

GIS Used Predictive Analytics for Customer Production In Insurance

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ABSTRACT

These days in the area of Geographic Information Systems (GIS) has given rise to sophisticated scientific techniques for collection, analysis and visualization of location based data. The GIS analysis processes are used to expose some critical patterns of occurrences. Due to inaccurate analysis and covering of insurance risks in the area, many companies have closed down prompting the Insurance Regulatory Authority (IRA) set up maximum and minimum premium rates on insurance risks. The set premiums discounts are given to the insured based on records of their yearly claims. The major problem here is that the rates cover the entire nation without considering the distribution of risk in various regions. The objective of the paper is to show that predictive analytics is a combination of tools and techniques that enable organizations to identify patterns in data that can be used to make predictions of future outcomes. In industry, predictive analytics typically take the form of projecting models that are used to drive better decision-making. They make measured patterns to identify risks and opportunities using Geographic data, demographic, web-based, historical, text, sensor, economic, and unstructured data. These powerful models are able to study multiple factors and forecast outcomes with a high level of accuracy. Geographic Information System (GIS) is vital talent and GIS is diverse technology with combination of GIS as domain skill in addition to the other business skills like Insurance, Utilities, and Retail etc. A prescriptive insurance rating model was then developed that uses generated risk areas to calculate different rates for auto insurance premiums for the relevant regions. This research shows that GIS techniques can be used for better visualization of risk at a given location for accurate risk analysis and agreement.

Keywords: GIS, Hot spot analysis, Auto Insurance Risk, Spatial Analysis, Projecting analytics, Prescriptive Auto Insurance Assessment Model

Received 27.12.2018

Revised 19.01.2019

Accepted 01.03.2019

CITATION OF THIS ARTICLE

Balakrishnan.M.and Ilanthirayan. GIS Used Predictive Analytics for Customer Production In Insurance.Int. Arch. App. Sci. Technol; Vol 10 [1] March 2019 : 89-94

INTRODUCTION

The predictive analytics is a combination of tools and techniques that enable organizations to identify patterns in data that can be used to make predictions of future outcomes. In business, the predictive analytics usually take the form of predictive models that are used to drive better decision-making. They make measured patterns to identify risks and opportunities using Geographic data, demographic, web-based, historical, text, sensor, economic, and unstructured data. These powerful representations are able to consider several factors and predict outcomes with a high level of precision. Geographic Information System (GIS) is vital talent and GIS is diverse technology with combination of GIS as domain skill in addition to the other business skills like Insurance, Utilities, and Retail etc. GIS is an ever-expansive far-reaching discipline. There is a difference between GIS software and GIS. In most cases when people refer to a GIS, they are referring to an integration of a variety of software from a variety of disciplines. GIS has an academic, intellectual, and theoretical background based on geographical theory and computer science. GIS is a

dynamic system of relationships between vast arrays of disciplines. GIS is a blend of many existing disciplines, including mathematics, history, engineering, and geometry and computer science.

MATERIAL AND METHODS

The use of Geographical Information Systems and tools has greatly helped and improved the preparation of crime maps, which visually identify reported illegal activities and help to analysts detect spatial and historical crime patterns and trends. The analysts can also use GIS tools to overlay mapped law breaking data with a variety of non-crime data such as population density, revenue and land use (e.g., the location of schools or alcohol stores in an area). These composite map views help law enforcement agencies gain a well understanding of the factors that give rise to crime and devise more effective response or justification strategies. Inside predictive policing arrangements, the GIS component can be utilized to geocode information (i.e., to assign geographic coordinates, usually expressed in latitude and longitude values, to data inputs so that the data can be displayed on a map). In the wake of geocoding, the GIS component can also be used to imagine raw data, provide a basis for subsequent analysis and forecasting and create maps that show the results of analysis and forecasting. For Insurance companies/ businesses are using GIS mainly in following areas are:

- Strategic Planning:
- Demographic Analysis
- Competitor Analysis
- Agent sites identification
- Special projects
- Aggregate risks by ZIP Code, county, or around a given location such as a fault line or coast line
- Identify overexposed and underdeveloped areas
- Catastrophe Analysis
- Risk Impact Analysis
- Use of historic data using GIS simulations for future Catastrophe impact predication. Example: Hurricane Andrews, Sandy etc.
- Claims and Claim Analysis
- Locate customers and claims
- Visualize damage zones
- Create evacuation routes
- Create incident boundary maps
- Catastrophe Territory Mapping
- GIS helps claims to evaluate the impact on their policy holders to expedite services where needed.
- GIS-enabled mobile devices can efficiently locate customers and help in collecting important details needed for settling claims
- Risk Management
- Identify areas of peak loss potential
- Understand the true spatial distribution of risk
- Segment high-risk policies by geographic sales region and territory
- Manage the different rules and possibilities for determining risk and rates that exist for different states, provinces, and countries
- Identify the types of claims most likely to be made in given areas, and develop prevention plans
- Map areas prone to fraud and develop prevention plans
- GIS helps insurers to create hazard maps and threat maps
- Underwriting
- GIS can be used to provide assistance in underwriting non-traditional risks, such as terrorism exposure accumulation, volcano and lava flow analysis, brushfire risk quantification, and hurricane risk visualization
- GIS allows modeling of peril types like earthquake & fire-following, hurricane, tornado &

hail, sinkholes, brushfire, storm surge etc and allows multi-peril exposure analysis for effective policy generation

- Predictive modeling along with the peril models build using GIS allows underwriter makes policy decisions.
- Reinsurance
- Market Development
- Creative in identifying new markets
- Serving underdeveloped markets
- Acquiring and retaining customers
- Knowing exactly where emerging markets are located
- Reevaluating markets as conditions change
- Performance Predictive Modeling
- New Agent location based on Geography as well as competitor locations
- Location based comparison and agent performance analysis.

RESULTS AND DISCUSSION

GIS in Customer Production

Insurance companies are using advanced GIS analytics using following methods:

Hot Spot analysis: Insurance hotspots are the density maps showing areas are having insurance company losing business. This density map allows identify statistically significant spatial outlier, clusters and trend over time. In addition to this, these maps effectively analyze customer movements and responsible factors.

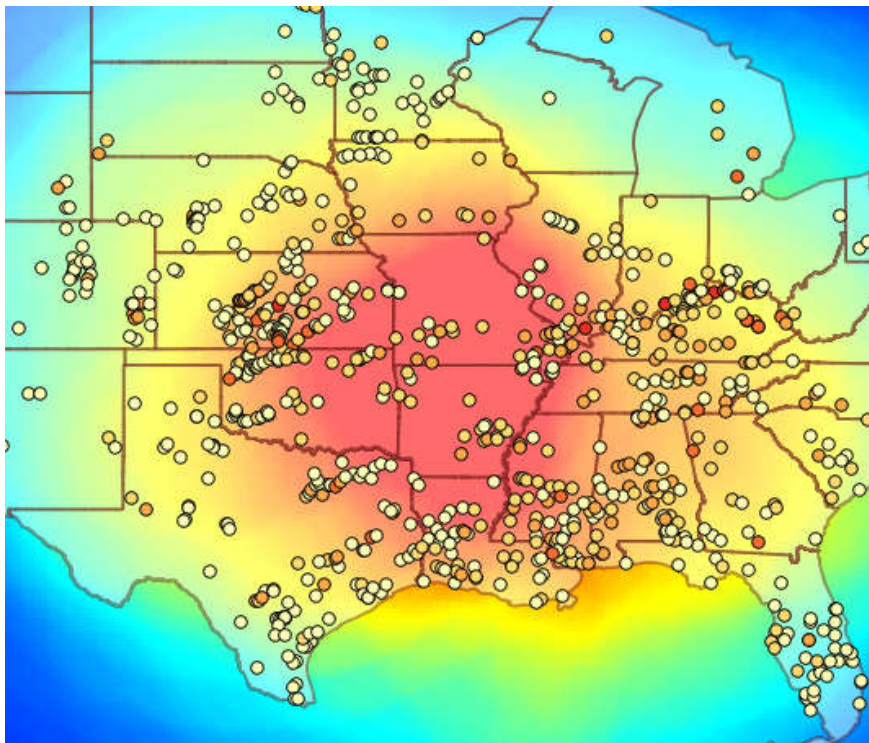


Figure: 1 Hotspot Map showing customer loss area

The above hotspot map indicates an Insurance company is losing business mainly in 4 US states of OK, KS, MO, and AR. Drill down analysis of these shows, patterns to zip code level. The drill down analysis also shows competitor locations and potential location for adding new agents.

Advantage of Hot spot maps:

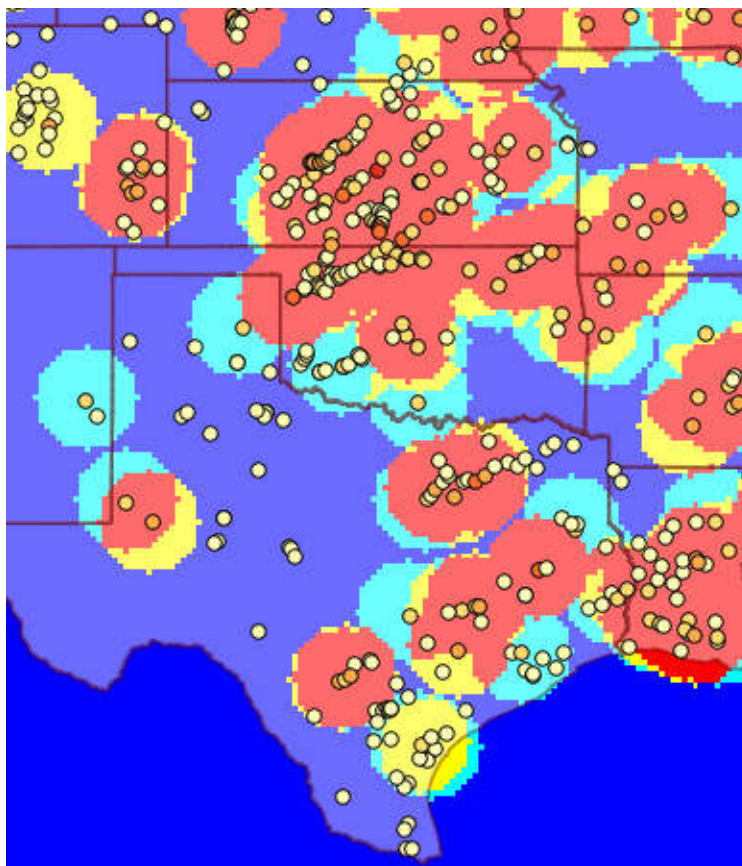


Figure:2 Drill down Analysis on Hotspot map

This analysis describes how geographic information system (GIS) technology can be part of a more expedient insurance claims process. GIS is a key component in modernizing the information technology (IT) of many organizations. By leveraging the data management, analysis, and visualization capabilities of GIS, claims adjusters are empowered to deliver services more efficiently. The Modernizing insurance information systems to facilitate more efficient business processes requires geographically referenced information. The science of geography recognizes that almost everything that exists can be described in terms of its location. A standard framework of spatial coordinates to communicate and relate the placement of people, things, and events can be applied to anything, wherever that may be. GIS provides a spatial baseline that is used for storing, analyzing, and communicating almost every type of data. GIS can supply a structurally coherent common ground for decision support mechanisms.

Place matters in the insurance claims process. Knowing where helps insurers better understand how to respond to customers. Carriers can make more timely decisions by understanding the location of a claim, and knowledge of exposures and other data about location ensures that they have adequate resources available to service their customers at a time when they are needed most.

Geographically enabled IT systems coupled with appropriate GIS technology provide claims insurance agents with enhanced capabilities that may be leveraged throughout many business processes. Claims insurance agents stand to benefit profoundly from the increased application of location intelligence through GIS technology.

Problem of Auto Insurance

The Motor insurance is designed to provide cover against losses and liabilities that the driver may suffer in the event of an accident, theft or certain other events relating to their vehicle. It provides financial compensation to cover liability for any injuries caused by the driver or owner of a vehicle to other people or their property.

Typically, ZIP codes and parcel data are used to define territories and establish automobile insurance premiums. However, ZIP code demarcation was designed by the U.S. Postal Service to help deliver mail efficiently. It was not designed to reflect homogeneity of risk

characteristics within a ZIP code. Many times, that results in huge differences in premium for people with similar overall risk factors who live on the same street but on opposite sides of the location and parcel area line. GIS (geographic information systems) can help overcome this problem using spatial smoothing and clustering techniques to develop rating territories.

Spatial smoothing uses data from all areas within a set radius from a specific location, weighted by its distance to the center, to achieve the desired level of credibility and to reduce sampling error. Clustering techniques can then be used to develop new rating territories. In addition to its use as an effective analytical tool, GIS is a great communication medium for visualizing analytical results on a map and reaching a wider audience.

GIS can provide the following Protection:

- Timely identification of provider and client fraud.
- Increased referral compliance for clients through maps and directions.
- Improved quality of geographic data to provide policy and practice decision support.
- Time and money saved by correcting wrong addresses.
- Time and money saved on more efficient routing of adjusters in the field after a disaster.
- Improved call center efficiency using reverse geocoding to identify caller locations.
- More efficient routing of adjusters.
- Early identification of significant issues after a catastrophe.
- Integration of a variety of third-party and externally collected data from many organizations to support the claims process.
- Eligibility determination and Address standardization.
- Referral (closest option, options within a distance range or area, options on a route)
- Access to services (including performance measures, network analysis, and service area definition)
- Trend analysis and detection
- Fraud detection

CONCLUSION

The important underwriting application for GIS is to predict best policyholder contact on-time. Many GIS applications incorporate drive-time simulation algorithms to analyze spatial relationships between locations based on drive time and distance. This can also be used to model an area's commute distances, which can then be used to develop optimum phone contact strategies. Using GIS mapping tools, it has been shown that in metropolitan areas, phone contact rates in the evening decrease with the distance from the downtown. This is due to longer commute times to the suburbs. In areas like New York City, this has a major impact to knowing when a policyholder will be home can dramatically improve an insurer's contact rate and encourage cost-efficient contact policies.

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