## Revamp of the Underwriting Workflow

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**Cathay Life Insurance (2024/12 - Present)** 

\*Due to confidentiality, all confidential information has been modified or removed.

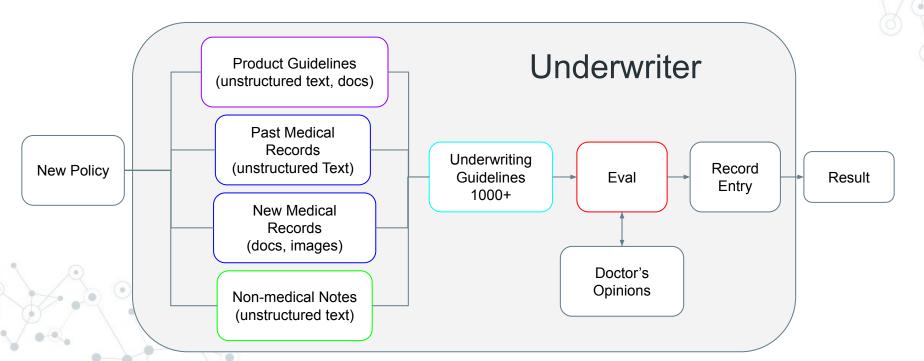


#### **Project Description**

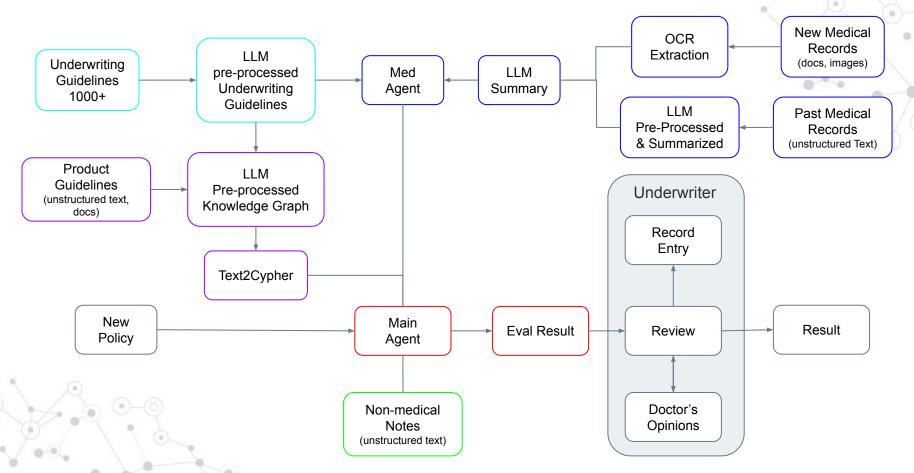
- This project aims to build an Al-driven underwriting workflow that ingests unstructured medical documents, product guidelines, and legacy rulebooks, outputting consistent, auditable risk evaluations.
- Issue: The traditional underwriting process is slowed by scattered product and underwriting guidelines, along with the manual interpretation of complex medical records. This leads to long turnaround times, data entry errors, and inconsistent decisions.
- Target Users: The Underwriting Department

#### Current workflow

- Under current guidelines, all policyholders with medical records must be reviewed by an underwriter.
- The review process can take two to four weeks.



#### New Workflow



#### New Workflow Description

- The new workflow is streamlined by AI to create consistent and auditable risk evaluations.
- Main Agent
  - This agent is powered by an LLM to automatically query necessary information and produce risk evaluations for underwriters.
- Med Agent
  - This agent queries relevant underwriting guidelines and combines them with a policyholder's medical history to conduct a medical evaluation.
- Text2Cypher
  - This component queries relevant product and underwriting guidelines for the main agent based on the policy being reviewed.
- Processing of the Underwriting guidelines
  - This component leveraged an LLM to digitize unstructured underwriting guidelines for different components and applications.

### **Processing of Underwriting Guidelines**

壽險核保標準(xxxxxx修訂):1.無甲狀腺惡性病變: (1)現症: 伴有結節-----依甲狀腺結節{{A101}}評估。 B.無結節, 僅甲狀腺腫 大: (a)近期病灶體積xxx, 無症狀: I.伴有甲狀腺功能 xx-----依甲狀腺機能xx{{A10B}}評估。 Ⅱ.伴有甲狀腺功能 xx-----依甲狀腺機能xx{{A1033}}評估。 Ⅲ.甲狀腺功能 xx-----100。 (b)近期病灶體積或疾病症狀有xx-----醫鑑。 (2)既 往症: A.目前甲狀腺機能xx----50。 B.目前甲狀腺機能xx: (a)甲狀腺功能xx-----依甲狀腺機能xx{{A10B}}評估。 (b)甲狀腺 功能xx-----依甲狀腺機能xx{{A103}}評估。2.伴甲狀腺惡性病變-----依甲狀腺癌評估。

#### Cont.

- Text contains semi-recursive structure
- Can be processed with this recursive data structure

#### Ex:

Disease ->

Conditions or result ->

Conditions or result ->

... ->

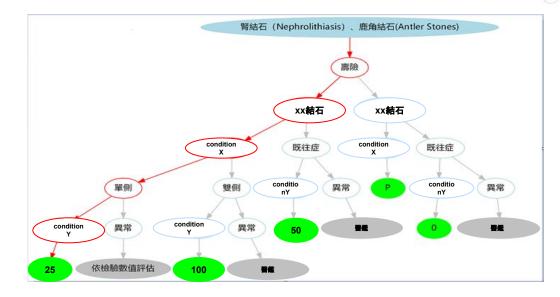
Only result -> end



### **Application 1: Tools**

- Health Risk Calculator
  - Remove unnecessary human variance
  - Speed up evaluation process
  - Usage Rate: 100%
- Visualization
  - Increase interpretability
  - Enhance maintainability

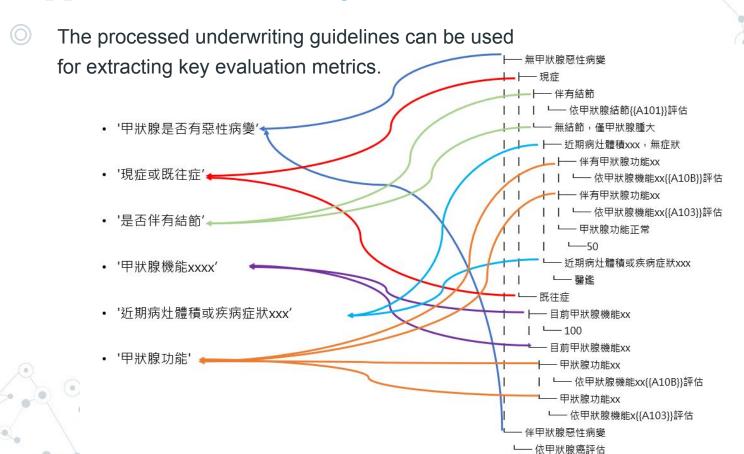




#### Application 2: Med Agent

- Too many medical records (15 past records & 5 new documents per new policy)
- Problematic records (different forms, outdated, hard to interpret, and missing information)
  - Ex: oo側輸尿管結石併oo側腎水腫伴有o及輸尿管結石性阻塞及oo側急性腎 盂腎炎併發敗血性休克及急性呼吸衰竭
    - Ex: 胃. 12指腸潰瘍o腸息肉o腸潰
- Too much human variance
  - In interpreting medical records (what is important, what indicates an issue, etc)
  - In making medical evaluations (experiences and medical knowledge)

### Application 2: Med Agent



## Application 2: Med Agent

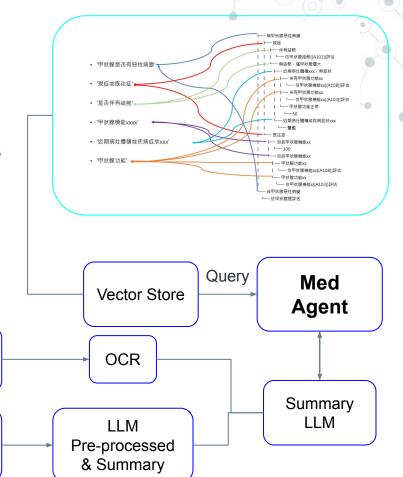
- Extracted key evaluation metrics can be used for summarizing medical records
- Processed 30 millions old medical records
  - 95%+ accuracy
- Automation of Document OCR
  - 88%+ accuracy
- The summary can be used for medical evaluations

New Medical

Record

Old Medical

Record



### Application 3: Text2Cypher

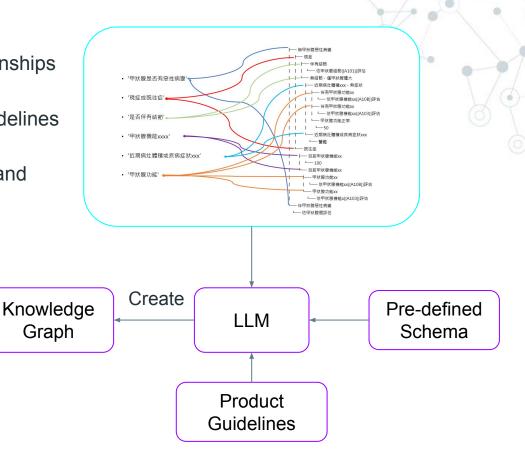
- Rich catalog with 2300+ products
- Products may have dependencies with each other
  - Ex: 需搭配xxxxx
  - Ex: 若搭配xxxx, 保戶需xxxx
  - Ex: 不得超過主契約保險期間屆滿
- Products may have requirements related to underwriting guidelines
  - Ex: 需經醫師診斷因罹患條款附表 XX的疾病
  - Ex: 曾經罹患XXXX者,可加費投保,倍數參照 XXXX
- Underwriters would need to spend time traversing product guidelines looking for the right terms and underwriting guidelines to perform the evaluation

### Application 3: Text2Cypher

- Knowledge Graph
  - Captures the complex relationships and dependencies between product and underwriting guidelines
- Text2Cypher (LLM)
  - Queries all relevant product and underwriting guidelines

**Text2Cypher** 

Query



#### Summary

- Key Applications & Results
  - Health Risk Calculator
    - A dynamic visualization tool that speeds up the evaluation process and enhances interpretability
    - Achieved a 100% usage rate among underwriters
- Automated Document Analysis
  - Processes new medical records from images and documents with over 88% OCR accuracy
  - An LLM summarized 30 million old medical records with over 95% accuracy, enabling quick queries by a medical agent
- Text2Cypher (Work In Progress)
  - Development is underway for a Text2Cypher pipeline that will query product
    guidelines stored as a knowledge graph

# The End

