:

When you select a point on a map, and choose “Drive by time”, Visual Analytics will interact with Esri to define the polygon that meets the criteria of the distance by road that one can travel in all directions from the point, in the given time.

There is an option of selecting multiple times. For example you can select 5 min and 10 min times. So there will be two polygons that represent 5 min and 10 min drive times. They are shaded differently.

Refer to figure 6

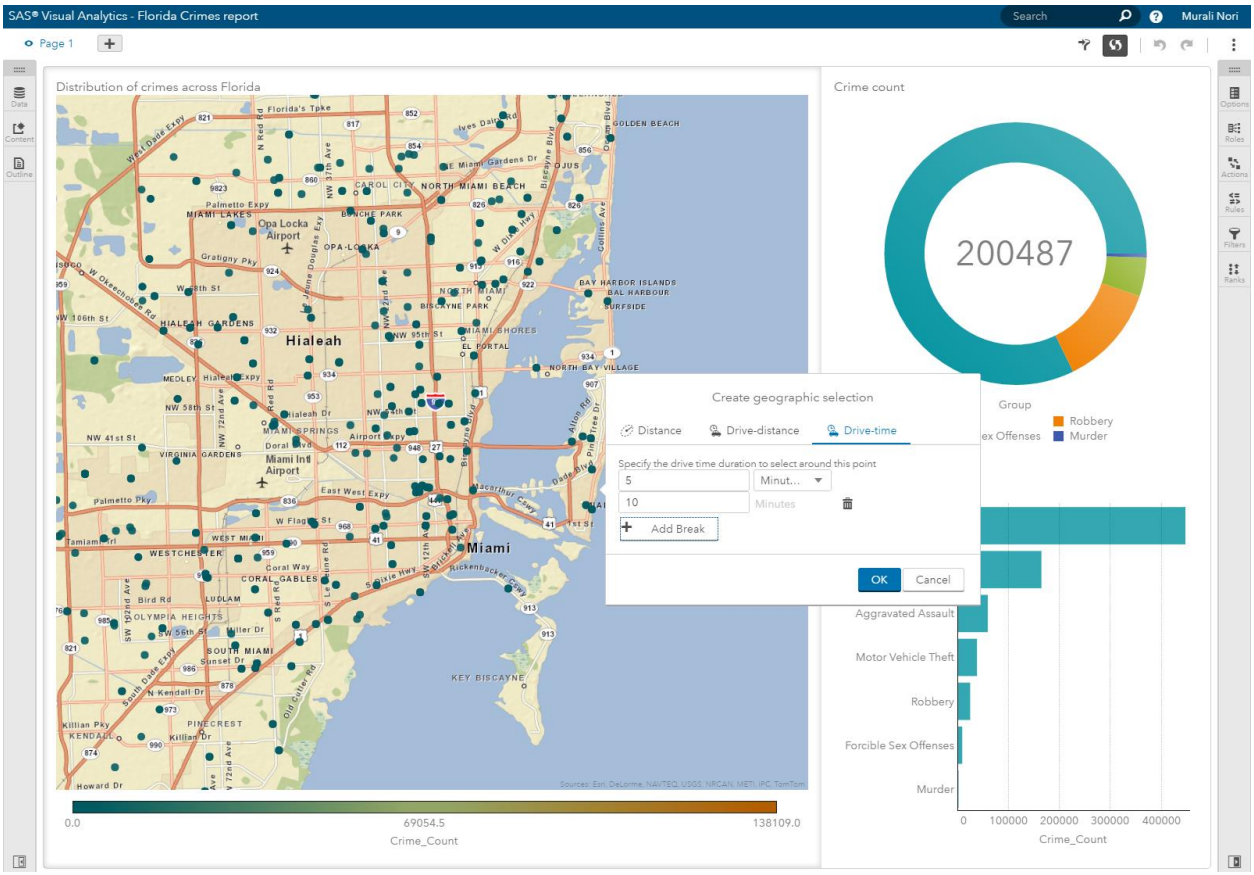

Figure 6: Drive by time to choose the time intervals

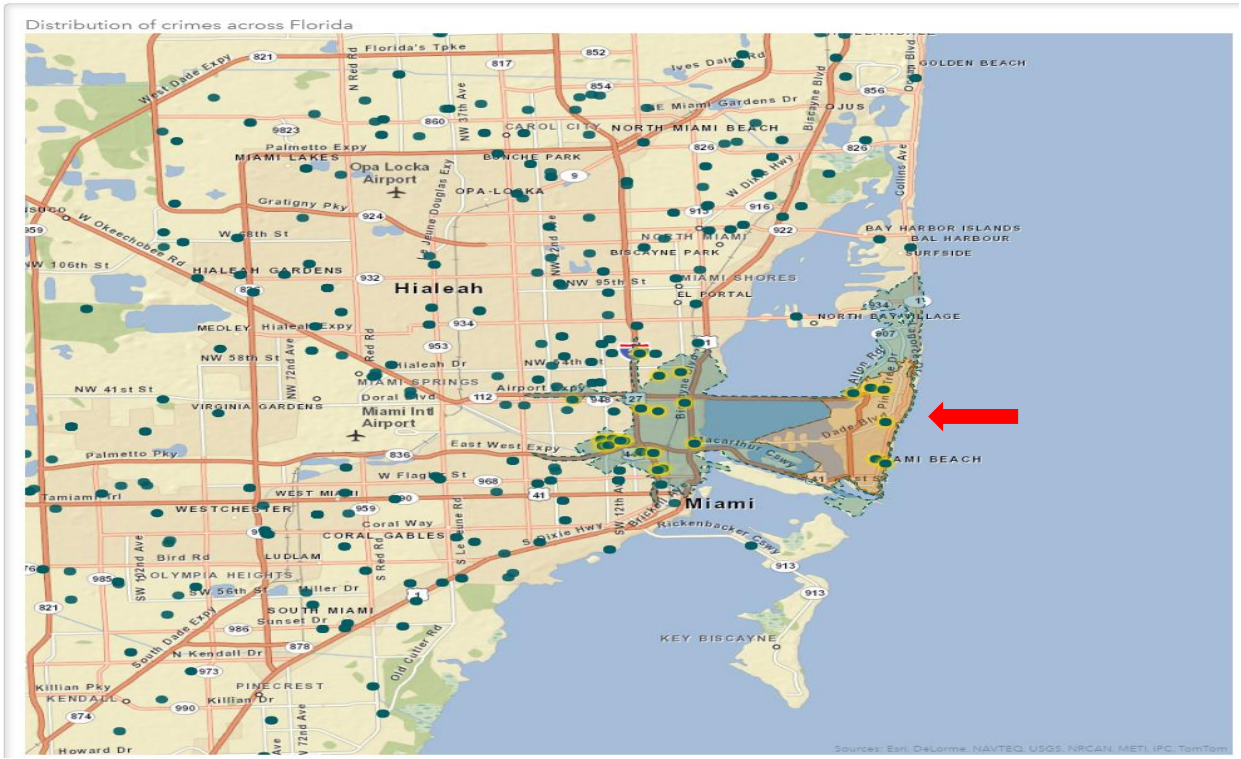

Figure 7: Drive-by-time polygon

Drive by distance:

When you select a point on a map, and choose “Drive by distance”, Visual Analytics will interact with Esri to define the polygon that meets the criteria of the distance by road that one can travel in all directions from the point.

There is an option of selecting multiple distances. For example you can select 5 Mile and 10 Mile distances. So there will be two polygons that represent 5 Mile and 10 Mile drive distances. They are shaded differently.

Users can also select either miles or kilometers.

Refer to figure 8

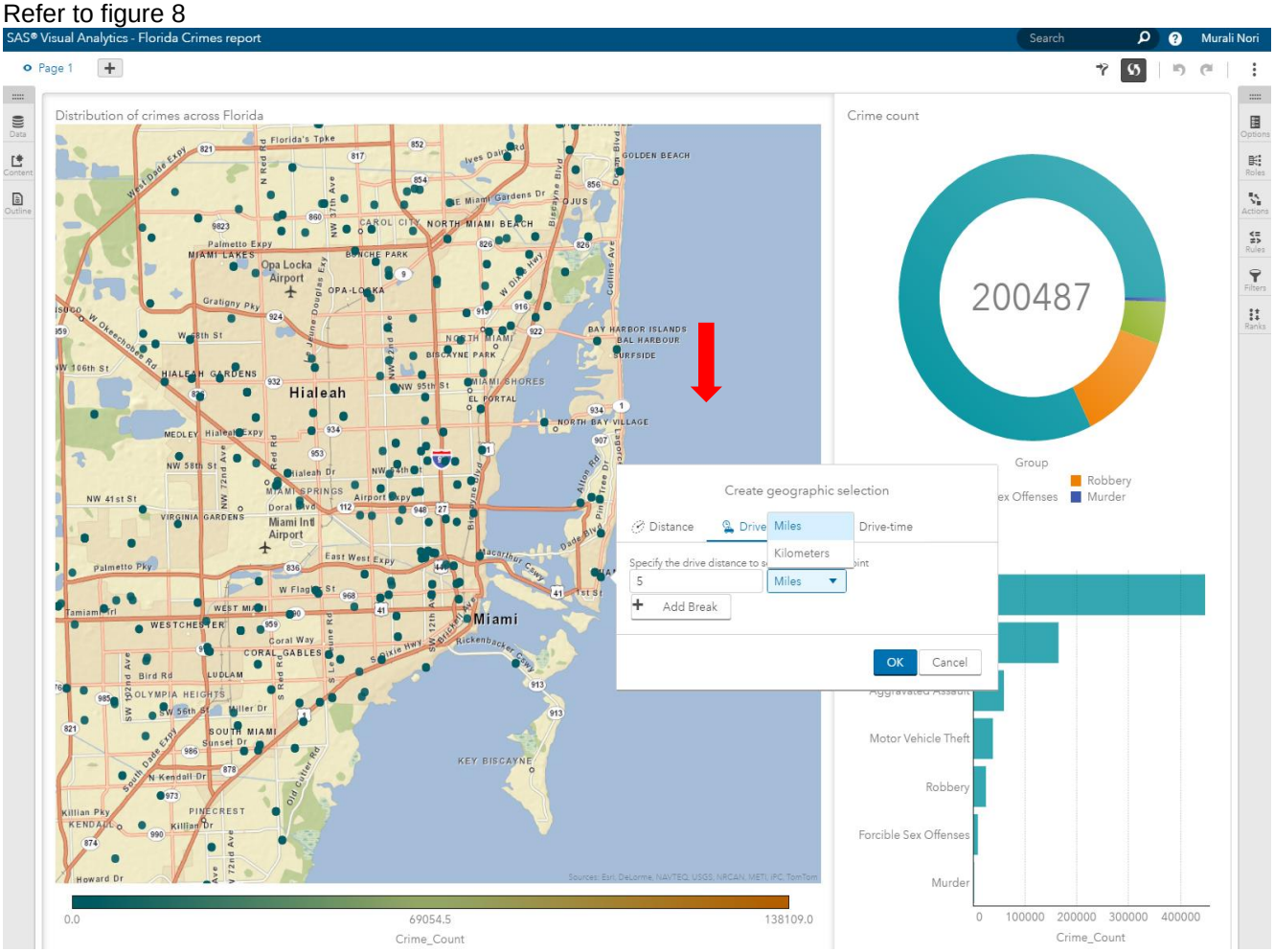

Figure 8: Drive by distance options for choosing the distance

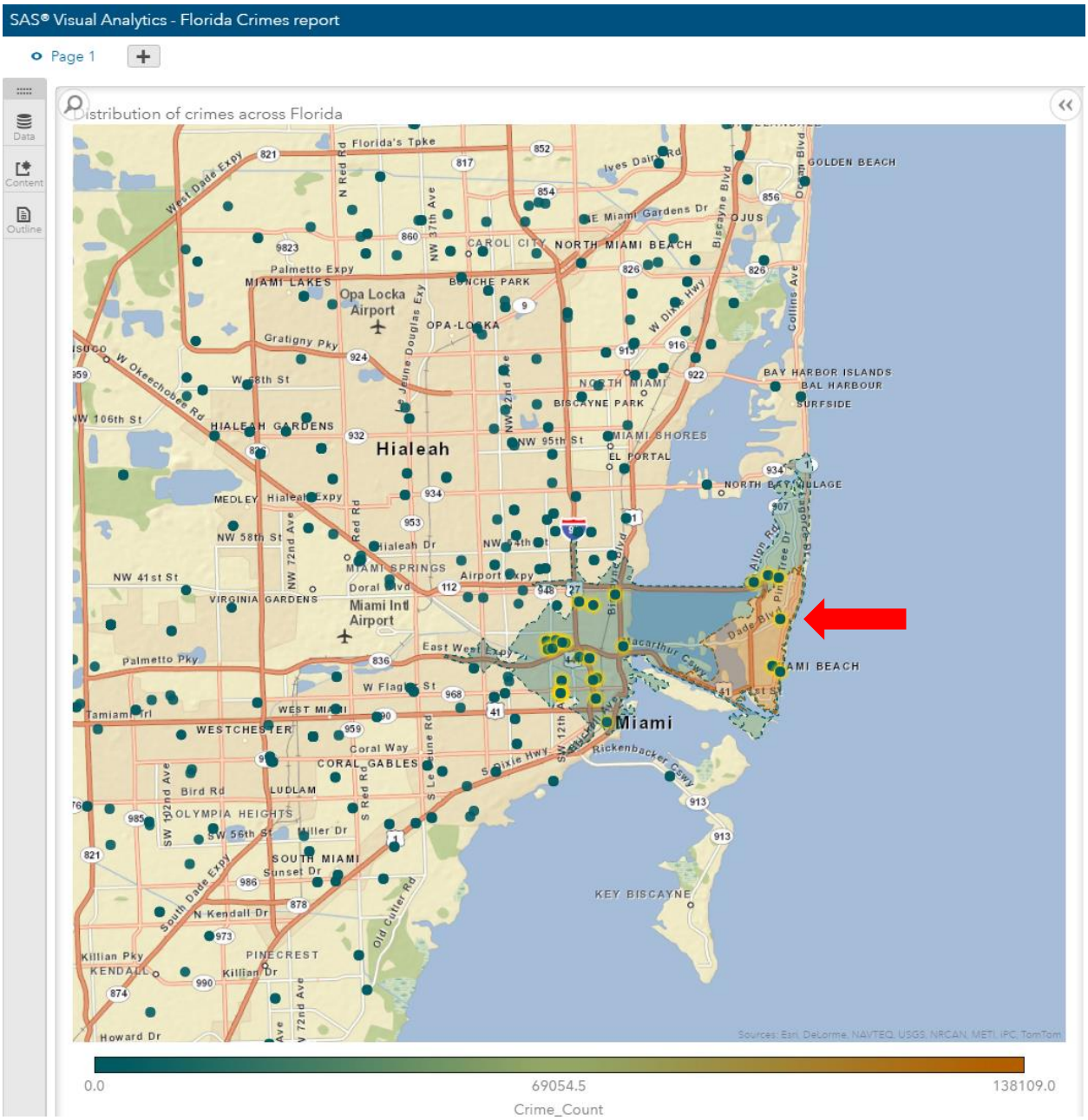

Figure 9: Drive-by-distance polygon

Drive distance "as crow flies":

You can select a point on a map and distance. A circle will be drawn on the map at that selected point. This circle represents the distance "as a crow flies", meaning in a straight line.

CONCLUSION

Location information will be playing a big role in the Business Intelligence and big data analytics. When location data is combined with demographic data, the business data is enriched.

SAS Visual Analytics with a combination with Esri provides a seamless experience for business users and allows the use of analytics with big data.

REFERENCES

SAS Visual Analytics

Esri ArcGIS Online

ESRI. ESRI ArcGIS Online. 2017. Available http://www.esri.com/software/arcgis/arcgisonline.

ESRI Demographics. ESRI ArcGIS Online. 2017. Available http://doc.arcgis.com/en/esri-demographics/.

ESRI Demographics Global Coverage. ESRI ArcGIS Online. 2017. Available http://www.esri.com/data/esri_data/explore-data.

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