Application of Large Language Models to Mammography Rad-Path Correlation for Automated Data Extraction and Concordance Prediction

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Key takeaway: Prompt-engineered gpt-oss extracted key mammography/pathology findings with near-perfect accuracy, supporting scalable automated database labeling from routine reports.

BACKGROUND + OBJECTIVES

Clinical need

Manual rad-path review and retrospective **database labeling** are labor-intensive.

Key data are trapped in **unstructured reports**.

Study aim

Evaluate **gpt-oss** for automated extraction of mammography/pathology findings.

Secondary: exploratory concordance prediction.

Methods at a glance

- De-identified mammography and pathology reports processed by gpt-oss
- Structured output extraction performed to identify key rad-path descriptors
- Base vs prompt-engineered concordance prediction compared against manual review

Study cohort

211 patients from 2023,
215 stereotactic biopsy targets,
38 augmented discordant cases

MODEL WORKFLOW

gpt-oss pipeline for report-level extraction and concordance assessment

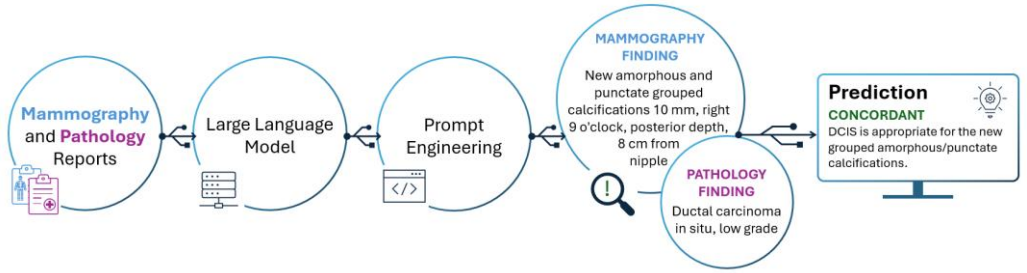


Figure 1. Single-case workflow: raw reports -> open-source LLM -> key findings -> concordance prediction.

KEY RESULTS

99.5% **mammography** extraction

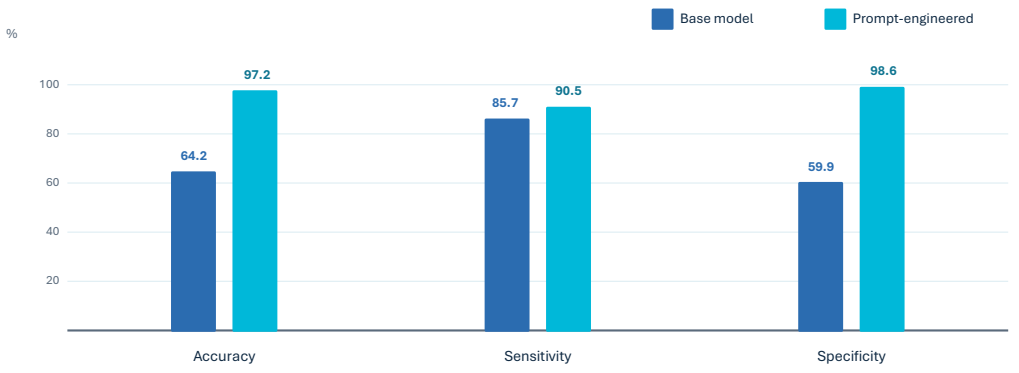
100% **pathology** extraction

97.2% **prompt-engineered** accuracy | base: 64.2%

p < 0.001 **prompted vs base** McNemar test

Prompt engineering improved concordance prediction, while extraction performance was already near-perfect.

CONCORDANCE PREDICTION PERFORMANCE



Prompt engineering improved accuracy and specificity without model fine-tuning; concordance prediction remains an exploratory use case requiring validation.

CONCLUSION + CLINICAL RELEVANCE

Database labeling at scale

Extraction supports structuring of routine mammography and pathology reports for retrospective research.

Prompt engineering matters

Prompt-engineered gpt-oss markedly improved concordance prediction performance without model fine-tuning.

Concordance prediction remains exploratory

The signal is promising, but clinical decision-support use requires larger, external validation before adoption.

Future work: validate on larger multi-institutional cohorts enriched for discordant cases.

REFERENCES

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