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Week 9

Applications of Foundation Models and Efficient Diffusion Models to Dental Radiography to Assist Dental Treatment Planning

Melody Halbert, MS and Laura Brattain, PhD

Project Overview

- Teeth charting is a manual process at the office
- It is a two person job and is error prone
- We aim to use AI to automate teeth charting
- Since dental datasets are limited, we are using foundation models
- To assist in pre-surgical planning and patient education we aim to apply diffusion models to generate synthetic teeth for fitting

What Has Been Finished

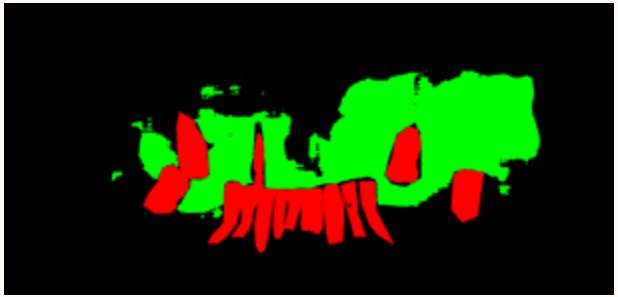
Zero-shot with MedSAM

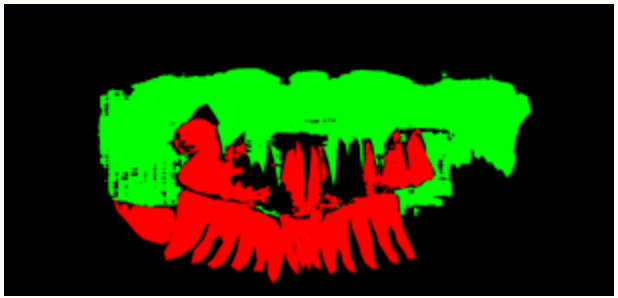
Zero-shot





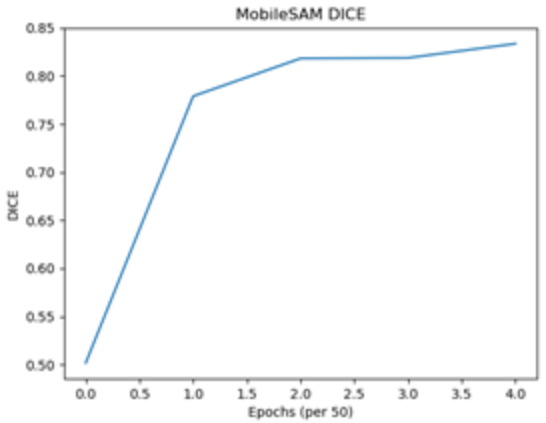
Zero-shot compared with Ground Truth





What Has Been Finished

Fine tuning with MobileSAM



Ground Truth Mask gt_mask_20.png

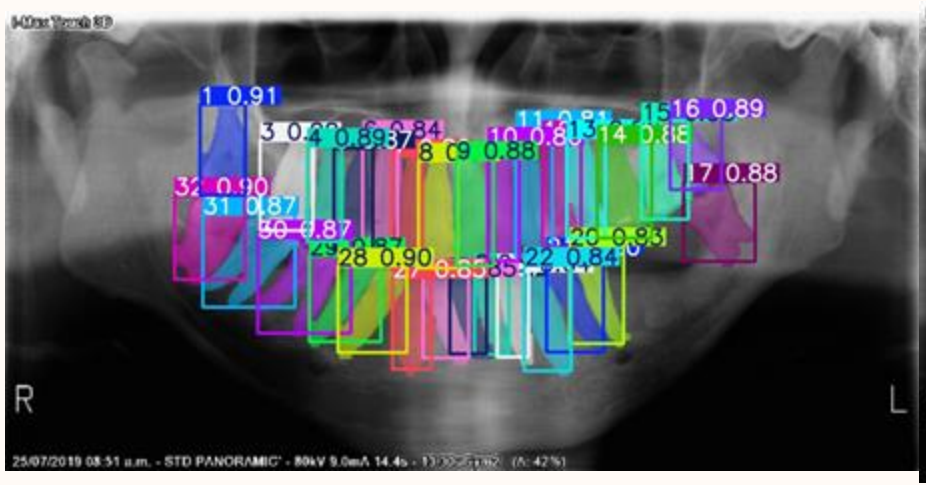


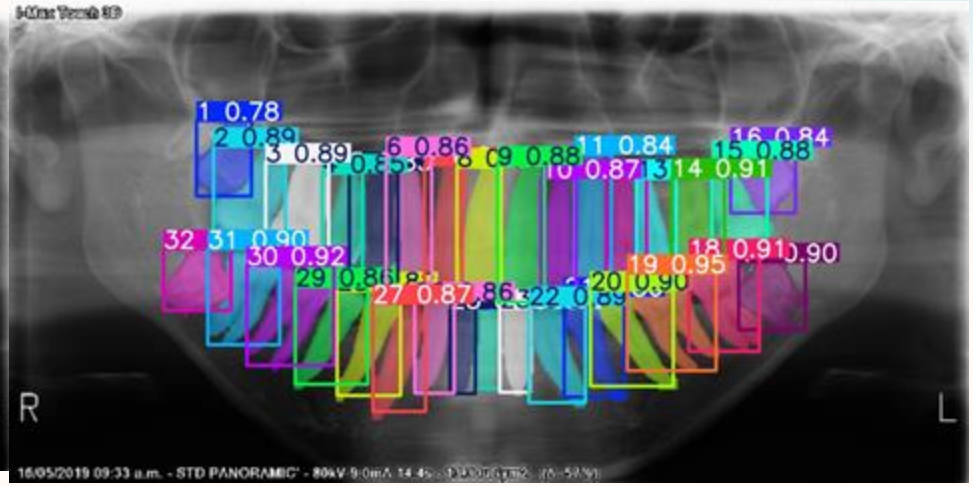
Predicted MobileSAM Mask



What Has Been Finished

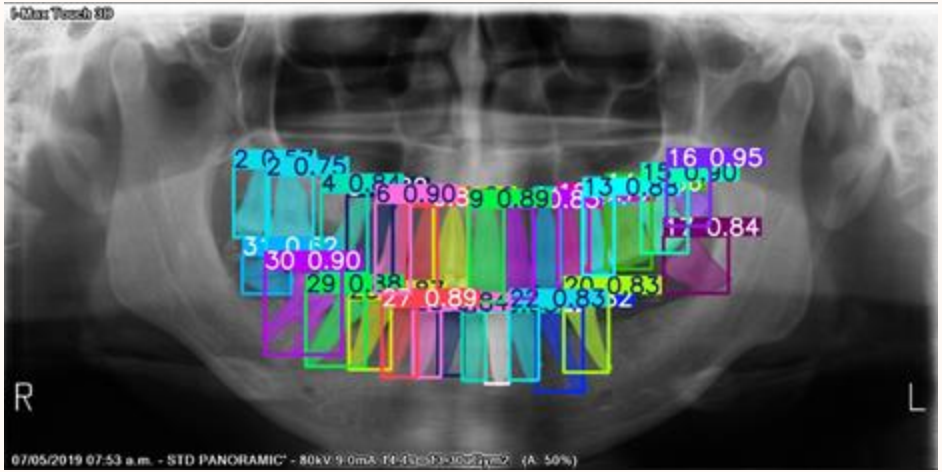
YOLOv8 Segmentation and Labeling





What Has Been Finished

YOLO Bounding Boxes with MobileSAM Fine Tuning Segmentation



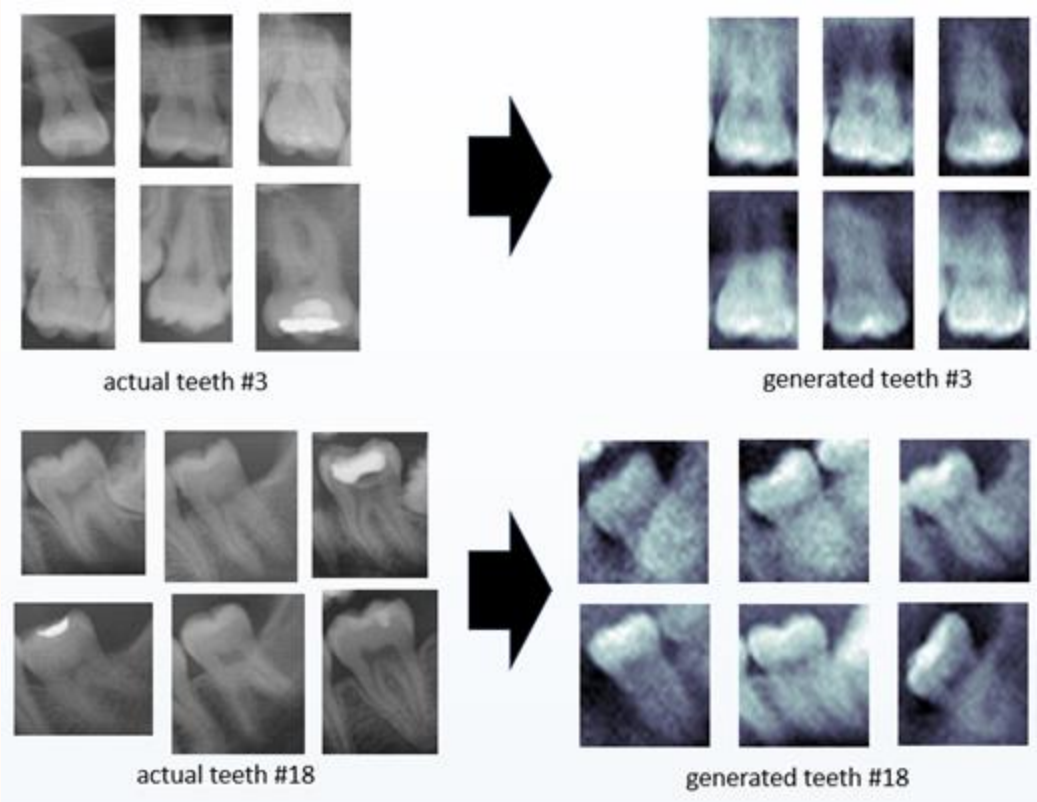


What Has Been Done This Week

- Just finished running experiments using the previous methods on the entire combined dataset vs. each dataset individually
- The chart for those metrics will be created after this meeting

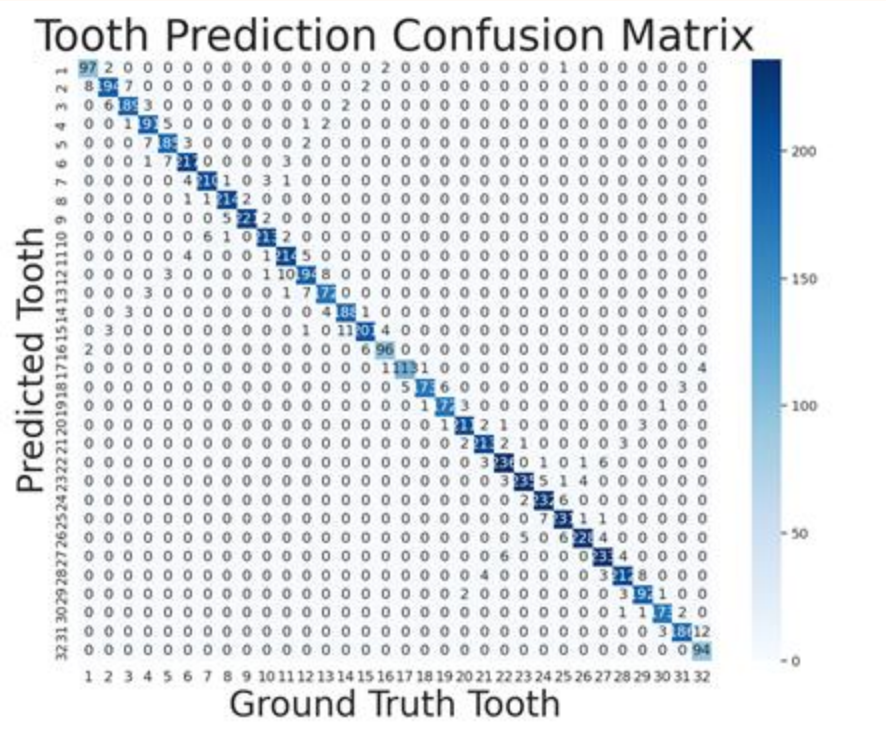
What Has Been Done This Week

Diffusion using a Stable DIffusion-based architecture

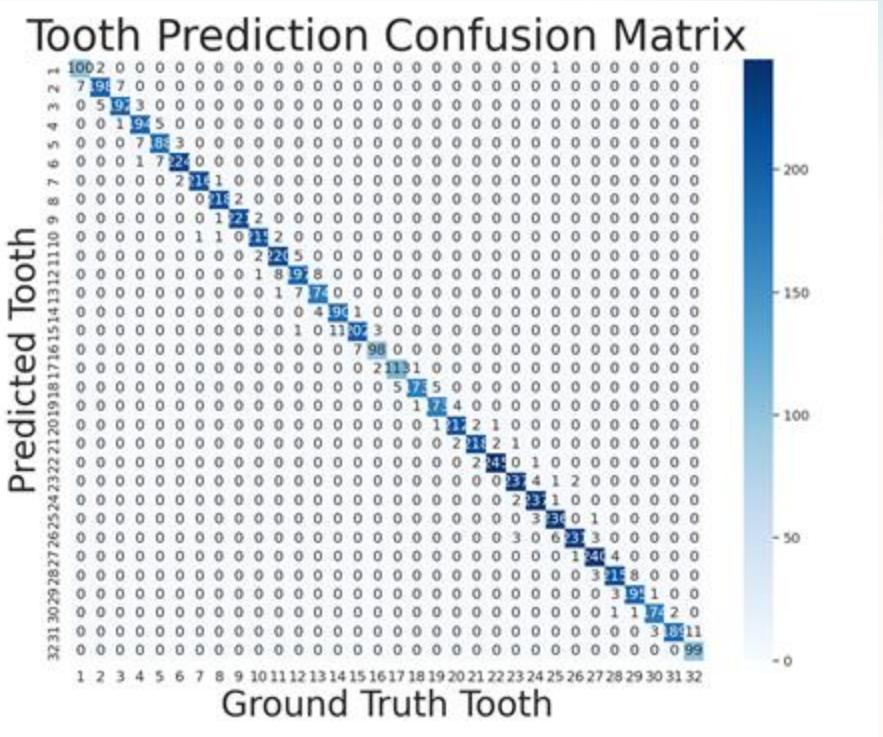


What Has Been Done This Week

Implemented post processing script to improve classification percentage from 95.1% to 96.7%.



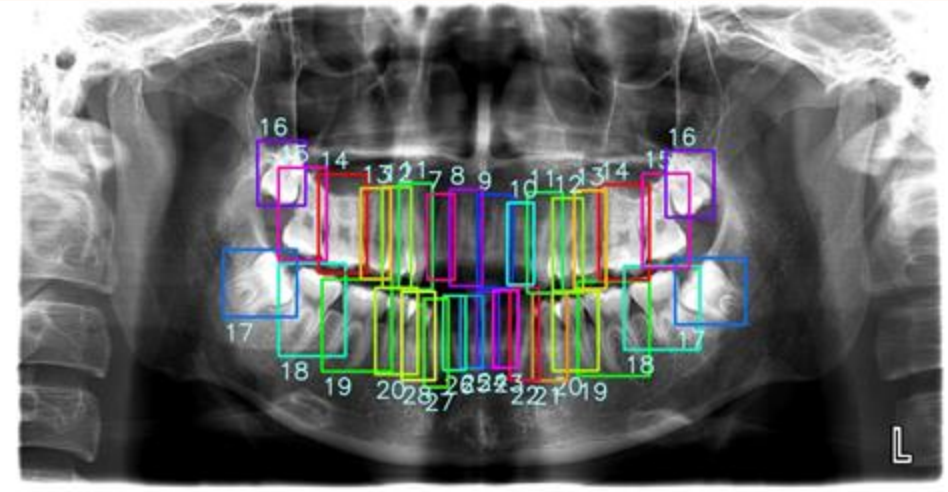
Original



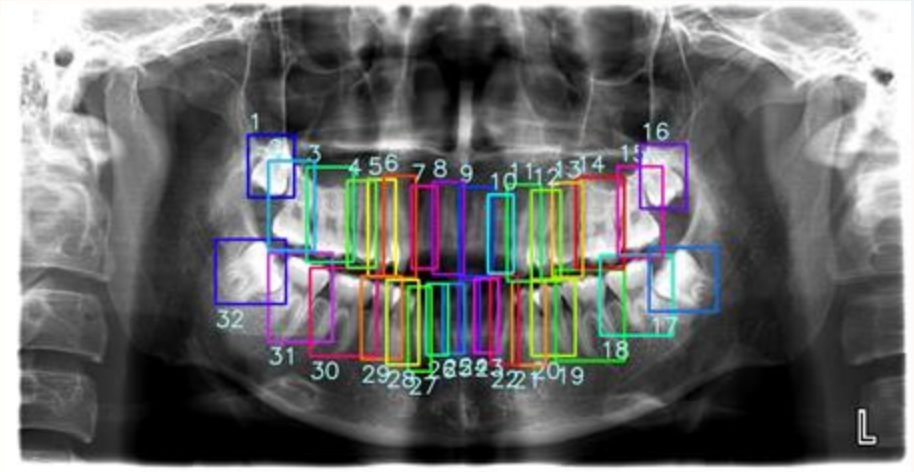
Improved

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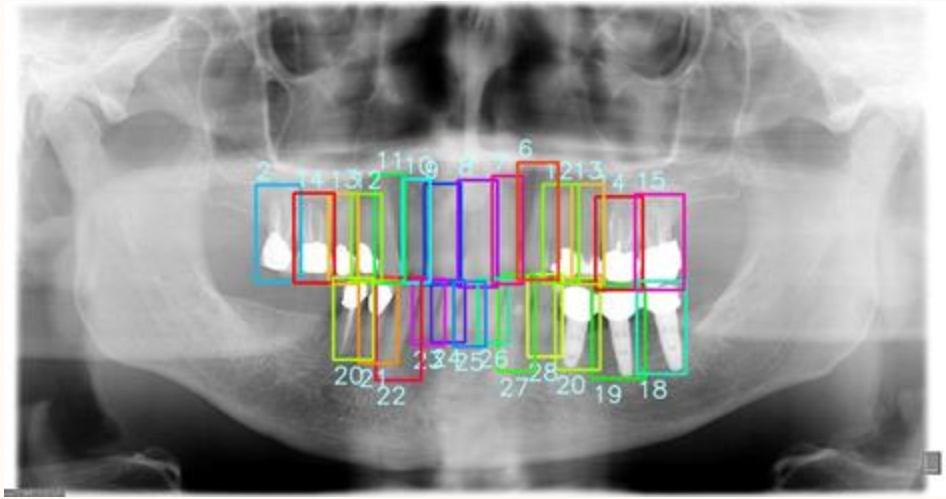
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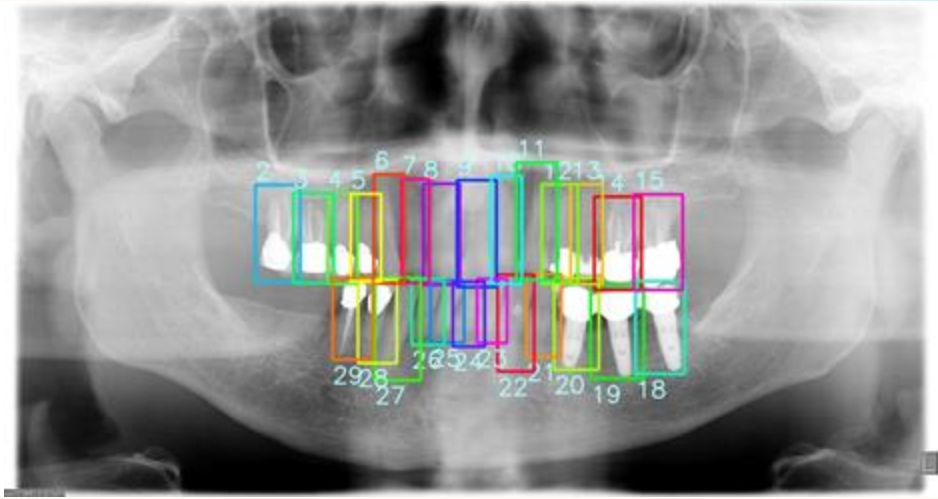
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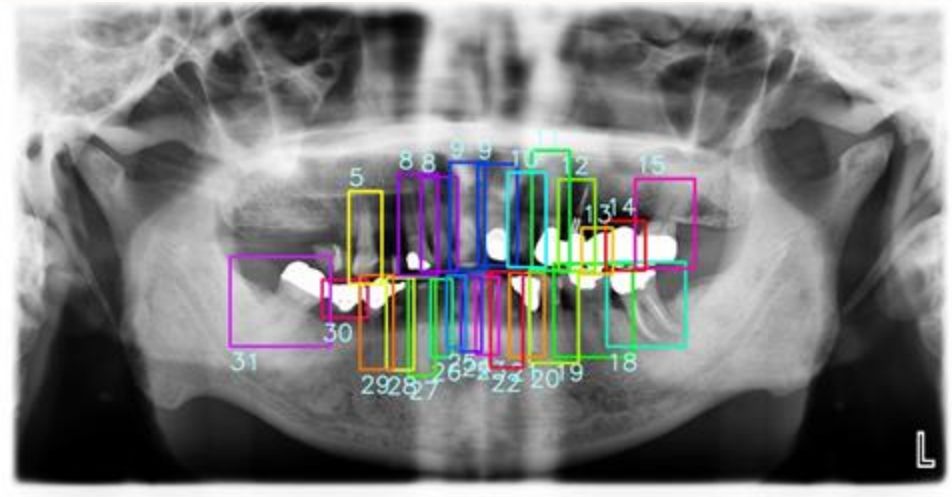
Original



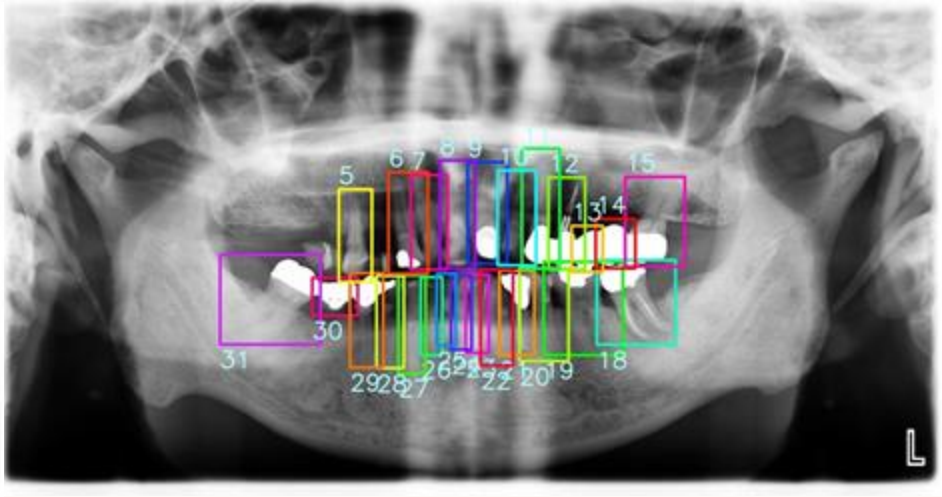
Improved

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Original



Improved

References

SuperMedIntel. (n.d.). *GitHub - SuperMedIntel/Medical-SAM-Adapter: Adapting Segment Anything Model for Medical Image Segmentation*. GitHub. https://github.com/SuperMedIntel/Medical-SAM-Adapter/tree/main

https://zaradental.com/teeth-numbers-and-names/

https://www.kaggle.com/datasets/humansintheloop/teeth-segmentation-on-dental-x-ray-images/data

https://github.com/bowang-lab/MedSAM

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Thanks!