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MICCAI · STSR / MMDental Task 3 · Poster 32

Medication-Safe Dual-Encoder Retrieval for Structured Dental Report Prediction from CBCT

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Seven fields. One traceable source per field.

Retrieve observed clinical text from just 50 labeled reports, then constrain branch selection by medication mentions.

CODE · MIT LICENSE

50 labeled CBCT–report pairs

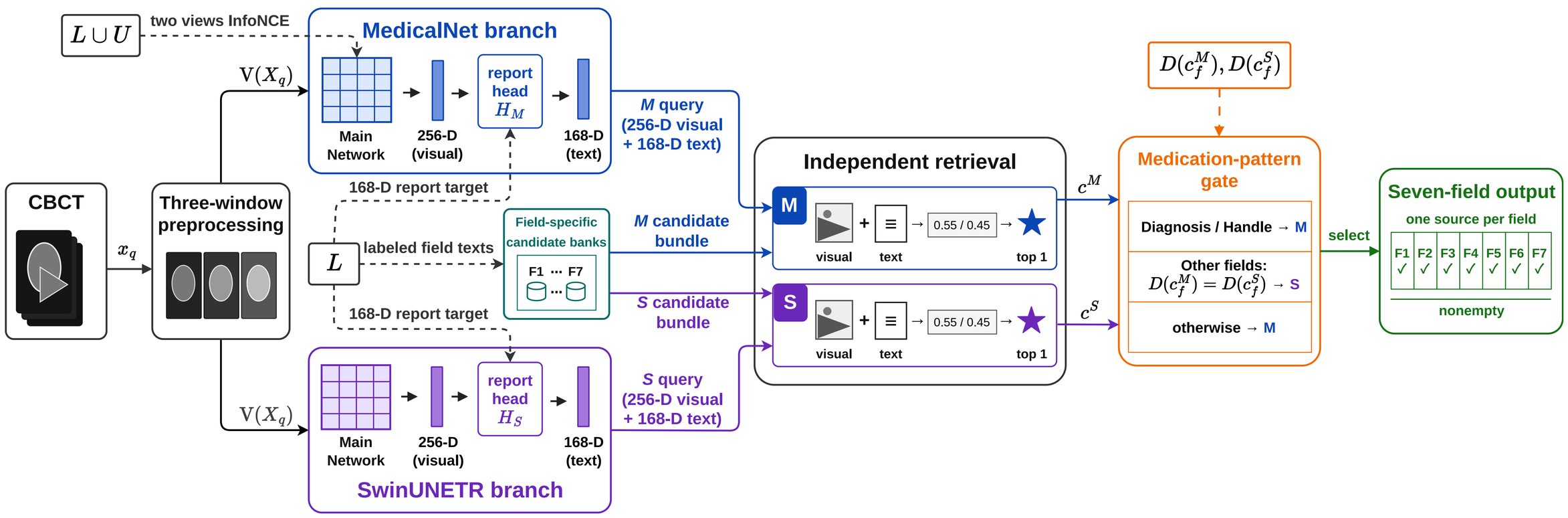
200 unlabeled training CBCTs

50 validation cases; reports hidden

The challenge: predict a structured clinical record from a CBCT query alone. [1]

Seven output fields: Main appeal · Present medical history · Oral Check · Diagnosis · Treatment plan · Handle · Doctor advices

01 Two independent retrievers. One constrained decision.



Method overview. L: labeled cases; U: unlabeled scans. Each branch independently scores visual and predicted-report similarity. Diagnosis and Handle use MedicalNet; other fields use Swin only if the recognized medication-pattern sets match.

Adapt the image encoder

Two-view InfoNCE adapts **MedicalNet only** on all 250 training CBCTs. The Swin encoder starts from public self-supervised weights. [2, 3]

Learn seven report spaces

The 50 reports define field-specific TF–IDF/SVD targets. Two **independent heads** predict 168-D report vectors using field-wise cosine loss.

Retrieve, then apply the gate

Banks store source IDs, field texts, text targets, and branch-specific visual vectors. Each top-1 uses **0.55 visual + 0.45 report** similarity.

02 Official results

Codabench evaluation · 50 cases [4]

0.235259
Weighted Score

100%
Field completion

0 missing predictions · 350 nonempty fields

Diagnosis-code F1	**0.161**
Treatment-action F1	**0.347**
Medication F1	**0.470**
Treatment-plan recall	**0.579**
Tooth-notation F1	**0.109**
ROUGE-L	**0.147**

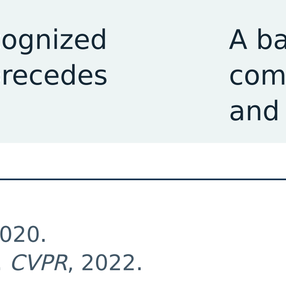
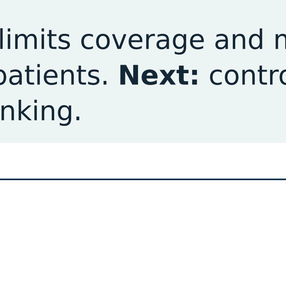
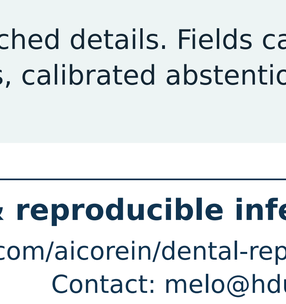
Tooth precision / recall: **0.066 / 0.453**.
Completion does not imply correctness; these results do not establish superiority over a matched baseline.

1.55 s / case
77.49 s for 50 cases; 7,273 MiB sampled peak.
Local RTX 4090 container run, not organizer latency.

Fine-tuning epochs: MedicalNet 300 / Swin 60.

03 Why the gate keeps MedicalNet

A recorded example · Query 552 · Oral Check

Query 552	MedicalNet source 391	Swin source 262
		

Central axial views of the existing preprocessed volumes; no lesion annotations.

MedicalNet candidate excerpt
$D(c_M)$ = {iodophor}
“26 27 **iodophor** gauze and sutures are stored, and the wound heals well”

Swin candidate excerpt
$D(c_S)$ = ∅
“17 The temporary inlay fell off.”

Unequal medication-pattern sets → retain MedicalNet.
The selected field keeps the observed “iodophor” mention.

D(c) is the set of recognized medication patterns in the full candidate. Excerpts are shortened for display. This audit verifies execution and provenance, **not clinical correctness**.

All 350 field decisions, reconstructed from frozen models

231 Swin equal sets

19 MedicalNet unequal sets

100 MedicalNet Diagnosis / Handle

Traceable text is not a clinical safety guarantee.

“Medication-safe” names a **lexical gate**, not a clinical claim. It checks recognized patterns—not indication, dose, route, negation, or correctness. Selection precedes deterministic shortening.

A bank of 50 reports limits coverage and may copy mismatched details. Fields can come from different patients. **Next:** controlled comparisons, calibrated abstention, and tooth-aware reranking.

Selected references · [1] Wang et al. MMDental. *Scientific Data*, 2025.
[2] Chen et al. A Simple Framework for Contrastive Learning of Visual Representations. *ICML*, 2020.
[3] Tang et al. Self-Supervised Pre-Training of Swin Transformers for 3D Medical Image Analysis. *CVPR*, 2022.
[4] STSR 2026 Task 3 · codabench.org/competitions/16117.
Developed and evaluated within the ODIN 2026 challenge cluster. We thank the organizers and data owners.

Code & reproducible inference
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Contact: melo@hdu.edu.cn
Paper · OpenReview: et8vccbqRE
ODIN 2026 · Strasbourg, France