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Reinsurance treaties analysis using NLP:
methods and innovation enablers for actuaries

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1. Context of the case study

- Reinsurance wording context:

| **Thousands of legal documents** | **Highly qualified people involved** | **Thousands of hours of work each year** | **Many formats, technical vocabulary** |

- At the end for actuaries:

  - An **heavy and repetitive workload**

  - A **complex document analysis**

  - **Operational risks** exposition

  - 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

Enhance data for risk assessment, pricing model, etc.

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2. Scope and IT framework

- Scope of the case study:

Around **950 documents**	Around **80 criteria** and **200 clauses**	English & French	.doc & .pdf files
All lines of business	Worldwide	Different providers	**Digital and picture** formats

- IT framework:

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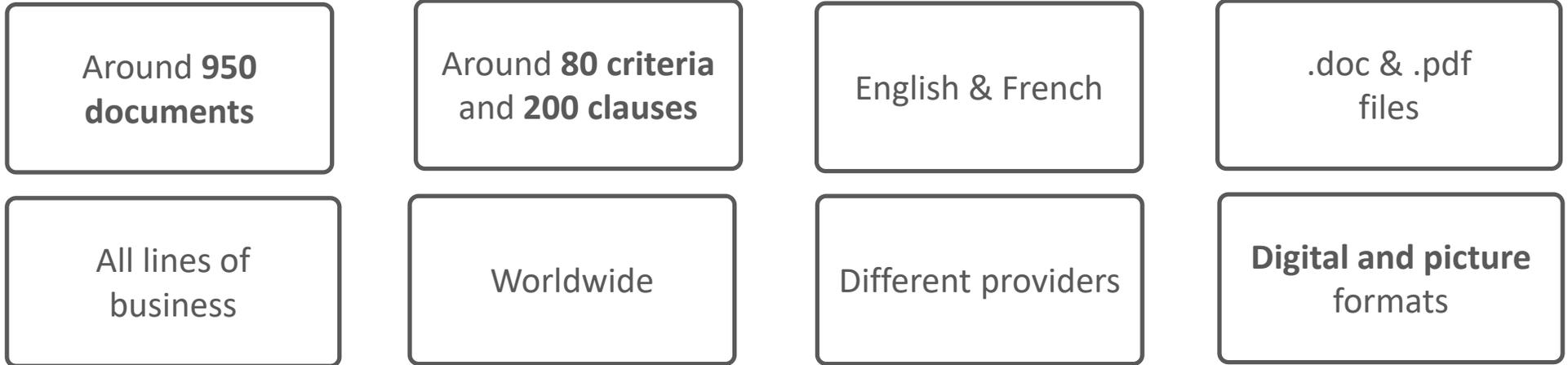
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3. Modelling aspects

■ For clause recognition process:

- Supervised ML model to **recognize clause titles** from regular sentences

- **RNN model to classify clause** per category

■ For criteria collect process:
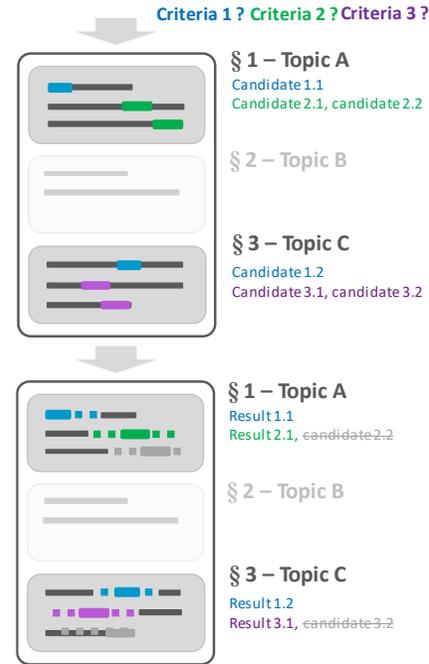
- Set of complex **regex to collect candidates** criteria

- **RNN models to classify contexts** and assess optimal criteria results

■ Results and accuracies in numbers:

92% accuracy
for clause title recognition

89% accuracy
for clause classification

94%* accuracy
for context predictions

18sec*
to analyse a doc.

* on average

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4. Innovation enablers for actuaries

 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.

Examples in practice for actuaries:

- Pricing process automation for Reinsurance faculatives

- Multi LoB concentration and diversification risks measures

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Contact

Thanks !

Do you have questions ?

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