The State of Big Data and Analytics in General Insurance

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Agenda

- Definitions
  - Big Data
  - Predictive Analytics
- Sources of Data
- Analytics Methods
- Applications

Definitions

Big Data

Then…

…and Now

Big Data

- Volume
- Velocity
- Variety

Predictive Analytics

- **Analytics**: the **science** of **logical** **analysis**
- **Analysis**
  - the separating of any material or abstract entity into its constituent elements
  - this process as a method of studying the nature of something or of determining its essential features and their relations
- **Science**: technical process (modeling)
- **Logical**: reasonable, to be expected
- **Predictive**: future usefulness

Sources of Data

Sources of Data

Social Media

Credit Score

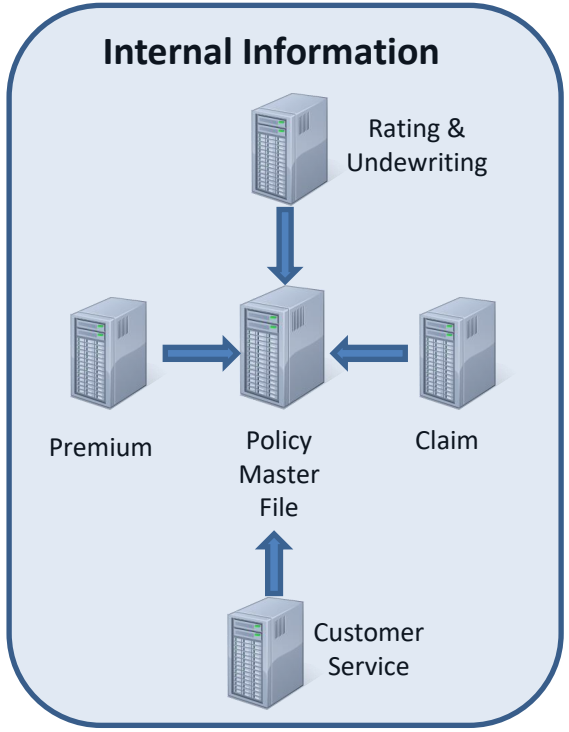
CARFAX VEHICLE HISTORY REPORTS

Vehicle History

Connected Home

Demographic Data

Competitor



Census

Telematics

Weather

Geographical Location

Internet of Things

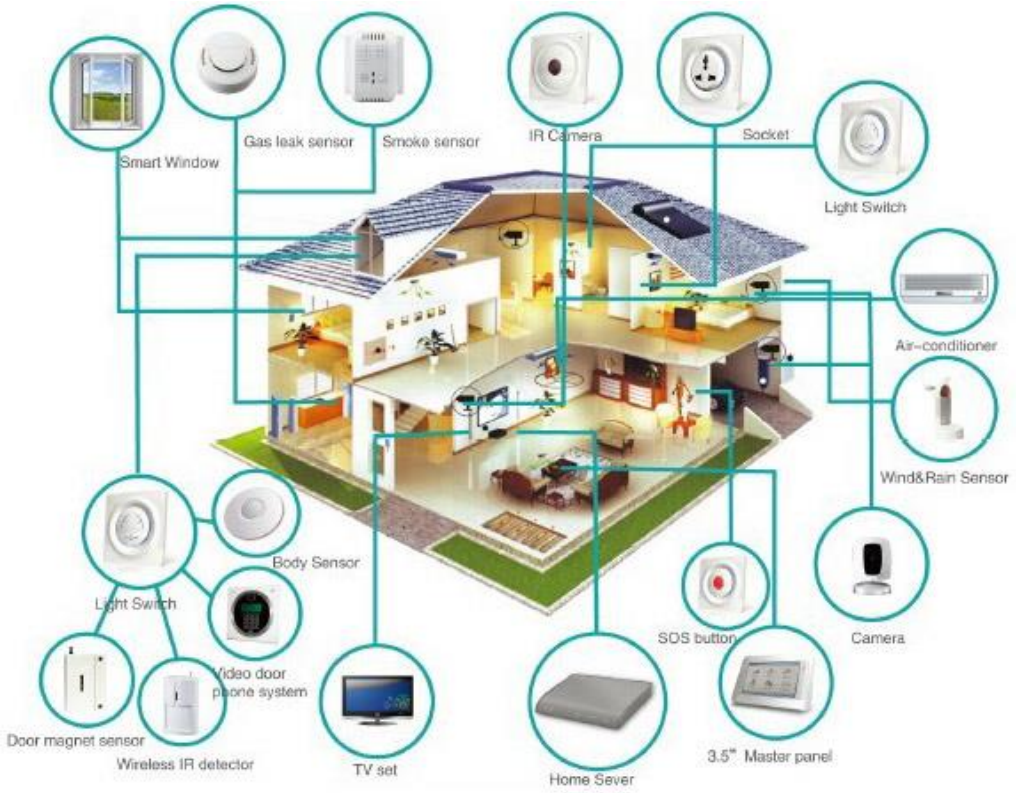
Usage Based Insurance

Ohio Mutual Insurance Group

metromile

SWD
SMART WHEEL DRIVE

Connected Home



Data Items

- Home usage/access (window and door activity)
- Home security armed/disarmed
- Remote vs. direct access
- Water usage
- Leakage detection
- Smoke alarm
- Carbon monoxide detector
- Thermostat settings
- Appliance usage
- Vacancy/occupancy
- Remote door lock/unlock
- Lights

Data Insights

- Water leakage
- Vacancy/occupancy
- Theft/intrusion
- Early fire detection
- Appliance malfunction
- Freezing pipe potential

Connected Home

A **connected home** is networked to enable the interconnection and interoperability of multiple devices, services and apps, ranging from communications and entertainment to healthcare, security and home automation. These services and apps are delivered over multiple interlinked and integrated devices, sensors, tools and platforms. Connected, real-time, smart and contextual experiences are provided for the household inhabitants, and individuals are enabled to control and monitor the home remotely as well as within it.

Technologies

- **Networking:** Familiar home networking technologies (high bandwidth/high power consumption), such as Multimedia over Coax Alliance (MoCA), Ethernet, Wi-Fi, Bluetooth, as well as 3G and Long Term Evolution (LTE), are complemented with low-power consumption networking standards for devices and sensors that require low bandwidth and consume very little power, such as thermostats.
- **Media and Entertainment:** This category, which covers integrated entertainment systems within the household and includes accessing and sharing digital content across different devices, has proved to be the most prolific and contains some of the most mature technologies in the connected home.
- **Home Security/Monitoring and Home Automation:** The technologies in this category cover a variety of services that focus on monitoring and protecting the home as well as the remote and automated control of doors, windows, blinds and locks, heating/air conditioning, lighting and home appliances, and more.
- **Energy Management:** This category is tightly linked to smart cities and government initiatives, yet consumer services and devices/apps are being introduced at mass-market prices that allow people to track, control and monitor their gas/electricity consumption.
- **Healthcare, Fitness and Wellness:** Solutions and services around healthcare have proven slow to take off, because they have to be positioned within a health plan and sold to hospitals and health insurance companies. The fitness and wellness segment has strong and quickly developed ecosystems that range from devices to sports wares to apps, which integrate seamlessly with each other to create a strong customer experience.

Analytics Methods

Analytics Techniques

Supervised

- Generalized linear models
- Decision trees
- Gradient boosting
- Neural networks
- Machine Learning
- Ensemble
- Deep learning

Unsupervised

- Clustering/segmentation analysis
- Principal components
- Association analysis
- Self - Organizing Maps
- Variable clustering
- Variable selection

Considerations in Choosing an Analytics Technique

- Underlying data
- Purpose of the analysis
  - Target variable structure
  - Use of the results
  - Prediction vs. understanding
- Sophistication of user
- Trial and Error
  - Run multiple models and evaluate fit

Infrastructure Improvements

- Data storage and access
  - Internal company systems
  - External system solutions
  - Other solutions (Cloud, Hadoop, etc.)
- Processing speed
  - What used to take hours can now literally be done in seconds
- Consumption of results
  - Dashboards
  - Scorecards
  - Bridge to company systems

Applications

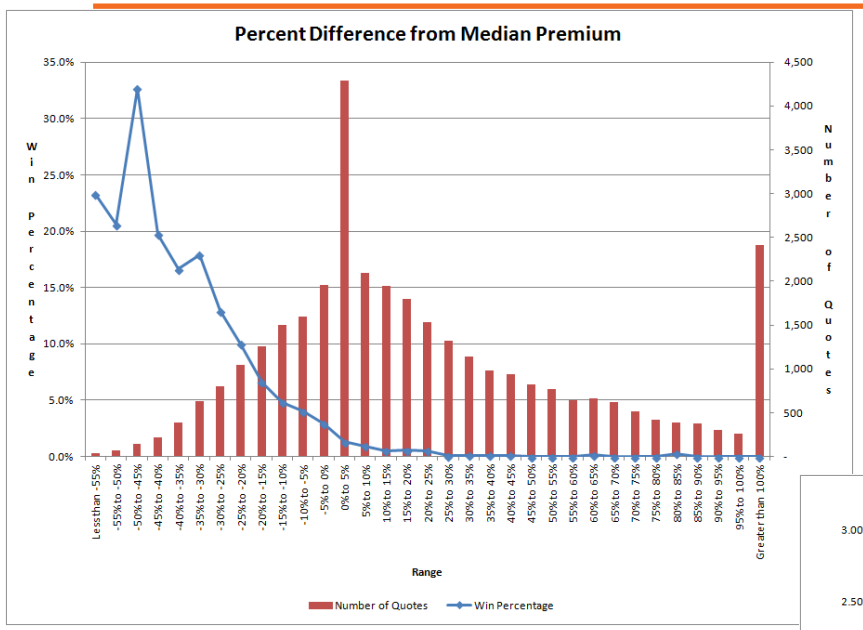
Applications of Analytics in General Insurance

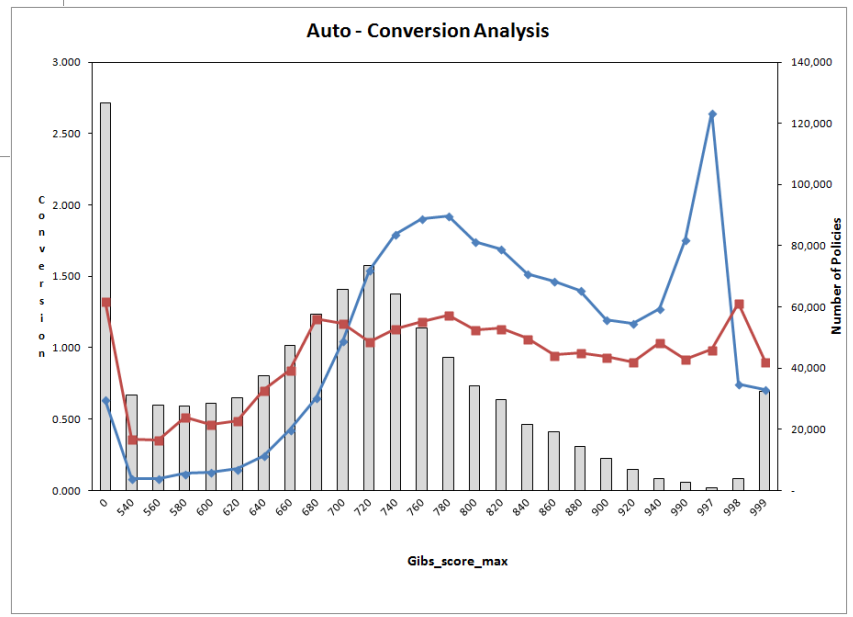
Marketing	Underwriting	Pricing	Claims
• Shopper characteristics • Marketing response • Advertising effectiveness • Retention and conversion • Policyholder characteristics development	• Straight through processing • Selection/rejection • Optimize report ordering • Vehicle inspection • Home inspection	• Rating plan development • Vehicle classification • Credit based insurance scores • Territories • Homeowner cause of loss • UBI • Customer value	• Fraud • Predict claim settlement value • Early warning indicator • Claim assignment • Evaluate service providers • Salvage and subrogation

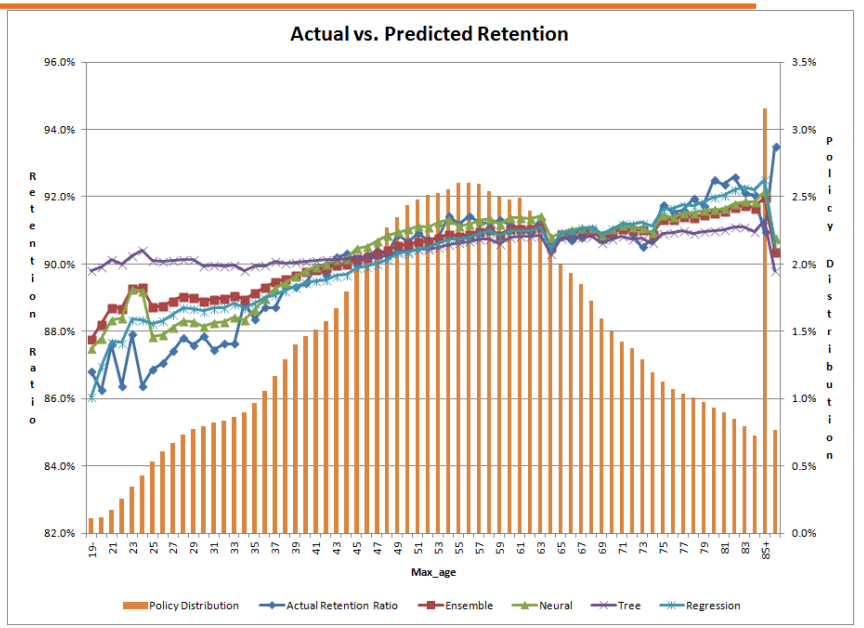
Pricing – Measuring the Impact of Price Changes

- **Business Problem**
  - Company was not realizing expected impact of rate changes
  - Needed a process in place to understand customer price sensitivity to rate actions
  - Wanted to incorporate competitive concerns into economic impact measurement
  - Desired to have a software tool to measure impact of multiple scenarios to optimize rate change action
- **Analytics solutions**
  - Retention analysis
  - Conversion analysis
  - Analysis of competitor premium differences
  - Development of economic impact software tool

Pricing – Measuring the Impact of Price Changes







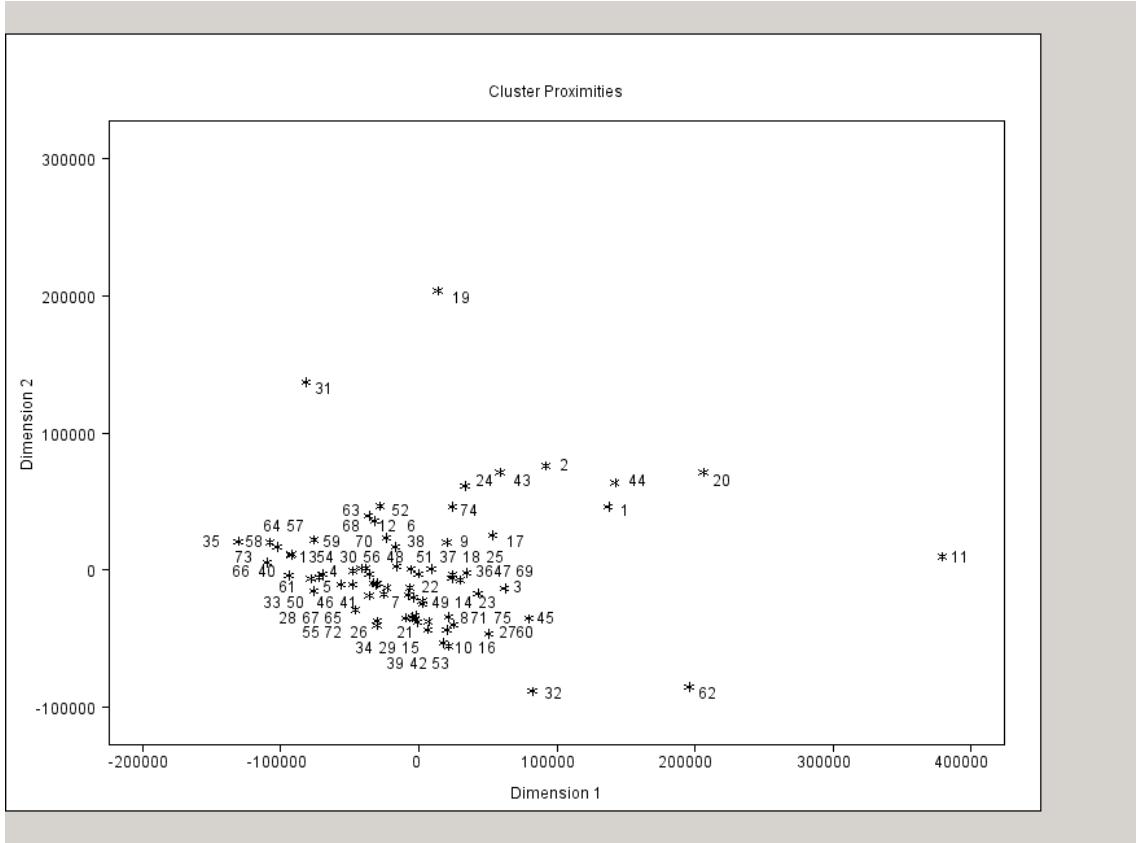
Claims – Fraud Detection Model

- **Business Problem**
  - Claim referral can be inconsistent – heavy dependence on claim adjuster
  - False positives
  - Claim adjuster may not be aware of all suspicious relationships
  - Not all historical fraud has been identified
  - Prioritization of potentially fraudulent claims
- **Multiple analytics solutions**
  - Predictive analysis of historical referrals (consistent referrals)
  - Predictive analysis of historical fraudulent claims (false positives)
  - Association analysis (recognition of claim patterns)
  - Clustering Methods (missed claims, prioritization)
  - PRIDIT (consistent referrals, prioritization)

Claims – Fraud Detection Model

- Claim values by detailed category
  - Replacement cost value
  - Depreciation
  - Number of items
  - Age
- Property characteristics (age, bathrooms, bedrooms)
- Coverage details (amount of contents coverage)
- Insured demographics (age, education, income)

Outlier Analysis – Suspicious Claims

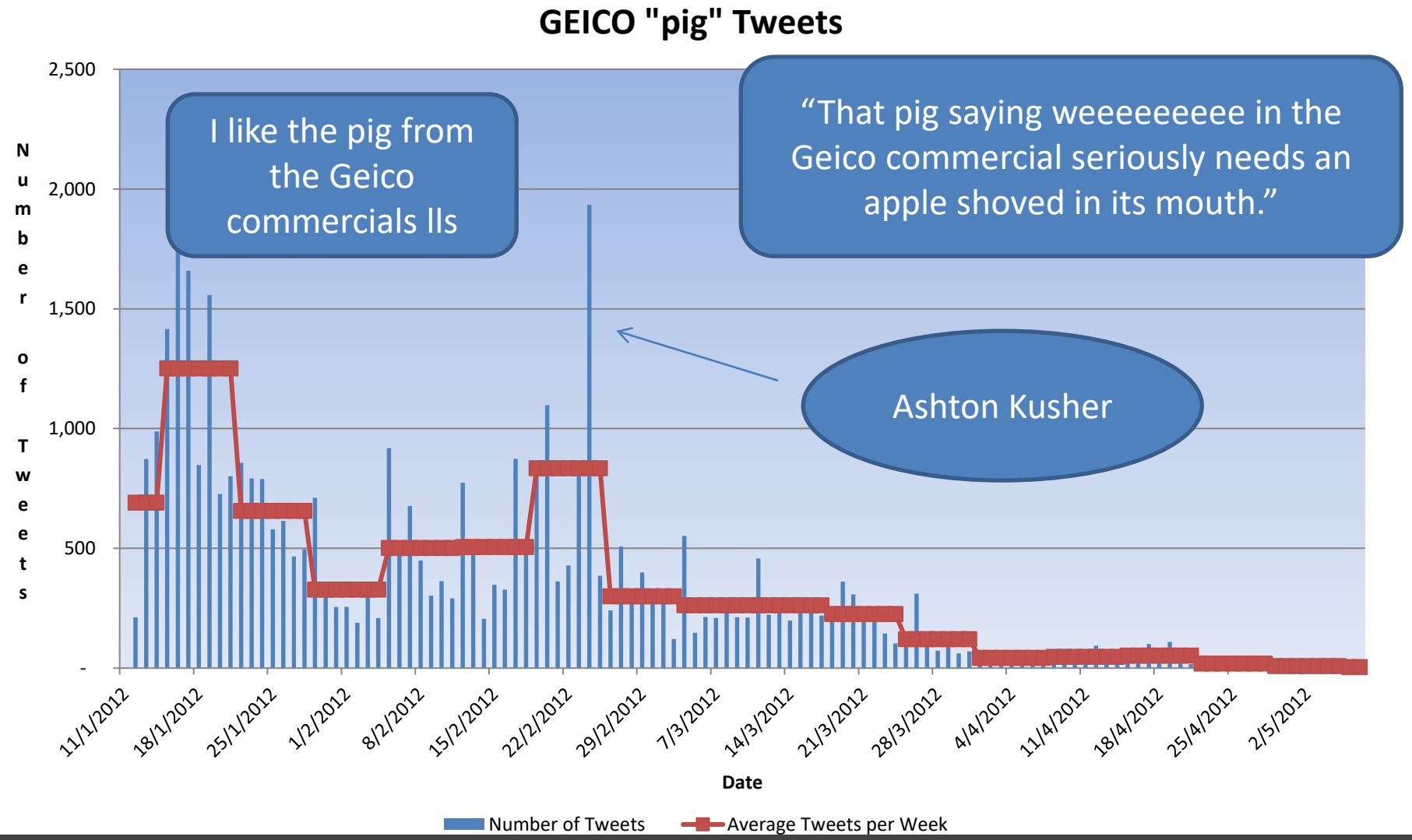


Claims – Fraud Detection Model

Factor Name	Description	Input Value
insured_kids_2	Y, N, or U	u
peril_2	Cause of Loss	Fire
public_adjuster	0 or 1	0
IMP_REP_Coverage_C	Coverage C Amount	190,500
IMP_REP_Insured_Home_Bathrooms	Number of Bathrooms	2
IMP_REP_Insured_Home_Bedrooms	Number of Bedrooms	3
IMP_REP_Insured_Home_SqFt	Square Footage	1,412
IMP_REP_Insured_Home_YearBuilt	Year Built	1973
IMP_REP_Insured_Homeowner	Homeowner (Y or N)	Y
IMP_REP_acvloss_rcttotal	Ratio of ACV Loss to RCT Total	1.13
IMP_REP_create_lag	Delay in Creating Record	9
IMP_REP_insured_age_2	Insured Age	50
IMP_REP_insured_educationlevel_2	Years of Education	12
IMP_REP_insured_homevalue_calc_r	Home Value Calculation Rounded	149
IMP_REP_insured_yearsinhome_2	Insured Years in Home	6

Suspicion Score	
Root Mean Square Error	99.7%
Distance to Nearest Cluster	99.4%
Distance from Mean	96.5%
Combined	98.3%

Marketing – Social Media Analytics



Using Big Data and Analytics to Effectively Execute Strategy

- Every company has a strategic direction, regardless of how well (or poorly) it is articulated
- There are many operational tools that are used to assist in executing this strategy
- Predictive analytics is a powerful TOOL that can be used to assist in executing strategy
- Predictive analytics can be applied in most functional areas of an insurance company
- When applied effectively, benefits can be realized regardless of where the market is in the cycle

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