CREATIS

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Registration Teaches Registration

Transform-Derived Crown Guidance for Semi-Supervised CBCT–IOS Alignment

A known transform reveals where crowns live. That knowledge registers the next patient.

1ST PLACE
STSR 2026
TASK 2
OFFICIAL WINNER

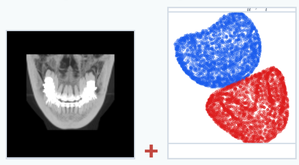
THE KEY MOVE Apply the labeled pose T^* once, rasterize the aligned IOS crowns in CBCT, and turn a registration label into spatial supervision.

01 HOW REGISTRATION TEACHES REGISTRATION

COLOR KEY: INPUT · WEAK SUPERVISION · LEARNING MODULES · GEOMETRIC PROCESSING · SEARCH + SELECTION · FINAL OUTPUT

TRAIN

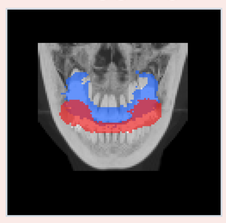
KNOWN ALIGNMENT



CBCT + IOS + labeled pose T^*

→

WEAK SUPPORT



Rasterized upper/lower crown evidence

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SUPERVISED FOLDS

5× 3D U-Net

Transform-derived support from 30 labeled cases

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SELF-TRAINING

5× 3D U-Net

Pseudo support from 289 complete unlabeled cases

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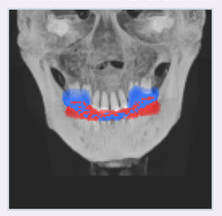
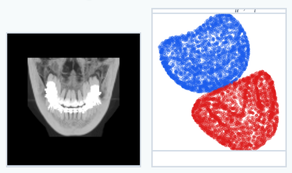
FROZEN GUIDE



Mean probability of 10 crown-support models

INFER

QUERY PAIR



Unseen CBCT + IOS jaws

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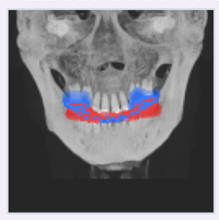
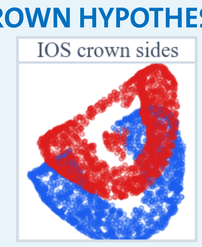
PREDICT SUPPORT



Anatomical search target

+

CROWN HYPOTHESES



Six PCA crown-side views

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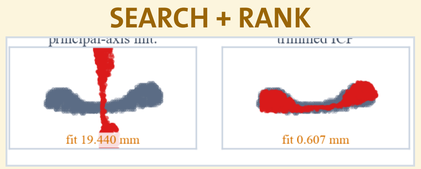
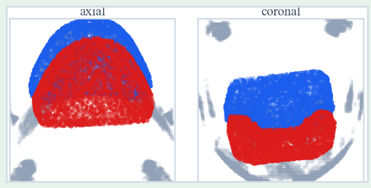
SEARCH + RANK



Signed PCA + multiscale ICP
Dual ExtraTrees rankers

→

FINAL POSE

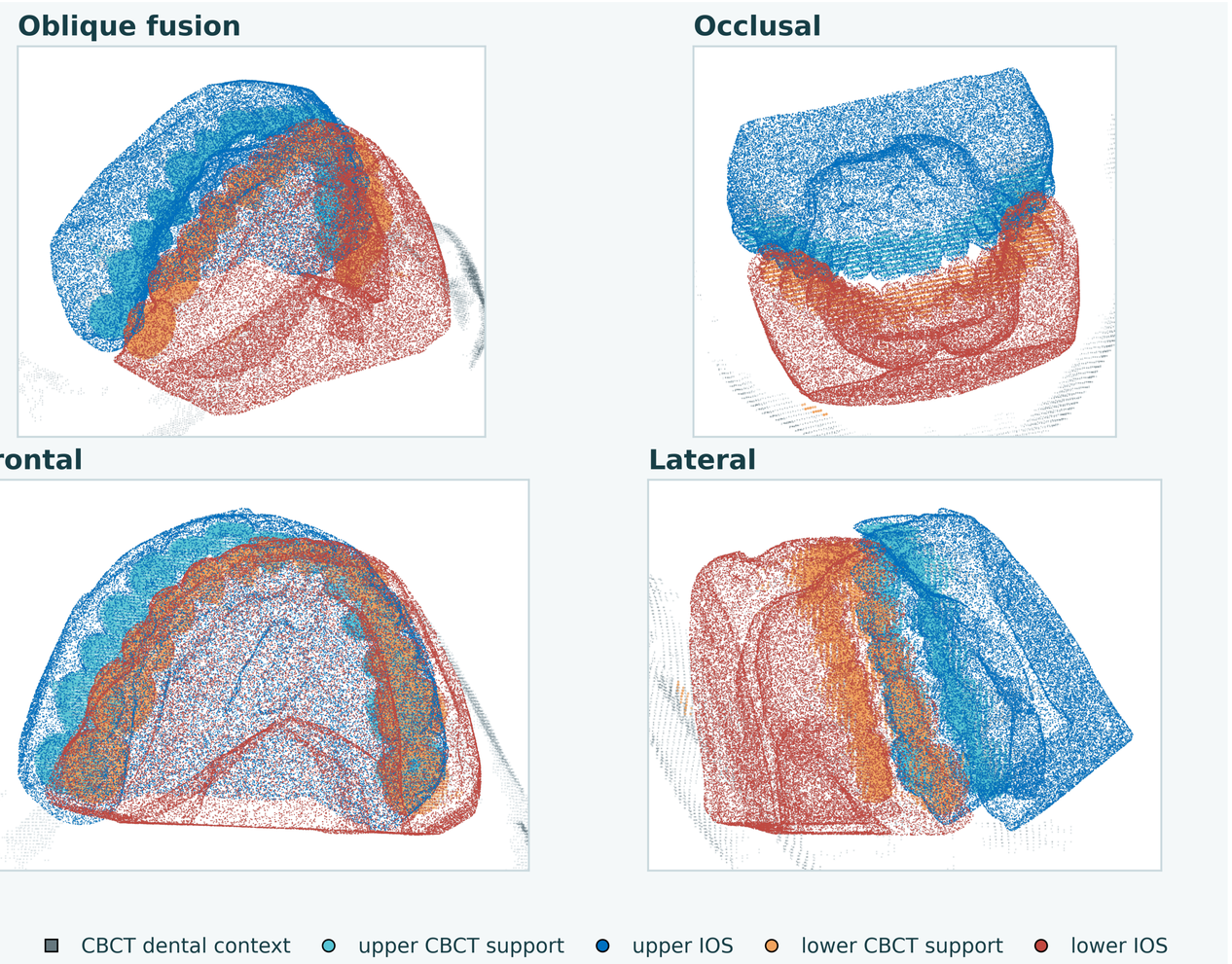


Rigid poses T_u, T_l in CBCT space

02 WHAT THE WINNING ALIGNMENTS LOOK LIKE

THE HERO ALIGNMENT

Case 145 final submitted system $\det(R) = +1$



The transformed IOS arches land on their corresponding high-density CBCT crown support in four complementary views.

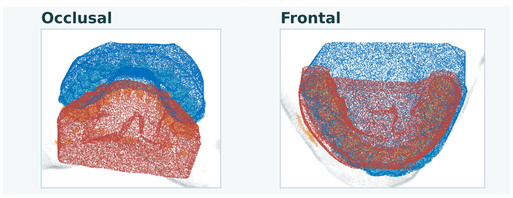
The paired target and IOS colors make local agreement visible at poster distance.

FINAL DATASET
7.902523 mm mean translation error
#1 avalanchezy
2.862457° mean rotation error
OFFICIAL WINNER
198/198 successful pairs
0 failed

ONLINE TEST DATASET
8.543497 mm mean translation error
#2 avalanchezy
2.612932° mean rotation error
162/162 successful pairs
0 failed

FOCUSED ROI REFINEMENT

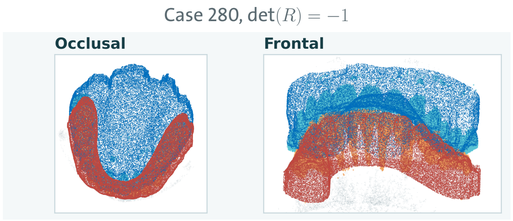
Case 049, $\det(R) = +1$



A focused crop recovers a difficult field of view.

REFLECTION-AWARE SEARCH

Case 280, $\det(R) = -1$



The mirrored rigid family remains a valid solution.

THE LABEL IS MORE THAN THE ANSWER.

It reveals where modalities overlap and becomes a geometric guide for the next patient.

PAPER

CODE

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