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Survey of Canadian Actuaries on ML in Reserving

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Composition of Survey Respondents

- Nine insurers including
  - Canadian and global companies
  - One reinsurer
- Six consulting firms including
  - Canadian and global firms
  - Three of the big 4 accounting firms
- Three telephone interviews and twelve email responses

Do you currently use any ML techniques for reserving?

- Where used, only on individual claims (no ML for triangles)
- Insurers/reinsurer
  - Four replied yes, two indicated that are actively investigating/planning for later in 2020, three said no
  - Used for:
    - Booking of reserves by one insurer
    - Insight but not booking by three insurers
    - Allocation of IBNER at policy level by one insurer
- Consultants
  - Two replied yes, and four said no
  - One indicated in use for R&D purposes not client engagements
- Types of methods used include: GLM, boost, Taylor McGuire, and operational time models

Use of Stochastic Methods

- Not discussed in terms of ML
- Reported use by several insurers for provision for adverse deviation (PfAD) and IFRS 17 risk adjustment
- Noted in use by three consulting firms
- From personal experience in previous industry initiatives and client assignments, know that stochastic methods are also used in Canada (by insurers/reinsurers and consulting firms) for financial condition testing (FCT), formerly dynamic capital adequacy testing (DCAT)

Do you have contact with other areas of the business that might be using ML techniques?

- All nine insurers noted other teams within their companies that are using ML (particularly pricing, claims, and analytics)
- Two insurers spoke of use of ML to clean data
  - One to identify data errors at transactional level
  - One to prepare data for use in ML algorithm
- Five insurers noted collaboration of reserving team with other teams
- Two insurers spoke of environment in which ML work is done by a development team outside of reserving, which is supported by reserving subject matter experts
- Did not see similar responses from consulting firms

Do you have plans to introduce, or develop further, ML techniques for reserving?

- All nine insurers replied yes but with different time frames
  - Yes but not immediately – four
  - Yes currently investigating with plans for later in 2020 – two
  - Yes with no further comments – two
  - Yes with much activity extending to other coverages and provinces – one
- In responding,
  - Two insurers with most advanced use are focused on Ontario personal auto
  - Two insurers noted challenges with application to commercial lines
- Only one consulting firm replied yes
- One consulting firm noted current priority focus on IFRS 17

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What barriers have you faced in the use of ML for reserving? Insurers' Responses (1 of 2)

- Insufficient IT platforms – response: upgraded systems capabilities
- Massive change as implications to so many stakeholders internal and external to company – response: formal change management program including steering committee and buy-in of senior management
- Need for speed in work associated with reserving and financial reporting deadlines – response: adjusted design of ML model
- Challenges in communications as difficult to explain methods and differences in results between traditional and ML techniques leads to
  - Lack of acceptance of results and default to traditional methods
  - Use of ML for insight instead of booking

What barriers have you faced in the use of ML for reserving? Insurers' Responses (2 of 2)

- Difficult to articulate cost/benefit unless linked to resource reduction, hard to demonstrate value in reserving area
- Resource constraints
  - Always other demands that take priority (e.g., IFRS 17, COVID-19)
  - Lack of resources with familiarity in ML methods
  - Even when there are expert ML resources, there are higher priorities than reserving
- View that there are more gains to be seen in activities related to automation than in ML
- Surprising absence of comments by insurers related to data

What barriers have you faced in the use of ML for reserving? Responses of Consultants

- Detailed data requirements – availability of granular and consistent data
- Ongoing need for/use of emergence patterns (reporting and paid)
- Requirements to produce exhibits that support analysis
- Challenge of finding most appropriate use of ML and how it fits best within reserving governance framework, such as
  - Segmentation
  - Making selections
  - Scenario testing

Is there any work in this area you are aware of that might be relevant to our research?

- Baudry and Robert, 2017 and 2019
- Wüthrich, Mario V, 2018
- Duval, Pigeon, 2019
- De Virgilis, Cerqueti, 2020
- Kuo, 2019
- Poon, 2019
- UQAM, Mathieu Pigeon
- ASTIN *ML and Traditional Methods Synergy in Non-Life Reserving*
- All recommendations provided by insurers, none offered by consultants
- Two insurers mentioned partnerships with universities for ML work

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What would you like to see to help develop your knowledge or use of ML?

- Similar comments from insurers, reinsurer and consultants
- Use cases and examples of successful real world applications, including
  - Code
  - Advantages and disadvantages
  - Approaches used and challenges faced
  - Proper attention to shortcomings and difficulties to overcome (“avoid the sales pitch”)
- Discussions of interpretability of results
- Highlighting important variables that significantly influence results, especially for individual claims reserving methods
- ML methods for late reported claims (pure IBNR)
- Roadmap for how to move from (a) not using ML to (b) using some input from ML to (c) full implementation of ML
- Focus on the practical (much theory available)
- Tutorials, simple examples that outline the steps of a ML algorithm

How happy are you with the data you have available that would allow you to apply ML techniques?

- Answers differ by insurers, reinsurer, and consultants
- Surprising number of insurers generally satisfied with data available
- Insurers split on satisfaction with data
  - High quality, rich data available, particularly from newer claims platforms (e.g., Guidewire)
  - Legacy systems and systems from acquisitions can present issues
  - Greater challenges cited with data for commercial lines vs. personal auto
- Reinsurer further removed from source data but nevertheless progressing on ML
- Consultants responded more often about limited volume and quality of data
  - Three issues related to data:
    - Quality of rich data, consistency of data over time, ability to access data quickly and cost efficiently
    - Few insurers have all three
  - Commented on cost-sensitivity of client engagements

Focus on Data Quality – Insurers' Comments

- Data availability is just one step in data journey
- Many insurers spoke of quality with a focus on data entry of Claims function
- Quality is key from point of entry
- One respondent stated that insurers need to "implement a data driven culture where accuracy of entered data primes above productivity metrics"

What is your organization's attitude to using open source software such as R and Python?

- Most insurers and consultants open to use of open source software
- Several insurers noted issues of security and governance (including need for vetting by IT) that must be addressed for use of open source software
- Some insurers have established dedicated environment
  - Operations with open source code separated from other company operations
  - For one insurer, data must be anonymized for use in this separated space
- Only one consultant noted preference for commercial software that offers dedicated training and support