Predictive Modeling – How Can it Help?

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Predictive Modeling Applications

▶ Marketing / cross-selling

▶ Customer analytics / policyholder behaviour

▶ **Underwriting / risk selection**

Four Main Topics

1. Customer experience

2. Data sources

3. Modeling approaches

4. Smaller company considerations

Interdependencies

▶ Customer experience drives choice of models to build

▶ Defining models to build creates data requirements

▶ Nature and means of data to be collected may result in customer response…

  ▶ Changing the data that will be collected

  ▶ Influencing the models that can be trained

  ▶ Impacting the customer experience

▶ Additional challenges for smaller carriers that result from smaller volumes of data

Customer Experience

Customer Experience

▸ Life insurance is a complicated product to buy

  ▸ Price (u/w class) is not known at the time of application

  ▸ Underwriting process is slow and invasive

▸ The objective is a new paradigm

  ▸ Faster process – (almost) real time decision

  ▸ Less expensive and intrusive – minimize use of exams and labs

  ▸ Improve – or at least maintain – accuracy of u/w decisions

A New Process For Issuing Life Policies

1. Consumer
2. Interface (direct online, agent, broker, retail outlet)
3. E-submission of application
   - Data is scraped from the application
   - Augment with additional data sources
4. Feed data into underwriting algorithm
5. Decision is made in real-time
   - Offer (preferred, standard, substandard)
   - Request additional information (Eg: complex or large cases)
   - Decline

Data Sources

Data Sources

1. Internal data sources
2. Big data
3. Customer's own data

1. Internal Data Sources

▸ Data collected from current underwriting practices

  ▸ Application for insurance

  ▸ Medical exam and lab results

  ▸ Attending physician statements

▸ This data is very predictive of mortality rates, but...

  ▸ Slow, expensive and invasive to collect

  ▸ Has not been stored in a manner that facilitates analysis

▸ Provides good underwriting results but poor customer experience

2. Big Data

▸ My definition: data about a specified individual that has been obtained from a third-party, for example:

  ▸ Purchased from data aggregator such as LexisNexis or Acxiom

  ▸ Purchased from another company that has the individual as a customer such as a pharmacy or telecommunications provider

  ▸ Scraped off the web such as public Facebook profiles

▸ This data can be acquired quickly, at low cost and (physically) non-invasively… but

  ▸ Indirect measures of the data really wanted for underwriting

  ▸ Exposes the company to the risk of customer backlash

Big Data – Customer Experience

▸ Does Big Data improve the customer experience?

▸ Yes:
  ▸ Time to decision can be greatly shortened
  ▸ Underwriting process no longer requires exam / lab tests
▸ No:
  ▸ Underwriting results may be difficult to explain / justify
  ▸ Process is digitally invasive rather than physically invasive

▸ Evolving legislative environment in Canada
  ▸ PIPED Act, Digital Privacy Act, Privacy Commissioner

Big Data – Questions to Ask

▸ Is it the data you want or just the data you can get?

  ▸ Eg: Blood pressure vs. gym membership

▸ Is the data reliable?

▸ Is the data complete?

▸ Will consumers learn to manipulate their data footprint?

▸ Does the consumer know you're using this data?

3. Customer's Own Data

▸ If you ask… will customer's agree to share the data they have collected?

  ▸ Eg: EHR's, wearable devices, wellness programs, online profiles

▸ Early indications are positive

  ▸ Installation of telematics devices for auto insurance

  ▸ Vitality / integrated life insurance products

▸ This will probably prove to be the optimal approach…

  ▸ Get the right data – quickly, cheaply, non-invasively

  ▸ Without antagonizing the customer

  ▸ Will need to develop infrastructure

Modeling Approaches

Modeling Approaches

▸ Define model objective

▸ Building the model

Model Objective

▶ Two possible approaches:

1. Replicate current underwriting decisions

2. Model mortality rates directly

1. Replicate Current Underwriting Decisions

▸ Objective: maintain current u/w outcomes – but quicker, cheaper, less invasively

▸ Pros:

  ▸ Do not have to wait several years for experience to develop

  ▸ Knowledge of vital status not required – all applicants can be analyzed, not just placed business

▸ Cons:

  ▸ Maintains, but does not improve, u/w decisions

  ▸ Approach does not age well – how do you recalibrate?

▸ Conclusion: Can be a stop-gap approach while experience is developing but is not a long-term solution

Modeling Underwriting Decisions

▶ Classification problems are straightforward to model

▶ Converting the model to a decision may not be

▶ Example:

	Preferred	Standard	SubStd	Decline
Probability	10%	40%	30%	20%
Debits	-50	+25	+100	+300

▶ Mode is standard (40%)

▶ Mean (+95 debits) is substandard

▶ If decline > some threshold, is that the right decision?

2. Predict Mortality Rates

▶ Objective: predict applicant-specific mortality rates

▶ Pros:

  ▶ Should improve u/w decisions relative to current paradigm

▶ Cons:

  ▶ Takes several years to develop experience (data) to analyze

  ▶ Should consider all applicants – not just placed business – but how do you determine vital status for non-placed business?

▶ Conclusion: Will likely prove to be the best approach but there are still obstacles to overcome

Modeling Mortality Rates

▸ Build a model from scratch or base off a standard table?

  ▸ If we use a table, are adjustments additive or multiplicative?

▸ How many years from issue do we model?

  ▸ Then what? Grade into a standard table?

▸ Don't forget to consider mortality improvement

  ▸ When modeling several years of experience how do we reflect mortality improvement in our training data?

  ▸ Straightforward if modeling off of a standard table

  ▸ More challenging if building a model from scratch

Considerations for Small Companies

Smaller Company Considerations

▸ Smaller companies will face unique challenges as predictive analytics for underwriting becomes prevalent

  ▸ Accumulating large enough data sets to build models

  ▸ Higher unit cost of building infrastructure and expertise

Overcoming Data Challenges

▶ Borrow strength

  ▶ Use industry tables as starting point and build in adjustments

▶ Data quality over data quantity

  ▶ The Law of Diminishing Marginal Returns applies to modeling

  ▶ Focus on accuracy, completeness and structure of key data elements rather than the quantity of data elements

▶ Collaborate with peer companies

  ▶ Find a means to pool data across several small carriers

  ▶ EG: CANATICS for auto insurance fraud

Overcoming Scale Challenges

▶ Infrastructure as a service for hardware and technology

▶ Open source technology

▶ Human Capital

  ▶ Build internal capabilities or outsource?

  ▶ Mixed approach may be best: small internal team to identify opportunities and oversee projects carried out by outsourced resources

Final Thought

Please Keep in Mind…

▶ Mortality experience takes several years to develop

▶ Just as the analysis you can perform today is limited by the decisions others made 15 years ago

▶ The decisions you make today will influence the analysis your company can do 15 years from now

▶ Invest the time to develop and implement a data strategy

  ▶ What data to collect

  ▶ From where to acquire the data

  ▶ How to store the data to facilitate analysis

Feedback

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