Revamp of the Underwriting Workflow

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Cathay Life Insurance (2024/12 - Present)

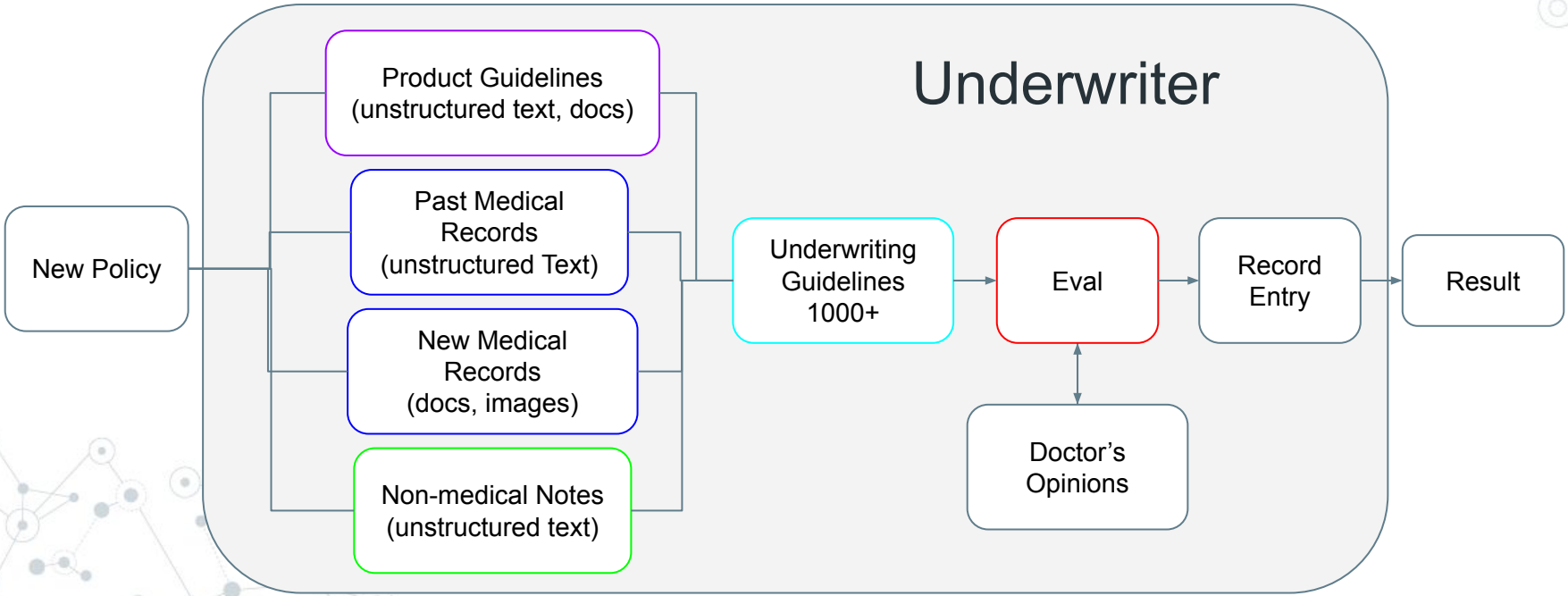
***Due to confidentiality, all confidence information has been modified.**

Project Description

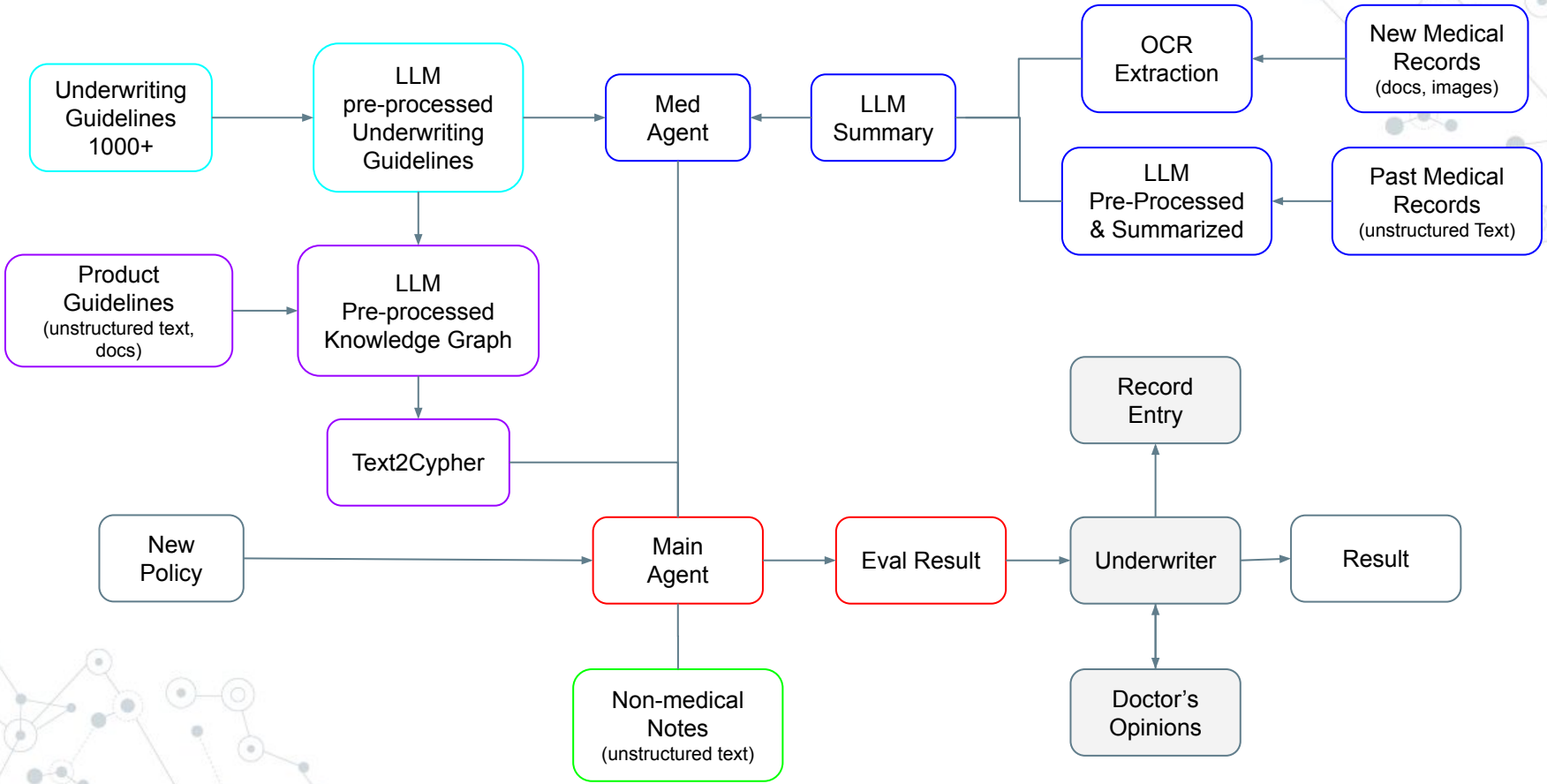
- This project aims to build an AI-driven underwriting workflow that ingests unstructured medical documents, product guidelines, and legacy rulebooks, outputting consistent, auditable risk evaluations.
- Issue: The traditional underwriting process is slowed by scattered product and underwriting guidelines, 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

Past 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 cont.

- 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: A.伴有結節-----依甲狀腺結節{{A101}}評估。 B.無結節,sub-conditionY: (a)近期病灶體積無改變,無症狀: I.伴有甲狀腺功能亢進-----依甲狀腺機能亢進{{A10B}}評估。 II.伴有甲狀腺功能減退-----依甲狀腺機能不足{{A1033}}評估。 III.conditionX-----100。 (b)近期病灶體積或疾病症狀有改變-----醫鑑。 (2)既往症: A.目前甲狀腺機能正常-----50。 B.目前甲狀腺機能異常: (a) conditionZ-----依甲狀腺機能亢進{{A10B}}評估。 (b)甲狀腺功能減退-----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.

- Contains semi-recursive structure
- Can be processed with this recursive data structure

Disease ->

Conditions or result ->

Conditions or result ->

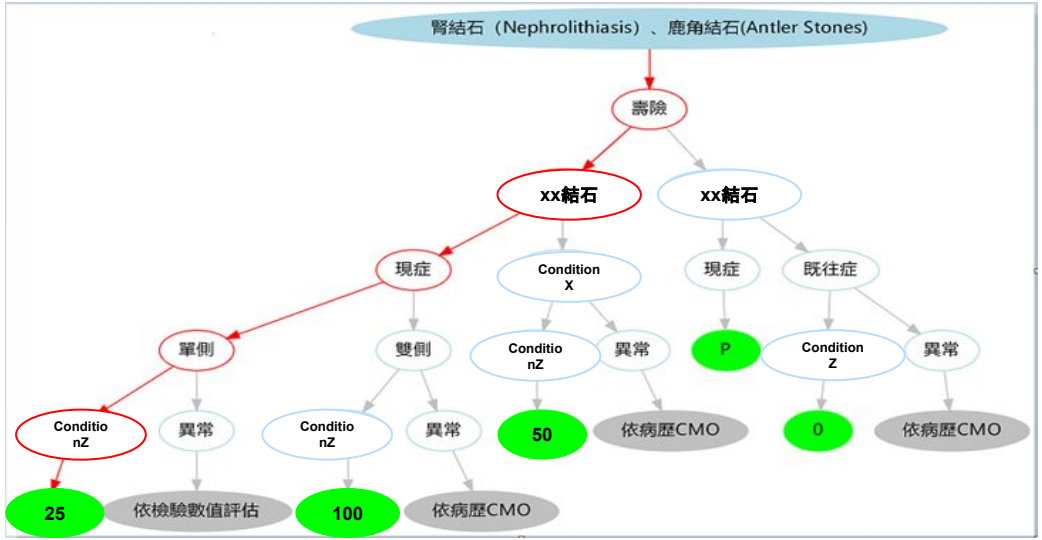
… ->

Only result -> end

甲狀腺腫
├── 無甲狀腺惡性病變
│ ├── 現症
│ │ ├── 伴有結節
│ │ │ └── 依甲狀腺結節{{A101}}評估
│ │ └── 無結節，sub-conditionY
│ │ ├── 近期病灶體積無改變，無症狀
│ │ │ ├── 伴有甲狀腺功能亢進
……
│ │ │ └── conditionX
│ │ │ └── 100
│ │ └── 近期病灶體積或疾病症狀有改變
│ │ └── 醫鑑
│ └── 既往症
│ ├── 目前甲狀腺機能正常
│ │ └── 50
│ └── 目前甲狀腺機能異常
│ ├── conditionZ
│ │ └── 依甲狀腺機能亢進{{A10B}}評估
│ └── 甲狀腺功能減退
│ └── 依甲狀腺機能不足{{A103}}評估
└── 伴甲狀腺惡性病變
└── 依甲狀腺癌評估

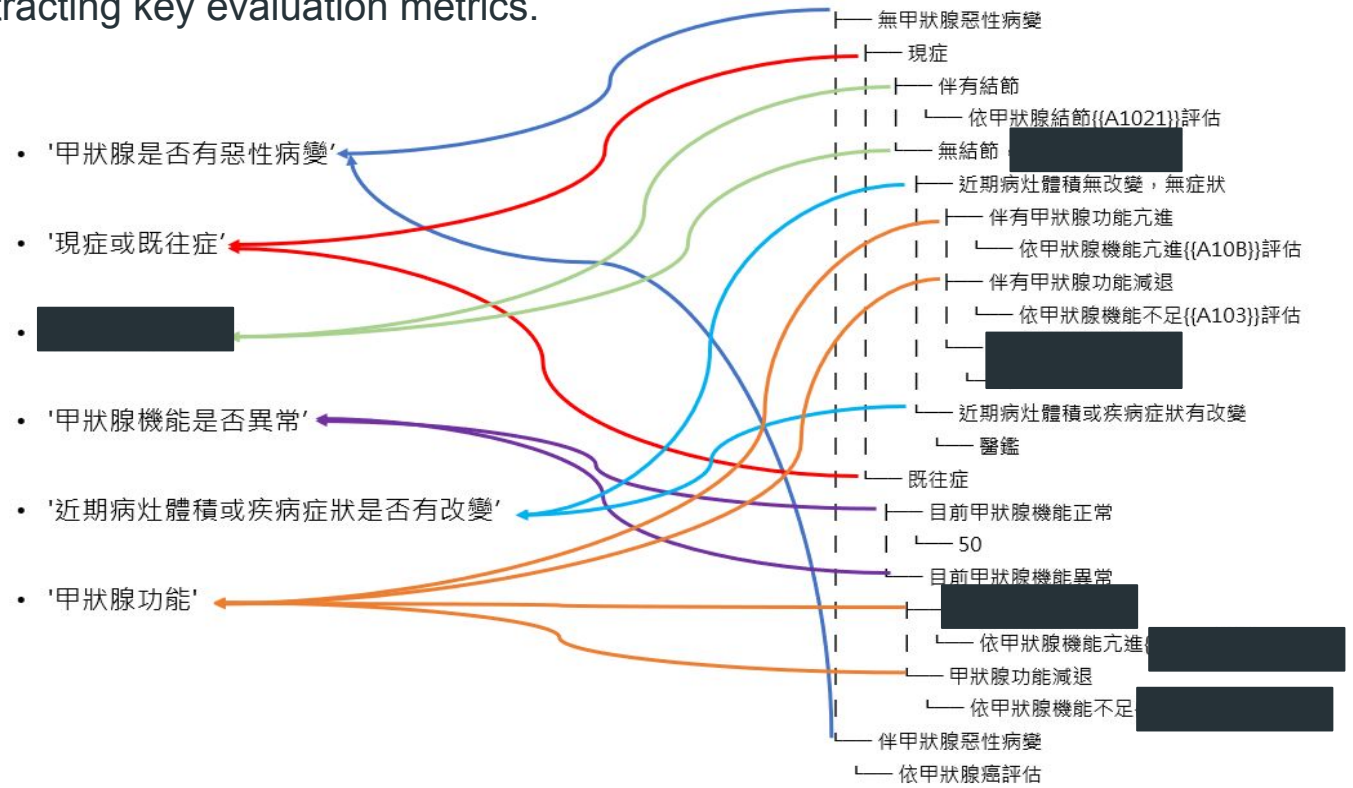
Application 1:

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



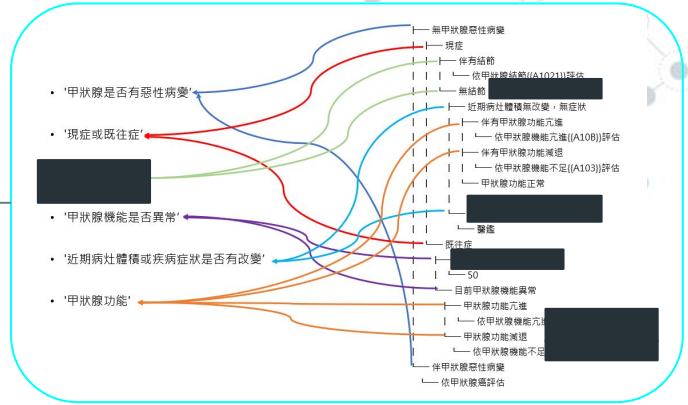
Application 2:

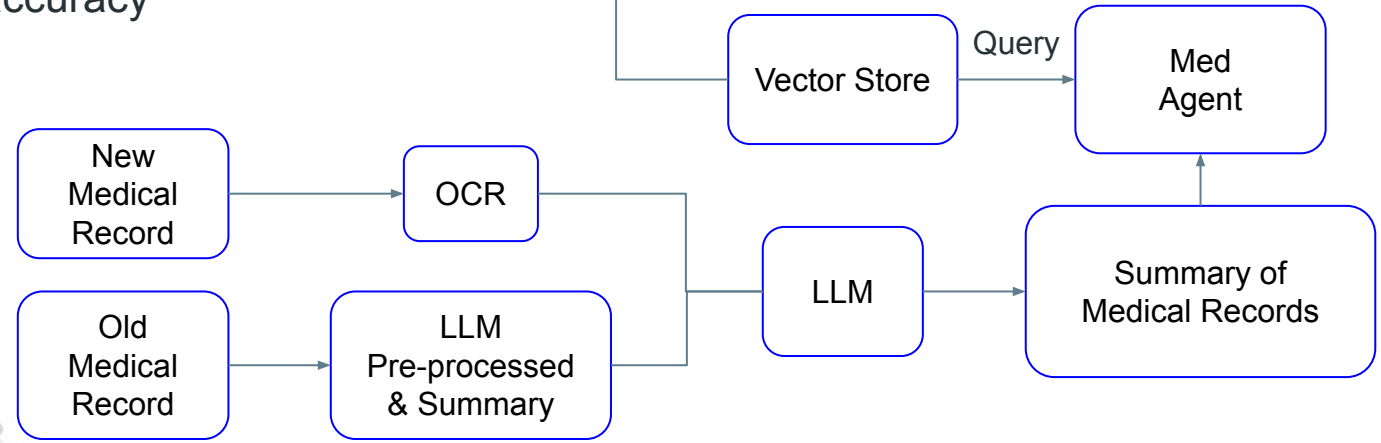
The processed underwriting guidelines can be used for extracting key evaluation metrics.



Application 2 Cont.

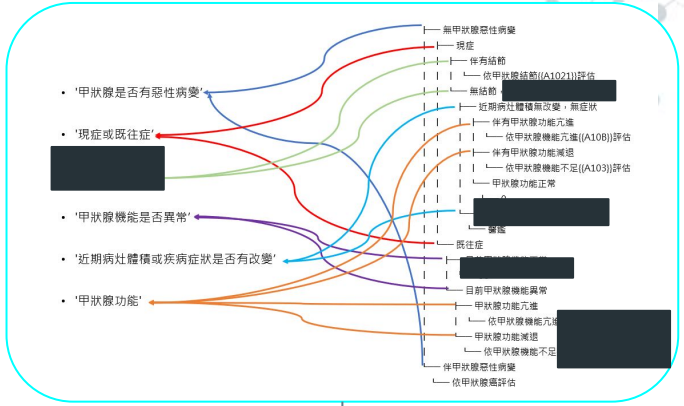
- Extracted key evaluation metrics can be used for summarizing medical records
- Processed 30 millions old medical records
  - 95%+ accuracy
- Automation of Document OCR
  - 88%+ accuracy

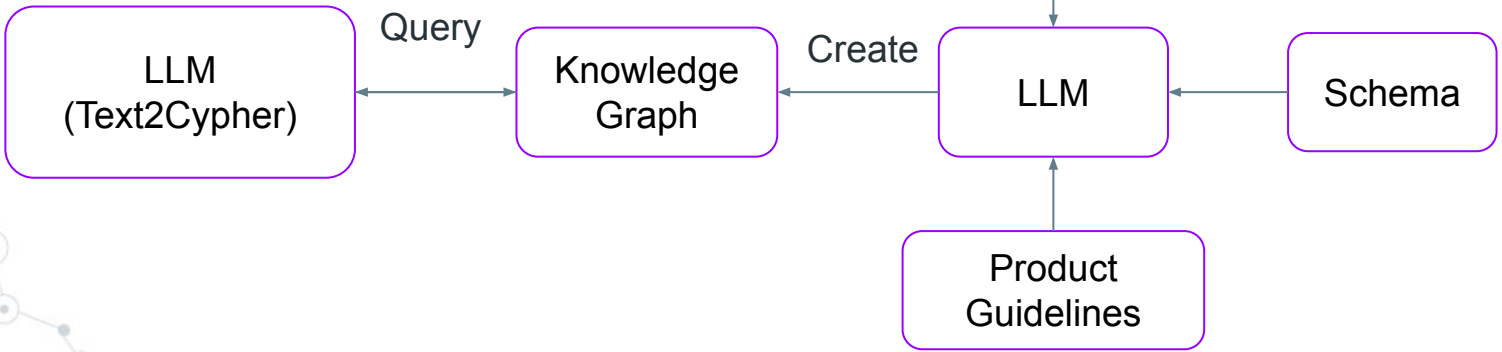




Application 3 (WIP):

- To capture the complex relationships and dependencies between various product and underwriting guidelines, we created a knowledge graph with a predefined schema and instructed the LLM to automatically query it based on specific policy information.





The End