Improving Efficiency In Claims Operations – Claim Settlement Amount Estimation

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Abstract

Estimating accurate settlement amounts early in a claim lifecycle provides important benefits to the claims department of a Property Casualty insurance company. Advanced statistical modeling along with machine learning techniques can significantly improve the accuracy of claim level reserve estimates; and thus, provide an effective approach to improve the efficiency of claims operations.
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Menace of inaccurate estimation of claim settlement amount

Estimating the final settlement amount for a claim is highly challenging, especially at the time of first notice of loss (FNOL) as the information available is very limited initially. An inaccurate initial estimate results in lower operations efficiency as the claim managers cannot triage the claims and allocate the resources properly to handle them. However, as the claim ages, additional information start pouring in which eventually leads to significantly accurate estimations towards the claim closure time.

Typically, a small number of claims make up a large percentage of the total cost. Estimating and prioritizing this small number of claims with substantially higher costs can help improve the operations efficiency significantly.

Inaccuracies in estimations can be gauged by the ratio of final claim settlement amount and the amount estimated at different time periods in a claim cycle. A value of *numero uno* is perfect estimation which decreases as the ratio moves on either side of it.

**Graph 1: Cumulative cost incurred by percent of claims (16 months)**

This paper suggests a multi-staged predictive analytics approach that will produce a significantly more accurate estimate of ultimate settlement amount using information typically provided at First Notice of Loss (FNOL).
Right claim with the right adjuster at the right time

Assigning complex claims to experienced adjusters at the beginning of claims lifecycle is important to settle them in the minimum time with limited costs.

To achieve this, claims are divided into segments based on their pattern of loss development and are analysed separately. For example, in the workers compensation line, indemnity claims have different settlement structure, both in terms of frequency and magnitude, from medical only claims. Similarly, claims related to chronic and traumatic conditions differ significantly in their development and settlement.

Graph 2: Gap in estimation across the claims life cycle

A multi-staged predictive analytics approach helps claim managers develop reliable profiles of these claims segments which enable:

- **Effective resource allocation**
  Claims handlers can prioritize time, effort and action on claims to mitigate the risk of unpredictable claims cost and duration based on their complexity.

- **Effective claims triaging**
  Optimal triaging of claims ensures that the claims handler assigned will produce the best outcome.

These enablers help realize the following benefits:

- More stable and predictable loss costs
- More efficient and predictable operating expenses
- Higher claim service ratings and policyholder retention
- Improved employee productivity
- Better reserve allocation and stability
- Optimal pricing of policies

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Multi-staged predictive analytics approach

The approach has two phases:

**Stage 1: Predict remaining duration of the claim**

It is important to determine the remaining duration to settle a claim as it is difficult to estimate the settlement amount accurately at FNOL especially for claims with longer lifecycle. The existing information matures along with additional facts over a period of time. 'Cox proportional hazard' survival analysis method can estimate this remaining claim duration at any time interval with good accuracy. Survival analysis method suits well as the time to settlement is typically not normally distributed. Also, ordinary least squares regression methods cannot handle event censoring that exists when open claims are also used for analysis.

**Stage 2: Estimate settlement amount**

The settlement amount is then predicted using predicted remaining duration and other claim, claimant and loss characteristics. Gradient Boosted Machine (GBM) learning algorithm can predict this settlement amount. It provides enhanced prediction accuracy over traditional regression techniques. It computes a sequence of simple trees, where each successive tree is built for the prediction residuals of the preceding tree. Such "additive weighted expansions" of trees eventually produces an excellent fit of the predicted values to the observed values, even if the specific nature of the relationships between the predictor variables and the dependent variable of interest is very complex (nonlinear in nature).

*Multi-staged analytics approach can accurately estimate settlement amounts in up to three times more cases. Reserve allocation can be improved by 10%.*

This multi-staged predictive analytics approach using Cox proportional hazard survival analysis and Gradient Boosted Machine learning generate fairly accurate results. The estimated settlement amounts from this approach come much closer to actual settlement amounts (especially at early stages of claims lifecycle) than the existing estimates which based on business rules created using non-statistical means.
Significant benefits from the approach

In a research it is found that a combination of predictive models and claims leakage analysis in claims operations can potentially result in an estimated loss ratio savings of 1% - 2.5% per annum.

Claims managers can accurately estimate settlement amounts in up to three times more cases by using multi-staged predictive analytics approach. Overall, reserve allocation can be improved by 10%.

“Multi-staged analytics approach can accurately estimate settlement amounts in up to three times more cases. Reserve allocation can be improved by 10%.”

Graph 3: Indicative gains from the statistical approach
Implementation

case example

A top P&C insurer wanted to estimate claims settlement amount accurately within weeks of reporting a workers compensation claim to mitigate risks and achieve operational efficiencies.

Fractal leveraged this multi-staged predictive analytics approach and analyzed data available at different lifecycle snapshots, starting with FNOL and estimated the settlement amounts with the progression in claims. The results helped the insurer achieve its objectives.

Conclusion

Efficient claims management is crucial for any insurer and in current context; accurate estimation of final claims settlement amount for a claim puts an insurer in a competitive advantageous position. The multi-staged predictive analytics approach proposed in this paper used our 3i approach to drive greater insight, high impact and innovation.

INSIGHT

Significant impact of duration remaining to settle a claim on estimating settlement amount

IMPACT

Accurate estimation of settlement amount in three times more cases. Improvement in reserves allocation by 10%.

INNOVATION

Successful integration of Cox proportional hazard survival model and Gradient Boosting Machine (GBM) model
About Fractal Analytics

Fractal Analytics is a global analytics firm that serves Fortune 500 companies gain a competitive advantage by providing them a deep understanding of consumers and tools to improve business efficiency. Producing accelerated analytics that generate data-driven decisions, Fractal Analytics delivers insight, innovation and impact through predictive analytics and visual story-telling.

Fractal Analytics was founded in 2000 and has 700 people in 12 offices around the world serving clients in over 100 countries. Fractal Analytics is backed by TA Associates, a global growth private equity firm, and recently partnered with Aimia, a global loyalty and consumer insights firm. The company has earned recognition by industry analysts and has been named one of the top five “Cool Vendors in Analytics” by research advisor Gartner. Fractal Analytics has also been recognized for its rapid growth, being ranked on the exclusive Inc. 5000 list for the past three years and also being named among the USPAACC’s Fast 50 Asian-American owned businesses for the past two years.

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