# Reacfin

# Reinsurance treaties analysis using NLP:

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methods and innovation enablers for actuaries

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Insurance Data Science Conference 2019 – Zürich – 14 June 2019

#### 1. Context of the case study

Reinsurance wording context:

Thousands of legal documents Highly qualified people involved

- At the end for actuaries:
  - An heavy and repetitive workload
  - A complex document analysis
  - Operational risks exposition

Thousands of hours of work each year

Many formats, technical vocabulary

- Difficulties to **automate the process**
- Uncertainty related to data quality
- Incapacity to **improve models**

Goals:



**Collect** structured criteria and related accuracy



Recognize and analyse document clauses

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**Enhance** data for risk assessment, pricing model, etc.



#### 2. Scope and IT framework

Scope of the case study:





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### 3. Modelling aspects

For clause recognition process:



- Supervised ML model
   to recognize clause
   titles from regular
   sentences
- **RNN model to** classify clause per category

 \$1 - Topic A

 Candidate 1.1

 Candidate 2.1, candidate 2.2

 \$2 - Topic B

 \$3 - Topic C

 Candidate 3.1, candidate 3.2

 \$1 - Topic A

 Result 1.1

 Result 1.1

 Result 2.1, candidate 2.2

 \$2 - Topic B

 \$3 - Topic A

 \$3 - Topic A

 \$3 - Topic A

 \$3 - Topic B

 \$3 - Topic B

 \$3 - Topic C

 <td

For criteria collect process:

Criteria 1? Criteria 2? Criteria 3?

Set of complex regex to collect candidates criteria

 RNN models to classify contexts and assess optimal criteria results

Results and accuracies in numbers:



for clause title recognition



94%\* accuracy for context predictions

18sec\*

to analyse a doc.

\* on average



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#### 4. Innovation enablers for actuaries

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**Feature engineering (and selection)** to create explanatory variables to improve predictive power of models.



**Define product segmentations** using these new criteria and the common ones(and using unsupervised ML).



**Set up risk measures and KPIs** according to wording content, standard compliance rules or related to an area, an industry, a risk, in order to assess claims impacts.

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#### **Examples in practice** for actuaries:

- Pricing process automation for Reinsurance faculatives
- Multi LoB concentration and diversification risks measures



#### Contact

## Thanks ! Do you have questions ?



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