

About the Author



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Roosevelt C. Mosley is a principal in Pinnacle's Bloomington, Ill. office. He holds a Bachelor of Science degree in actuarial science and a Bachelor of Science degree in statistics from the University of Michigan in Ann Arbor. Roosevelt has 14 years experience in the property/casualty industry.

Roosevelt has extensive experience in the application of advanced statistical modeling techniques to insurance processes. His experience in predictive modeling applications includes rating and underwriting plan design; homeowners by-peril analysis; claims settlement value modeling; claims process evaluation modeling; custom credit-based insurance scores; enhanced vehicle classifications; territory boundary redesigns; policyholder retention analysis; and new business conversion analysis.

Roosevelt is a Fellow of the Casualty Actuarial Society and a member of the American Academy of Actuaries. He currently serves on the CAS Board of Directors and the Strategic Planning Committee. He is also a member of the board of directors for the International Association of Black Actuaries.

Upgrading the Claims Process through Predictive Modeling

By Roosevelt C. Mosley, FCAS, MAAA

The claims process presents critical opportunities for insurers to positively interact with customers and ensure claims are being handled appropriately. Insurers can improve that process by turning to predictive modeling to improve effectiveness and efficiency.

Predictive modeling enables insurers to more effectively analyze the claims process, ensure reasonable payouts, honor contract terms and improve customer satisfaction.

As a result, insurers can see real and immediate improvements in their bottom-line results.

Unlike traditional approaches to analyzing the claims process, predictive modeling enhances the process by applying advanced statistical techniques to reveal events that affect claim outcomes. Predictive modeling gathers all information known about the claim and develops models using historical data to determine which characteristics are important and to what degree.

The ultimate goal of predictive modeling is to gain new information to support better decision-making.



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This process will both confirm already-understood characteristics concerning how claims develop and challenge conventional wisdom.

Processing Claims

Every step in the process, from filing a claim to its resolution, provides an opportunity for improvement. The claims process begins when an insured files a claim for a loss. The insurer then determines claim legitimacy and

actions necessary to fulfill the contract and satisfy the insured. Depending on the claim's complexity, the process may involve several parties, such as claims adjusters, automobile repair shops, doctors and attorneys. Once the claim is investigated and adjusted, payments are made. When all parties are satisfied, the claim is closed.

Applying Predictive Modeling

The first step in applying predictive modeling to the claims process is to define the objective. This leads to a question or questions the insurer is trying to answer. After identifying and analyzing data appropriate to the objective, the results of the model are put into action.

To develop a predictive model, the defined question or problem becomes a dependent variable. Example questions could be: What characteristics are more likely to lead to larger ultimate claim settlements? Which Chicago-area doctors best address soft tissue back injuries? Or, what factors impact lost time from work for an injured worker? Once the question is framed, the next step is to determine possible answers. Known as independent variables, they might include location, cause of injury, number of treatments and total payments.

Identifying and capturing data is one of the largest challenges in any predictive modeling application. While a lot of useful claim information is typically collected, it is important to determine if the data is part of the electronic claim record or part of a claim adjuster's claim file notes. There are many types of data elements – from insured characteristics to geography – that can be used to support claims modeling (see sidebar).

Unleashing the Power of Predictive Modeling

There are a variety of claims predictive modeling applications. While it would be great to achieve the benefit of all applications at once, it is often more effective to focus on a limited number of applications, implement them well, and then define and implement additional applications. Three initial areas to focus on are claim payments, service providers and procedures.

The ultimate settlement value of a claim is a logical place to start because there is generally a large amount of historical data concerning how different characteristics impact claims payments. This data can be used to develop a claim settlement value estimation process. This analysis uses a database of ultimate claim amounts, associated claim characteristics at the time of the report, subsequent development periods and the time to closure. Figure 1 shows an example of the characteristics for an automobile injury.

The results of the analysis can be used to develop an estimate of the ultimate claims settlement value. This initial estimate is based on the known characteristics of the claim and alters as the characteristics change. For example, even after other claim characteristics have been accounted for in a multivariate analysis, the cost of a claim nearly doubles when an attorney is involved. Predictive modeling, therefore, can be used to identify the likelihood of attorney involvement and handle the claim appropriately to ensure complete customer satisfaction.

Besides claim settlement value estimates, claim characteristics can also reveal if there is a greater-than-average likelihood

Data Elements that Can Be Used to Support Claims Modeling

- **Insured Characteristics** are usually obtained from the rating and underwriting information associated with an insured.
- **Claimant Characteristics** of the claimant will influence the claim settlement process in the case of third-party coverage.
- **Loss Characteristics** describe the loss. For injury insurance coverages, the description of injuries suffered. For property coverage, a description of property loss.
- **Geography** can have an impact if a claim ends up in court and affects factors like medical and property repair costs.
- **Time** typically affects claim settlement values and processes, including reporting and settlement lags. Time-related characteristics can usually be calculated based on dates associated with a claim.
- **Attorney Involvement** can change the complexion of the entire process depending on the nature of the claim.
- **Claim Service Networks**, such as auto repair shops, medical service providers and attorneys, can usually be found in the claim file.
- **Claims Adjusters** responsible for the claim can impact a claim based on their previous experience.

that the claim will develop into a large loss. Based on this analysis, such claims could be handled with more attention early on to mitigate the amount of the loss. For example, the longer a claim has been open, the more likely it is to settle for a large value, even when adjusted for other factors such as injury type. Therefore, if a claim has been open for an extended period of time, an insurer may implement special handling procedures to resolve the claim.

The effectiveness of claims service providers can also be evaluated through data analysis. There are two types of providers. Internal providers include claim processors and claim adjusters. External providers include medical networks, auto repair shops, preferred glass shops, preferred contractors and attorney networks. Since service providers will have an impact on the ultimate settlement value of a claim, they should be evaluated to determine the value added to or subtracted from the claims settlement process.

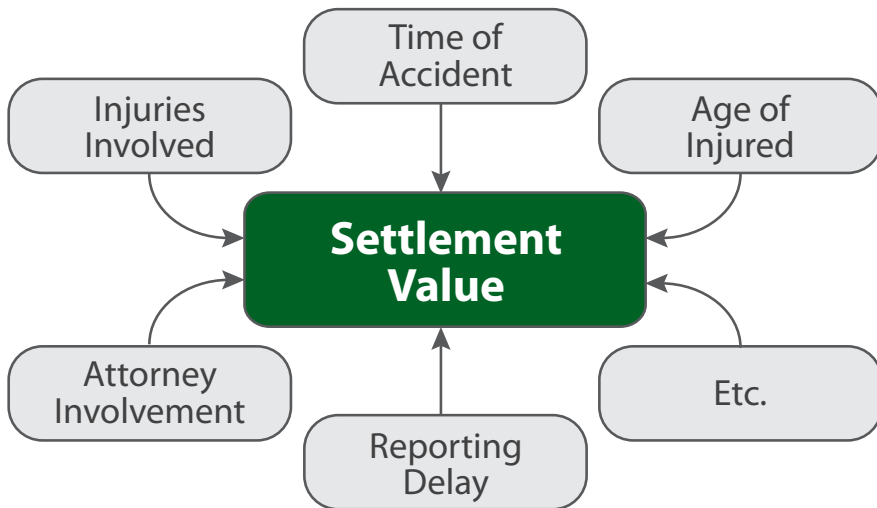
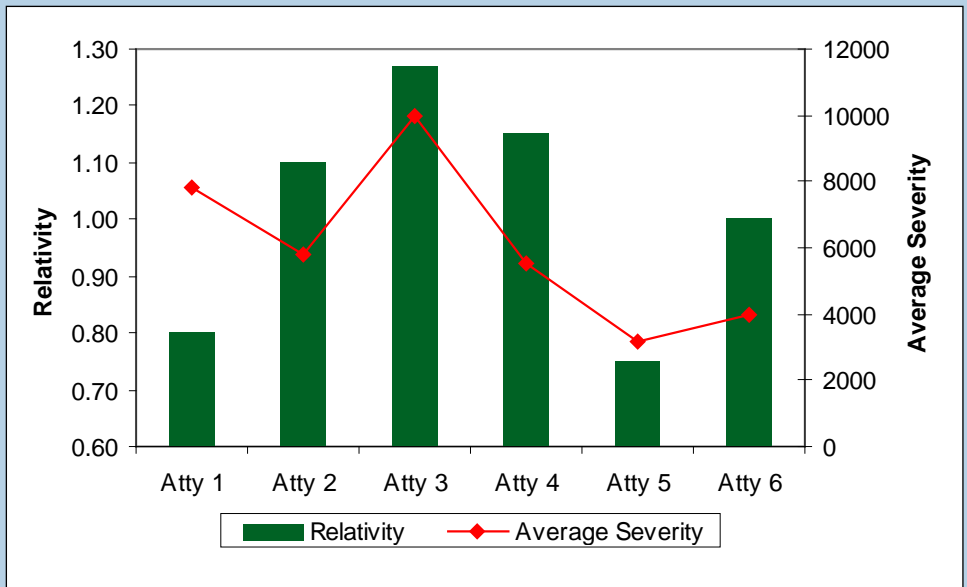


Figure 1: Predictive Modeling Characteristics for Auto Injury Claims

To perform this type of analysis, an identifier for the service provider needs to be added to the data. The providers can then be evaluated in a fashion similar to other influences in the claims settlement process. This should reveal if certain providers are adding or subtracting value from the claims process.

Figure 2: Claim Service Provider Evaluation



An example of this analysis is shown in Figure 2. The red line represents the average severity of claims associated with a particular defense attorney. In this example, Attorney 4 appears to be performing better than Attorney 1, with average severity being almost 40 percent lower.

The green bars, which represent the relative performance for each attorney after adjusting for other claims characteristics, uncover previously hidden information that leads to a different conclusion.

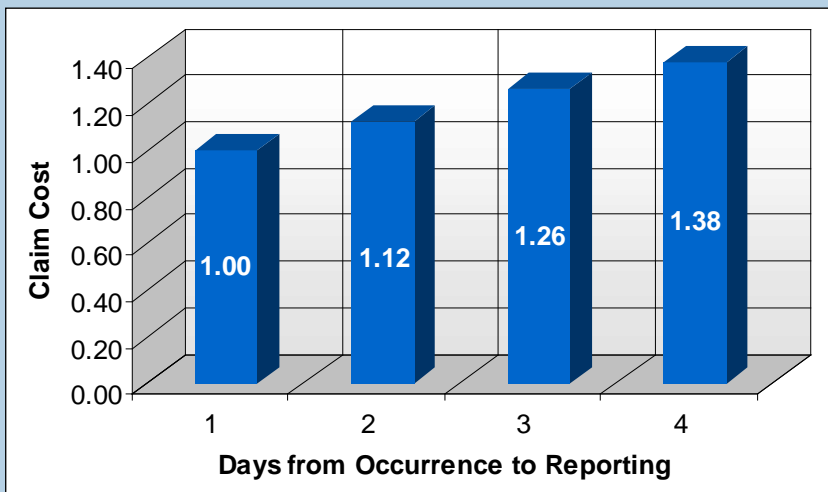
It turns out that Attorney 1 actually performs about 30 percent better than Attorney 4, all else being equal. This could be because Attorney 1 does a better job handling more complex claims.

Claims procedures – including managing lag time, understanding the change in the nature of a claim and detecting claims fraud – can also be analyzed to show their ultimate impact on claims settlement.

In general, the longer it takes to start the next step in the claims process, the larger the ultimate settlement. Once a claim has been reported, there can be a lag between the time the incident occurs and when it was reported. The time it takes the insurer to contact the insured to settle the claim represents another possible lag.

Figure 3 shows how the cost of a claim can increase significantly with just a short delay in reporting. This is true even when considering different injury types and other claim characteristics.

Figure 3: Report Lag



Predictive modeling can also help identify the triggers that affect a claim. The process has the flexibility to allow a more-complicated-than-normal claim to be sent to the appropriate claims personnel as soon as possible, which significantly reduces duration and unnecessary expenses.

For example, in jurisdictions that have personal injury protection auto coverage, there may be limitations on filing a bodily injury claim so the liability claim can be filed only if certain thresholds are met.

Considering the claim's characteristics can help establish if a claim has a higher likelihood of actually becoming a liability claim. If so, measures can be put into place to handle the claim more appropriately.

Predictive modeling can point to measures insurers can use to detect fraud. This is especially important because claim fraud represents a unique challenge to insurers due to the lack of available historical data and cross-insurer fraud information.

There are types of claims that have historically been referred to special investigation units and/or have been determined to be fraudulent. These claims, along with their characteristics, could be analyzed. The results can then be applied to future claims to identify potentially fraudulent claims.

This process, however, has potential problems. First, determining a suspicious claim is usually subjective. Some fraudulent claims are not obviously suspicious while others could be legitimate but have padded severities. Also, this

assumes that the past will be like the future. Chances are that individuals attempting to defraud an insurer will constantly adapt their techniques.

Companies can employ different techniques that seek to identify unusual data patterns and flag them for further investigation. For example, a particular claim type has an average severity associated with the claim and a reasonable range around the average claim severity. If there is a claim that looks like it might settle for an amount that is significantly outside what is reasonable (either too high or low), it deserves extra attention. Another technique looks for claim anomalies or

unusual patterns. For example, a claimant that uses a repair shop that is significantly outside his/her immediate vicinity could trigger additional review and investigation.

Predictive modeling allows insurers to identify areas of concern and to examine every step of the claims process.

Conclusion

Just as insurers have reaped rewards by using predictive modeling for rating and underwriting, those who apply predictive modeling to the often-complicated claims process can also see better results.

Predictive modeling allows insurers to identify areas of concern and to examine every step of the claims process. Improving this often-complicated process allows insurers to better serve their customers while realizing better bottom-line results.

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