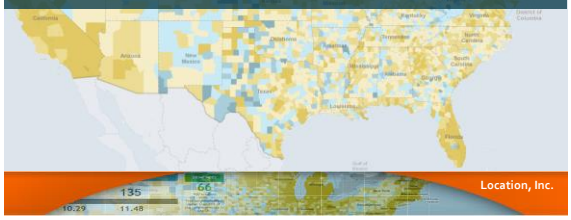
SecurityGauge®

New Big Data Crime Risk Analytics for P&C Insurers

2013 CAS Annual Meeting



About Us

- 10 Years of Big Data for Spatial Analytics from parcels to places
- Led by a pioneering team of patented Ph.Ds. From Oak Ridge National Laboratory and the University of Washington, focused on location-based tools to support high-risk, high-cost decisions
- More than 25 million people & businesses served by Location, Inc. analytics and tools

Historical Use of Crime Analytics in P&C

- Flat Pure Premium across all policies based on historical portfolio-wide crime related loss experience.
  - blunt, non-surgical instrument
  - adverse selection
- Some insurers have tried to incorporate location by city, zip code or census tract into crime hazard ratings.
  - crime risk does not typically follow such arbitrary boundaries
  - result in inaccurate pure premiums

Industry Trends

- Leading insurers are moving towards address-specific, by-peril risk ratings to define and manage risk portfolio-wide.
- These data are currently available and in use for flood, earthquake and other hazards.
- Crime hazard data has lagged other spatial hazard layers in R&D.

Need for Accurate Crime Risk Information

Crime costs the P&C industry billions annually

- Inefficient premium pricing:
  - compromised profitability
  - attract higher risk policies into the portfolio
  - no competitive differentiation
- Unnecessary loss claims:
  - Typically not the highest severity loss claim type
  - Yet often the most frequent loss claim type
    - high cost to process
    - require intensive claims processing resources and personnel
    - unnecessarily consume SIU resources

SecurityGauge®: Crime Risk Using Big Data

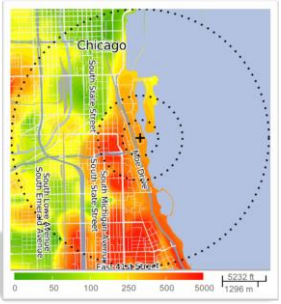
New Technology Delivers:

- Ground-breaking 10 Meter Spatial Resolution
  - More than 150 times the spatial accuracy of other products
- 92% + predictive accuracy for crime related insurance loss claims, by address

SecurityGauge®: Crime Risk Using Big Data

Spatial Accuracy breaks down risk within cities, blocks, to addresses

SecurityGauge®: Crime Risk Using Big Data



2301 South Lake Shore Drive
Chicago, IL 60616

Total Crime Risk

National Comparison Index:	213
State Comparison Index:	201
County Comparison Index:	145

Risk Ratings Defined:
0 to 5,000 Scale
100 = Average
300 = 3 times Average
50 = One half the Average

SecurityGauge®: Crime Risk Using Big Data

2301 South Lake Shore Drive Chicago, IL 60616

National Comparison Index:

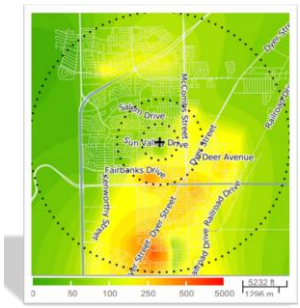
Year	Total	Burglary	Larceny	Vehicle Theft	Armed Robbery	Violent (All)
2008	206	83	174	269	282	190
2013	213	117	228	295	298	183
2018	215	149	270	322	323	175

100 = Average, 300 = 3 times Average, 50 = One half the Average

What SecurityGauge® is Not

- No Red Lining
  - No data on race, ethnicity, ancestry, language, religion, or any protected class
  - Nothing about individual persons, households or housing structure at the address.
  - 180 degrees away from using credit scores.
- Crime is a spatially expressed risk, just like flood, hurricane, or hail
- The crime risk "climate" rather than the "weather today"

SecurityGauge®: Low income ≠ high crime

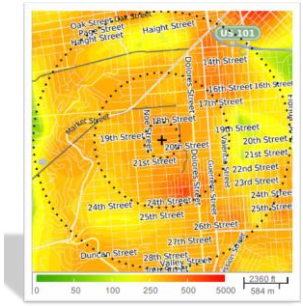


5500 Sun Valley Drive
El Paso, TX 79924

Total Crime Risk: 93

Neighborhood Attributes:
- Lower income than 91% of the US
- Median home value of $75,952

SecurityGauge®: High income ≠ low crime

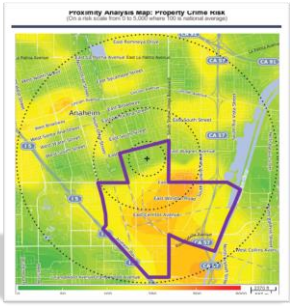


310 Cumberland St
San Francisco, CA 94114

Total Crime Risk: 234

Neighborhood Attributes:
- Higher income than 94% of the US
- Median home value of $1.68M

What Makes SecurityGauge® Unique?



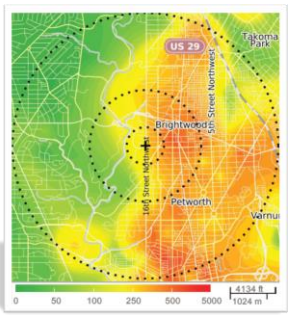
150X Spatial Resolution

- Here a Census Tract boundary is overlaid on top of a SecurityGauge® Total Crime hazard map
- No artificially abrupt changes in risk
- Risk varies within polygon
  - Min = 61
  - Max = 259
  - Census Tract Wide Average = 139

(spot risk values before ring calculation is applied)

SecurityGauge® : Exploring Predictive Accuracy

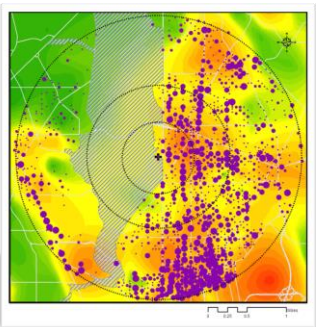
- Use point locations of crimes to check accuracy of models
  - Models based on conditions at site
  - Validate with points where available from PD
  - Check point pattern
  - Check risk calculation
- 1600 Kennedy Pl NW Washington DC
  - Total Risk: 235
  - Violent Risk: 267
  - Crimes per block available from municipal police



SecurityGauge® : Exploring Predictive Accuracy

2012 Police Data within radius area
Property Crimes

1
2
3
4
5+
1600 Kennedy Pl
Park Land
Major Streets



- Heatmap shows predicted risk from our model
- Crimes from city police plotted to block midpoint
- Crimes not plotted
  - Park and transit police
  - Crimes beyond outer ring

SecurityGauge® : Exploring Predictive Accuracy

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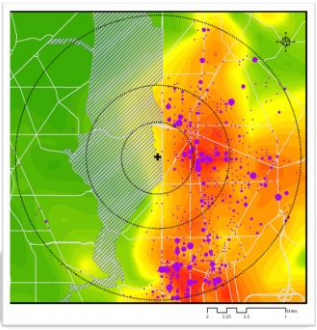


- Violent crimes more concentrated
  - Almost all crimes occur in areas of predicted high-risk
- Strong validation for our geographic precision
  - Both property and violent distributed as predicted

SecurityGauge® : Exploring Predictive Accuracy

Ring	Miles	Pop.	Murder	Rape	Robbery	Assault	Total Violent	Violent Rate	Violent Risk
1	0.5	5161	0	0	39	13	52	10.08	262
2	.85	16664	0	7	133	46	186	10.60	275
3	1.8	75972	5	23	372	194	594	7.58	197

- Sum crimes in each ring then convert to risk scores
  - Rate based on resident population
  - Risk levels calculated relative to nation as a whole
- Predicted Violent Risk = 267. The observed risk confirms this is a very close estimate
  - Observed 256 nearly matches prediction
  - Accuracy for more serious crimes most important since these are more reliably reported
  - < 1% probability we would have predicted this closely by chance.

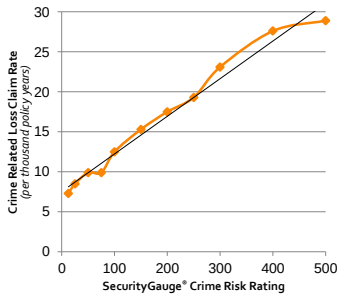
Case Study: Predicting Crime-Related Insurance Loss Claims

Test Process:

1. Insurer provided 300,000 policy-year, blind addresses to Location, Inc. with no indication as to which addresses experienced crime-related loss claims.
2. Location, Inc. appended crime risk data elements for each address.
3. Insurer then appended a crime-related loss claim indicator: 2,432 out of 300,000 addresses.
4. Predictive Ability Analyzed.

Case Study: Predicting Crime-Related Insurance Loss Claims

Correlation to Actual Crime-Related Loss Claims Exceeds 97%

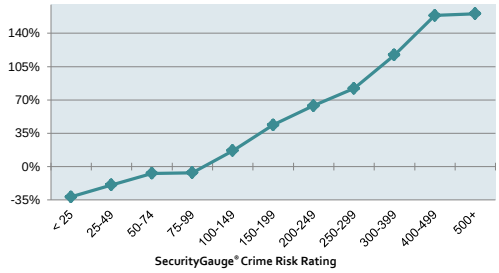


300,000 Policy Years:

Crime Risk Rating	Crime-Related Loss Claim Rates per 1,000 Policy Years
0-24	7.3
25-49	8.5
50-74	9.9
75-99	9.9
100-149	12.5
150-199	15.3
200-249	17.5
250-299	19.3
300-399	23.1
400-499	27.6
500+	28.2

Case Study: Predicting Crime-Related Insurance Loss Claims

Percent Change in Crime Related Pure Premium



Case Study: Predicting Crime-Related Insurance Loss Claims

Notes:
1: $38 = Average Pure Premium with old methods - applied to all policies regardless of actual risk
2: Pure Premiums in this plot based on an estimated average Severity of $5,000.

Case Study: Predicting Crime-Related Insurance Loss Claims

Using SecurityGauge ® For Ratemaking:

- Price policies with higher profitability, in-line with actual risk
- Attract lower risk policies into your portfolio
- Mitigate adverse selection
- Reduce demands on claims departments
- Use SIU for higher priority cases

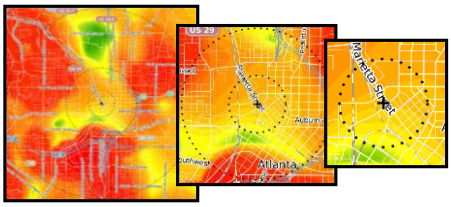
SecurityGauge® : Access and Coverage

Coverage: The Crime database covers every piece of terra firma in the U.S. (every addressable address, every location in all 50 states and D.C.).

Resolution: 10 meter (via web services); individual blocks (fully installed flat file)

Update Frequency: Annual

Access: Direct server-to-server, bulk processing, or available for full install as a flat file behind your firewall.



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