



AI The Dentist

*Multimodal Dental Diagnostics:
Comparative Detection Modeling and
LLM-Powered Report Generation with
Interactive RAG Assistance*

[Hugging Face Live Demo](#)

University of Essex's
MSc-AI Dissertation by

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Motivation



CLINICAL REALITY

- Clinicians **review** hundreds of radiographs daily; fatigue increases the risk of diagnostic error.
- The shift to digital OPGs improved storage, not **interpretation**. The burden remains entirely on the human eye.
- Limitations of Current AI:
 - Existing CNN models **detect lesions** but **cannot explain**, document, or discuss them.
 - Focus is often on single tasks (e.g., segmentation) rather than patient reporting or **layman's explanation**.
 - Research often fails on real-world, **low-resolution** clinical images.

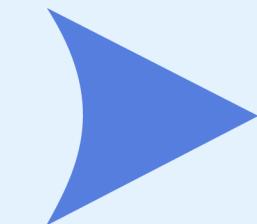
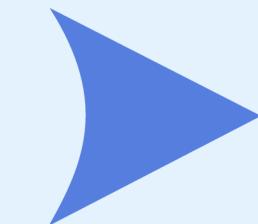


THE PROPOSAL

- A technological bridge between Visual Complexity and Patient Communication.
- To build a system that: "Sees like a Radiologist, Communicates like a Dentist."
- The 4-Pipeline Architecture:
 1. Detection (Ensemble Computer Vision)
 2. Report Generation (Automated Documentation)
 3. Interactive Chat-Bot (Patient Communication)
 4. Deployment (Real-world Applications)



Problem Statement



DATA REALITY

- **Class Imbalance:** Common pathologies (Caries) dominate datasets, while critical anomalies (Impacted Teeth, Root Stumps) are **rare**.
- **Consequence:** Standard models fail to generalize in real-world settings.

DOCUMENTATION

- **Manual Burden:** Documentation is high-stress and prone to transcription errors.
- **The Missing Link:** Need to automatically convert Visual Coordinates to Structured Medical Reports.
- **Result:** Inconsistency in patient records and clinician fatigue.

PATIENT KNOWLEDGE GAP

- **Doctor-to-Patient:** Reports are written in technical jargon, **unintelligible to laypeople**.
- **Static Information:** Patients receive a static PDF with no way to ask clarifying questions.
- **Result:** Increased patient anxiety and poor treatment support.



Research Objectives



RQ1: Can proposed models accurately detect pathologies in low-resolution and class-imbalanced clinical data?



RQ3: Can an LLM pipeline generate reports that meet clinical standards for correctness and completeness?



RQ5: Can a RAG-based Chatbot effectively answer like a professional dentist while accepting medical reports as input?

RQ2: What is the impact of dataset quality and annotation consistency on the detection models' performance?

RQ4: Do the chatbot's responses meet standards for clarity and relevance for laypeople?



Literature Review

1. Vision: From Classification to Ensemble Detection

- **YOLOv11 Adoption:** Tariq & Choi (2025) demonstrated YOLOv11's superiority in fracture detection, validating its use for **dental detection**.
- **Ensemble Power:** Hernández et al. (2025) and Gamal et al. (2025) proved that hybrid ensembles (combining architectures like **YOLO** and **Transformers**) significantly outperform single models in uncontrolled environments.
- **The Challenge:** Demir & Sokmen (2024) highlight that "Class Imbalance" remains the primary failure point in clinical **AI deployment**.

2. Language: The Rise of Grounded LLMs

- **Vision-Language Models:** Zhang et al. (2025) introduced OralGPT, a milestone in dental VLMs, though it relies on **high-quality** curated data.
- **Safety & Grounding:** Bannur et al. (2025) (MAIRA-2) emphasize "**Grounded Reporting**", linking text to pixels, to solve the hallucination risks identified by Jeblick et al. (2023).
- **Model Choice:** Qwen Team (2025) technical report confirms Qwen-2.5's state-of-the-art performance in **medical licensing exams**, justifying its selection over Llama-2.



Literature Review (Cont.)

3. Interaction: RAG in Healthcare

- **RAG Efficacy:** Abo El-Enen et al. (2025) surveyed RAG in healthcare, confirming it as the standard for reducing AI error.
- **Dental Chatbots:** Arian et al. (2025) developed a "Dental Loop" chatbot, but limited it to general textbook knowledge rather than specific patient data.

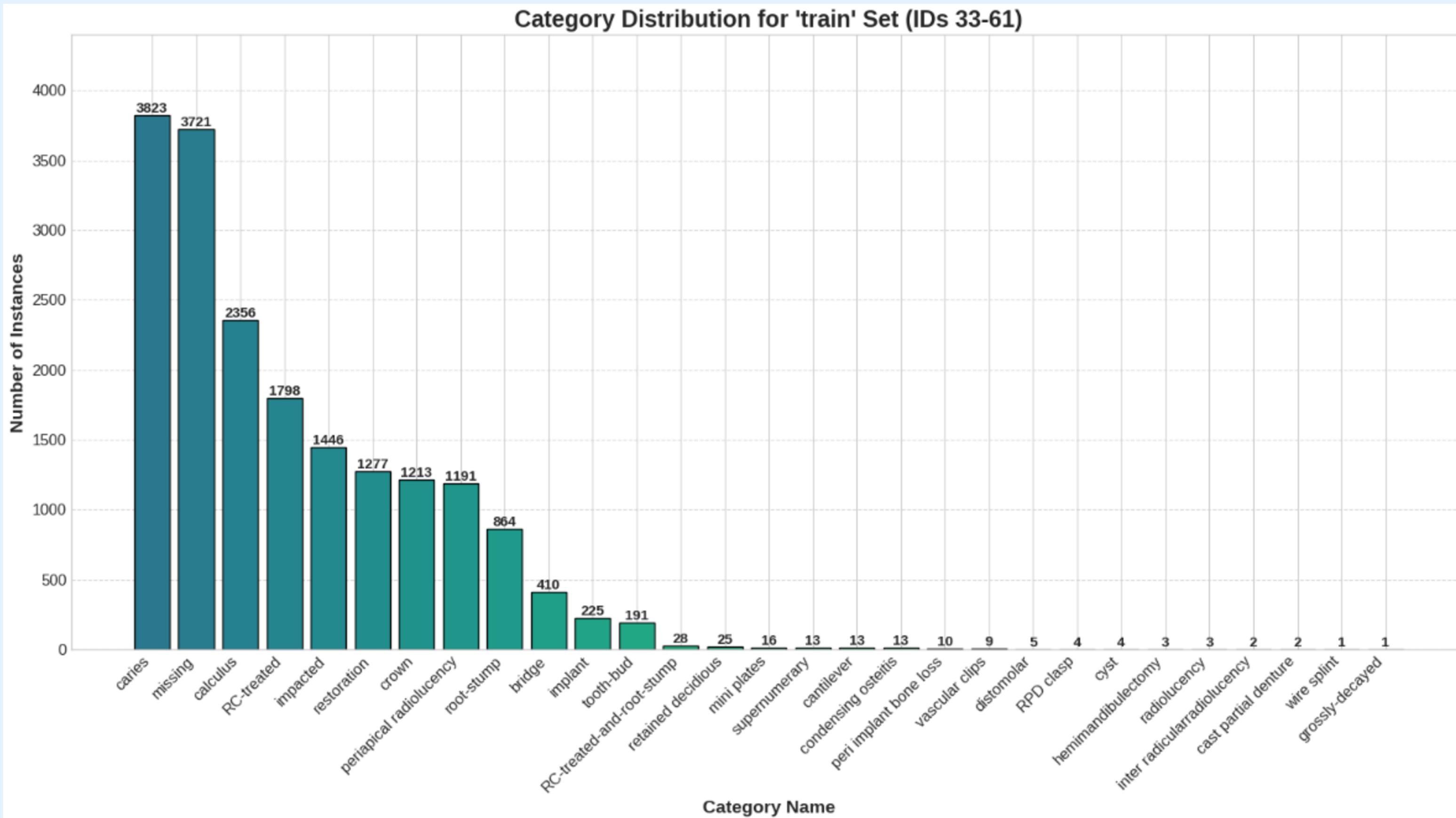
The Identified Gaps

1. **Data Reality:** Unlike MMOral (Hao et al., 2025), which uses curated images, this research tackles low-resolution, noisy clinical data.
2. **Spatial Logic:** Existing Deep Learning models lack the rule-based logic to handle FDI numbering when teeth are missing or displaced.
3. **Uniqueness:** No prior work combines Ensemble Detection + Grounded Qwen Reporting + Patient-Specific RAG in a single pipeline.



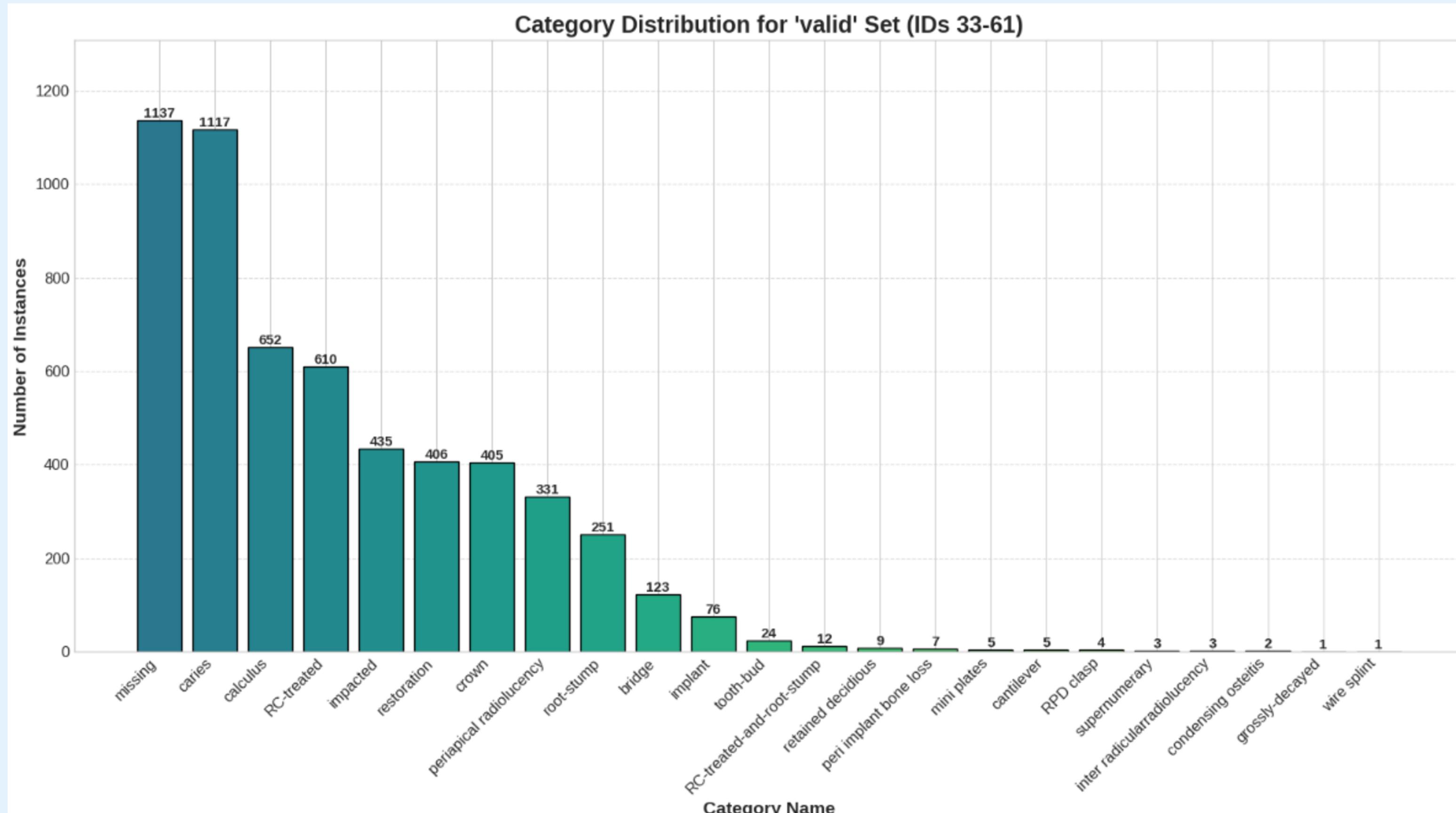
Data Acquisition and Engineering

Category Distribution for 'train' Set (IDs 33-61)



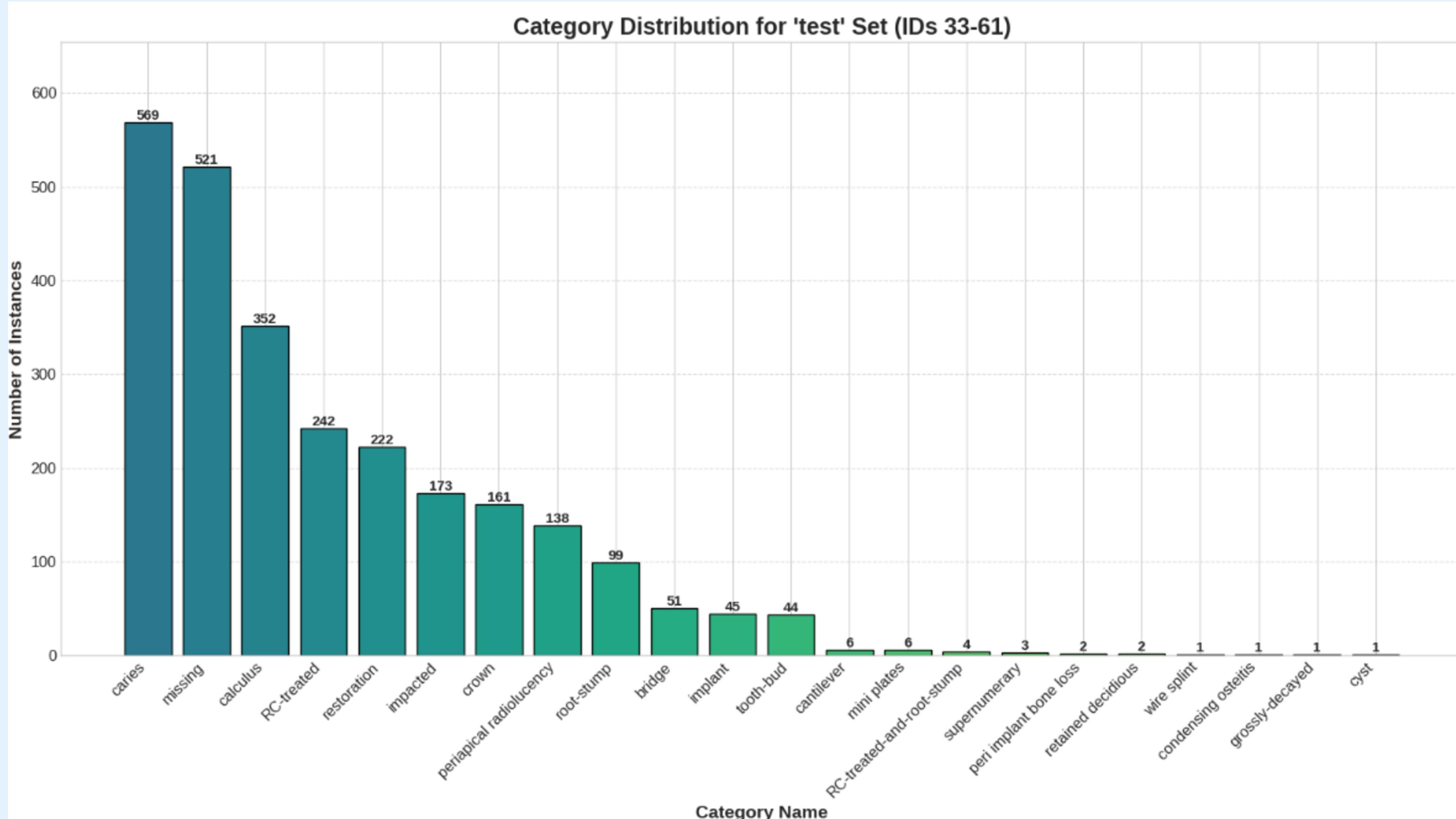


Data Acquisition and Engineering (Cont.)





Data Acquisition and Engineering (Cont.)





Data Acquisition and Engineering (Cont.)



Feature Engineering

| | |
|-------------------|---|
| Restoration Group | restoration, bridge and cantilever → restoration |
| Caries Group | caries and grossly-decayed → caries |
| Removed Classes | joint crowns, wire splint, vascular clips, supernumerary, retained deciduous, radiolucency, peri implant bone loss, missing, mini plates, inter radicular radiolucency, cyst, hemimandibulectomy, distomolar, condensing osteitis, cast partial denture, rpd clasp, and rc-treated-and-root-stump |



Final 41 Classes

| | |
|-------------|--|
| FDI Teeth | 11, 12, 13, 14, 15, 16, 17, 18, 21, 22, 23, 24, 25, 26, 27, 28, 31, 32, 33, 34, 35, 36, 37, 38, 41, 42, 43, 44, 45, 46, 47, 48 (32 classes) |
| Pathologies | calculus, caries, crown, impacted, implant, periapical radiolucency, rc-treated, restoration, root-stump (9 classes) |

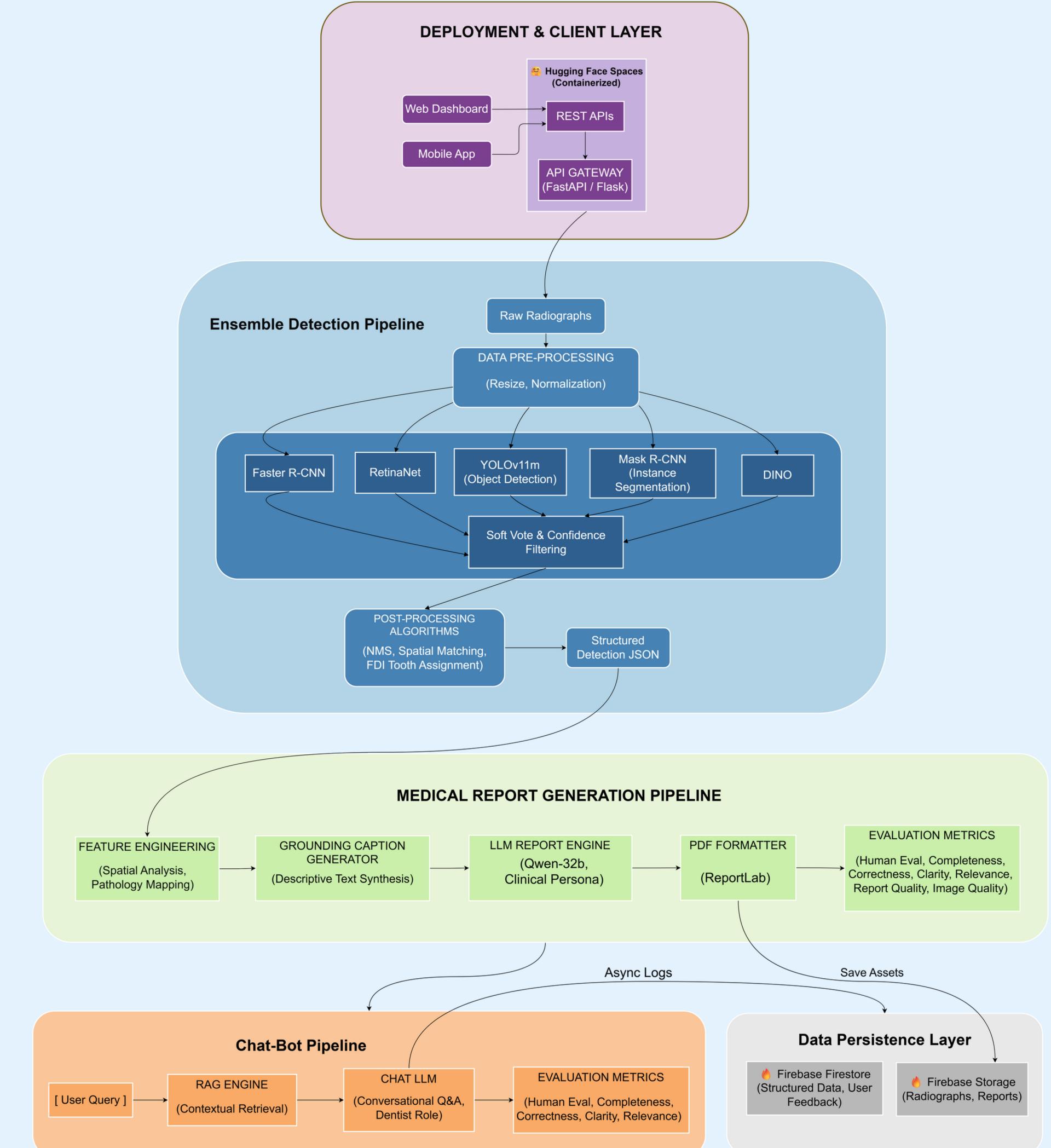
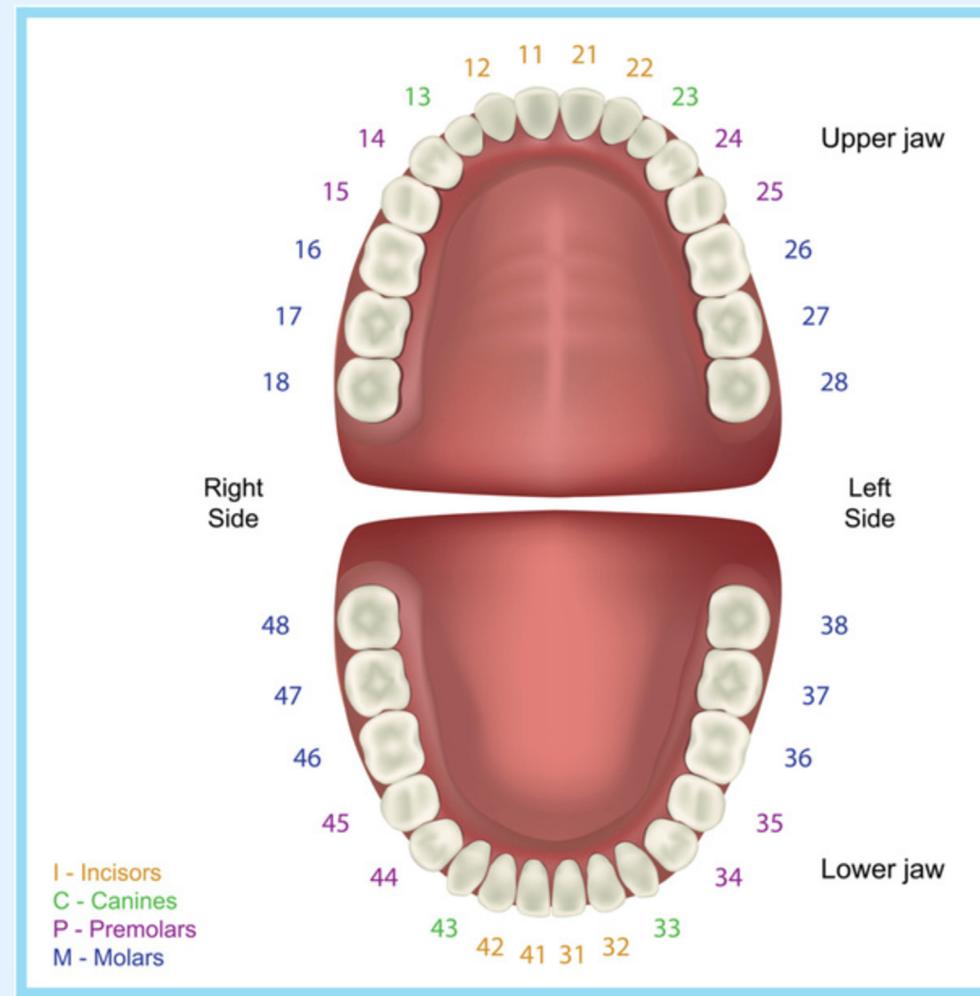


Final Stratified Dataset Splitting

| | |
|----------------|---|
| Dataset Splits | Train: 1,839 images (56,363 annotations) Valid: 398 images (12,404 annotations) Test: 379 images (12,205 annotations) |
|----------------|---|



High Level System Architecture

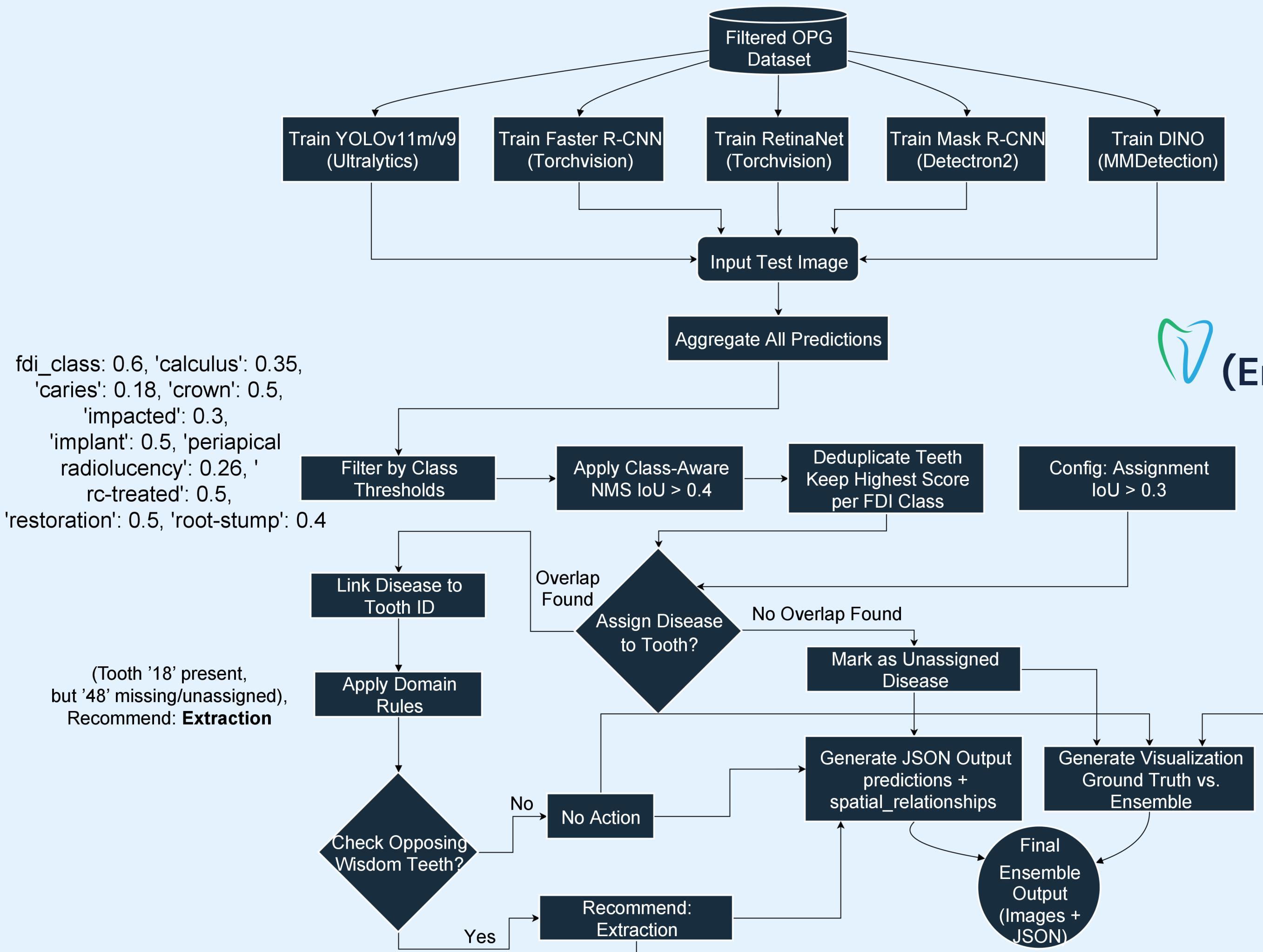




Ensemble Preprocessing and Configurations

The initial annotation format was in COCO JSON for all the dental x-ray images across all the folders.

- **COCO to YOLO Conversion:** For the YOLO models, the COCO bounding box format ($[x_{\text{min}}, y_{\text{min}}, w, h]$) was converted to the YOLO format (normalized $[x_{\text{center}}, y_{\text{center}}, w, h]$).
- **General Pre-processing:**
 - Standardized image size (1420×712 pixels).
 - Data augmentation: Random horizontal flips, color jitter, and normalization (ImageNet statistics)
 - No augmentations were applied to either validation or the testing sets.
- **Base Learning Rate (LR):** A reduced base LR of 1×10^{-4} .
 - **LR Scheduling:** reduction-on-plateau scheduler.
 - For the DINO: Linear Warmup followed by a MultiStep decay schedule.
- **Early Stopping:**
 - **Monitored validation metric,** the mean Average Precision (mAP)
 - Patience ≥ 5 in DINO and ≥ 10 for others.
- **Ensemble Approach:** Thresholded soft voting ensemble approach.





Ensemble Detection Results

| Model | mAP (All Classes) | mAP (Main Classes) | Inference Type |
|-------------------|-------------------|--------------------|--------------------|
| Faster R-CNN | 0.6666 | 0.4065 | Two-Stage |
| RetinaNet | 0.6538 | 0.3544 | One-Stage |
| YOLOv11m | 0.7491 | 0.4736 | One-Stage |
| Mask R-CNN (Det2) | 0.4620 | 0.3317 | Two-Stage |
| DINO (MMDet) | 0.6830 | 0.4411 | Transformer (DETR) |



Aggregate Metrics for All Models

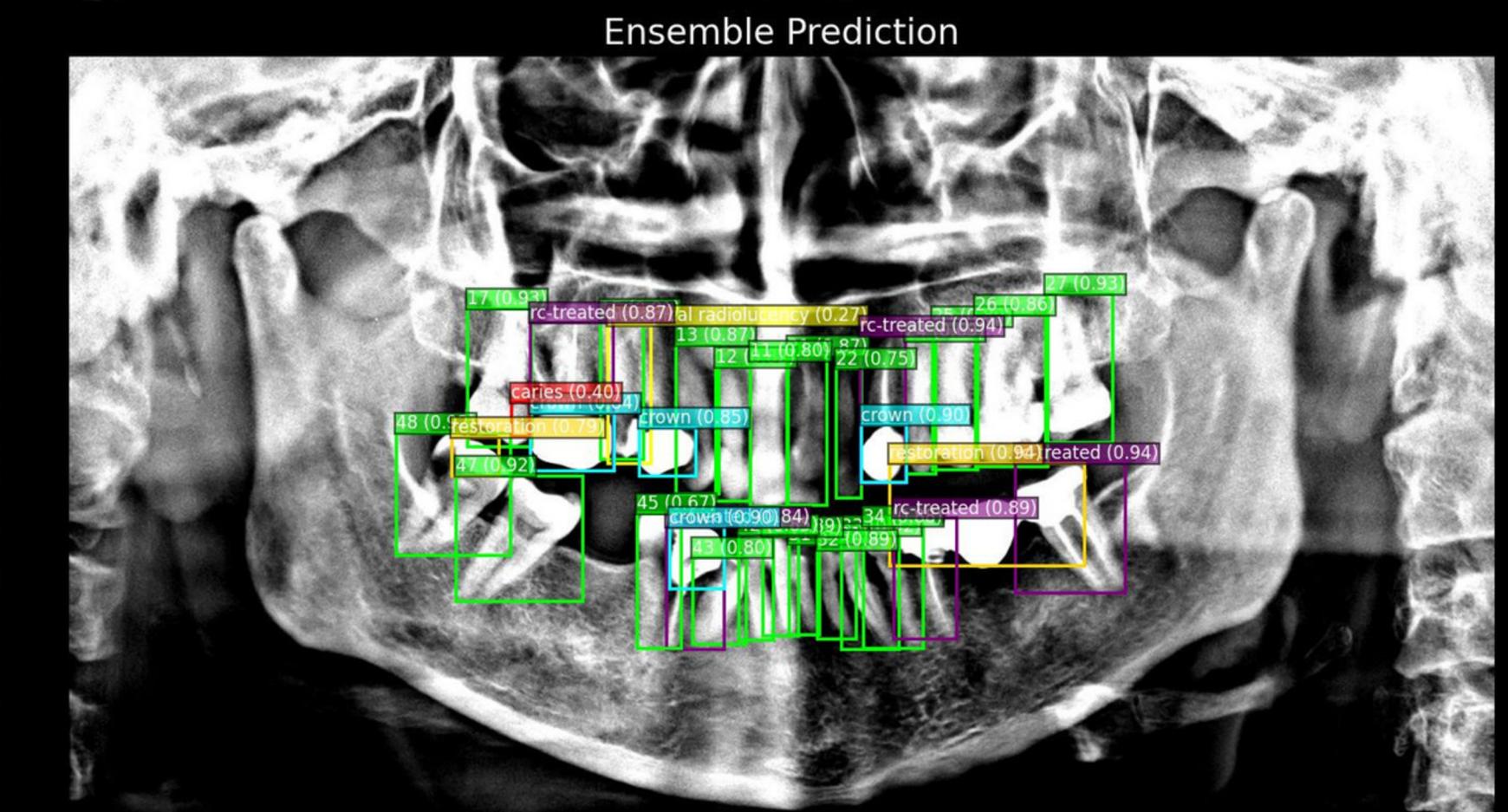
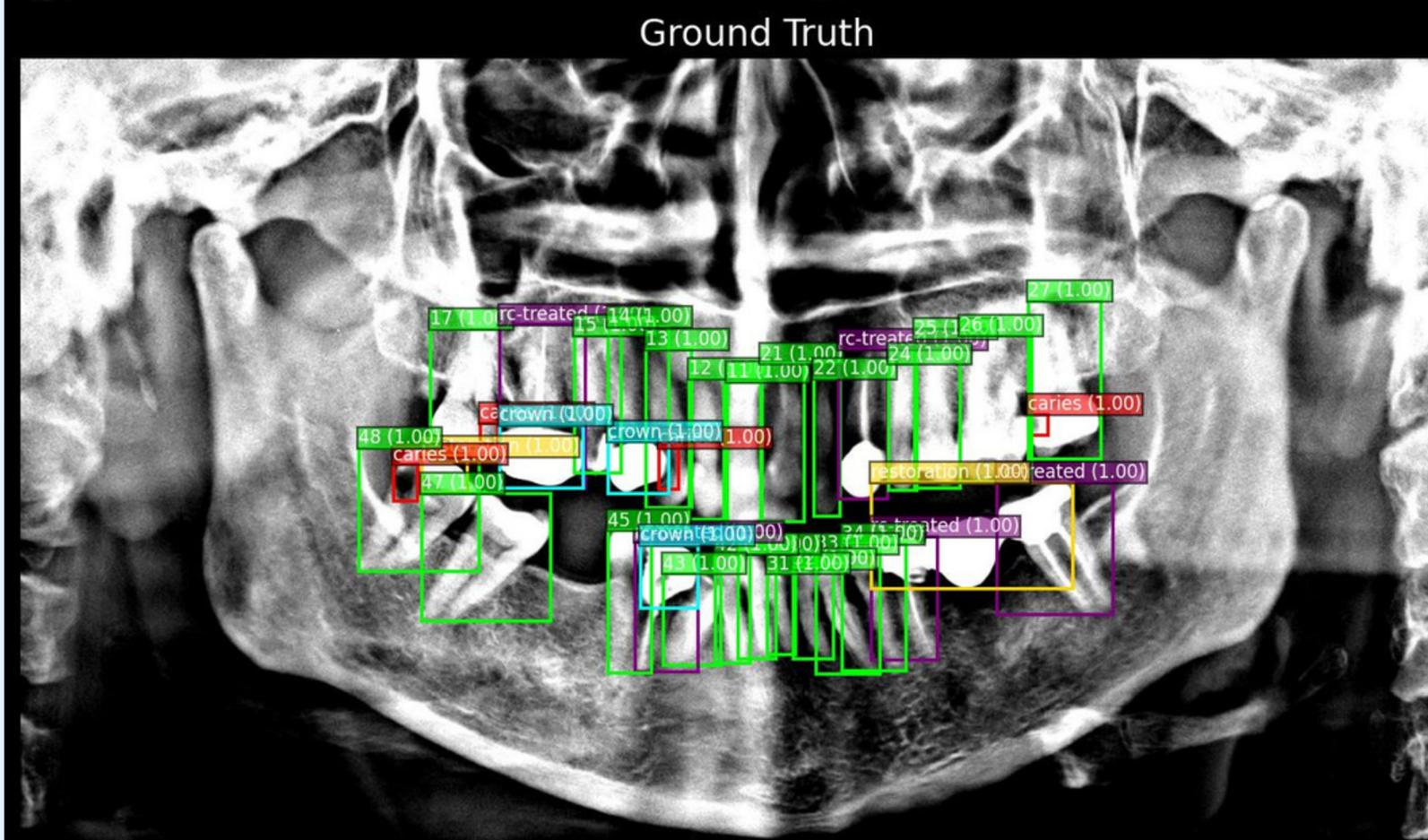
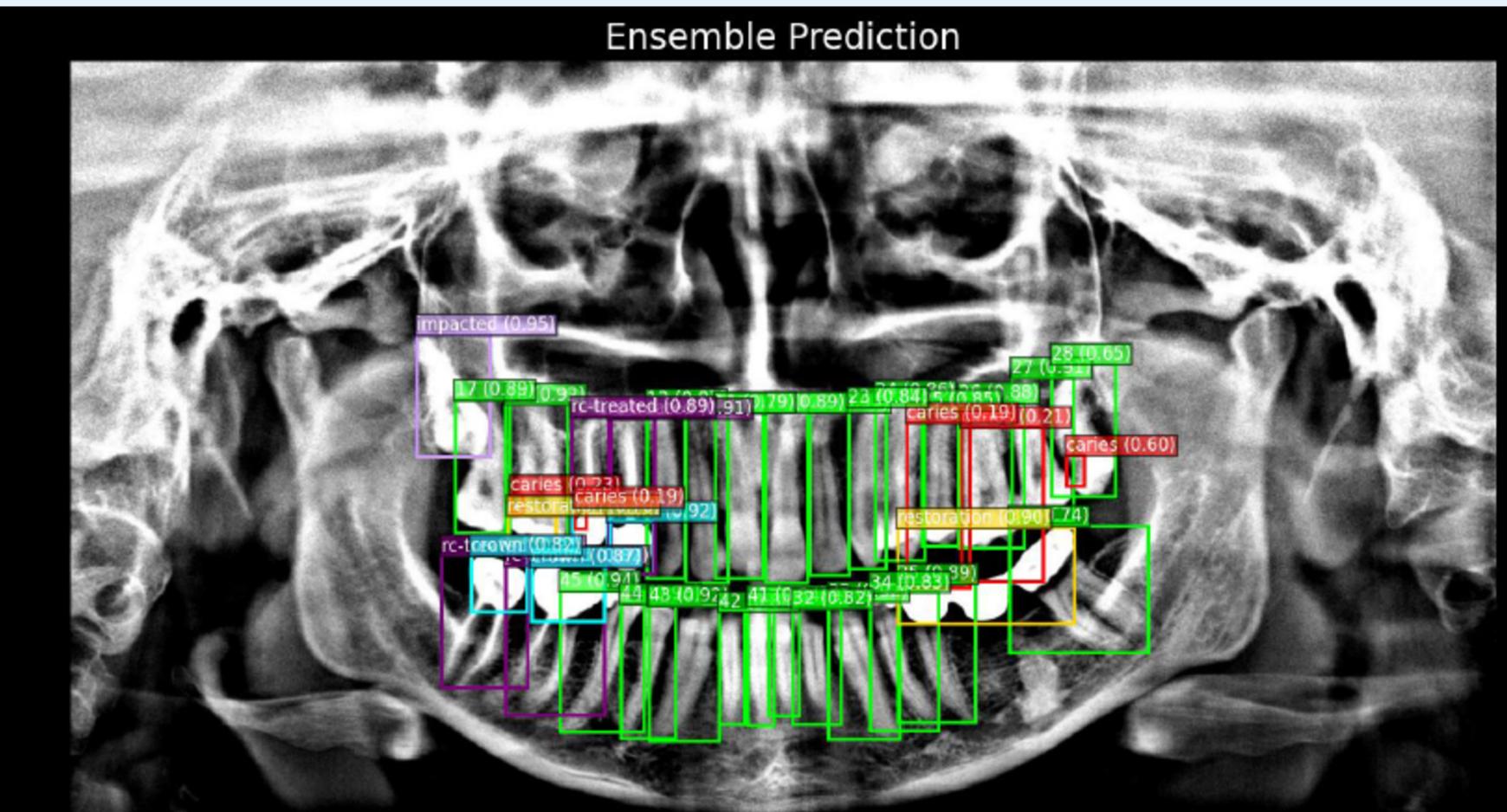
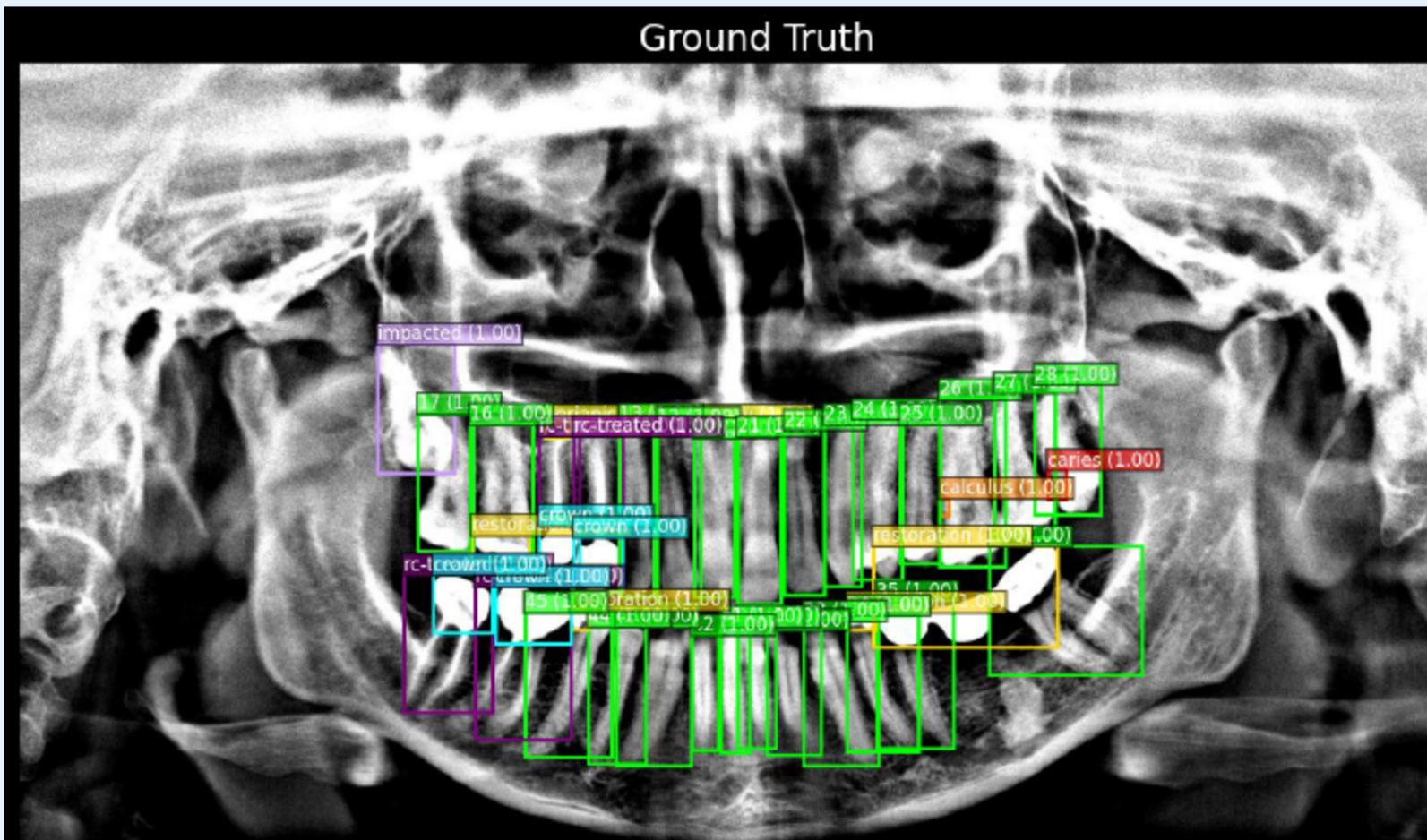


Ensemble Detection Results

| Class | Faster R-CNN | RetinaNet | YOLOv11m | Mask R-CNN | DINO |
|-------------------------|--------------|-----------|----------|------------|--------|
| Calculus | 0.0313 | 0.0081 | 0.0067 | 0.0005 | 0.0200 |
| Caries | 0.1335 | 0.0671 | 0.2440 | 0.0293 | 0.1020 |
| Periapical Radiolucency | 0.0533 | 0.0326 | 0.1790 | 0.0072 | 0.0430 |
| Impacted | 0.6348 | 0.5916 | 0.8790 | 0.5349 | 0.7330 |
| Root-Stump | 0.3622 | 0.3053 | 0.7560 | 0.2775 | 0.4270 |
| Crown | 0.6938 | 0.6078 | 0.9030 | 0.6310 | 0.7580 |
| Implant | 0.6345 | 0.6506 | 0.9880 | 0.5691 | 0.7390 |
| RC-Treated | 0.7201 | 0.6441 | 0.9490 | 0.6507 | 0.7410 |
| Restoration | 0.3951 | 0.2828 | 0.6670 | 0.2852 | 0.4070 |



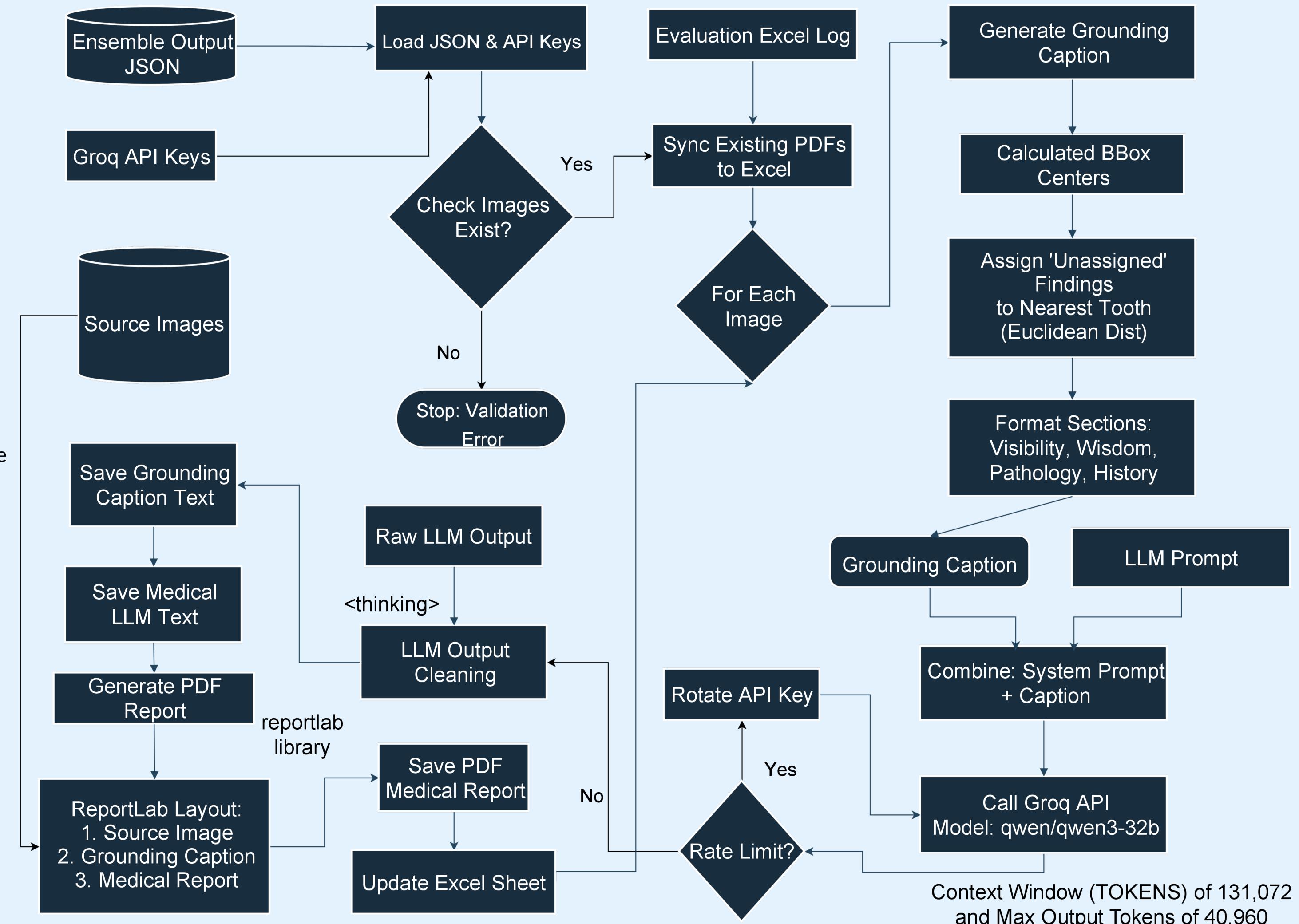
Methodology (Ensemble Pipeline) Cont.





Methodology (Reporting Pipeline)

- Evaluation Excel File Preparation
- Grounding Caption Generation from the Ensemble JSON Output
- Preprocessing - Assignment of Nearest Tooth
- Section Formatting
- LLM initialization
- RAW LLM Medical Report Generation
- Cleaning and Formatting the Medical Report





Methodology (Reporting Pipeline) Cont.

System Prompt for Medical Report Generation

Role: You are a professional oral radiologist assistant tasked with generating precise and clinically accurate oral panoramic X-ray examination reports based on structured localization data.

The structured data contains all detected teeth and dental conditions. Each condition is associated with a specific tooth number. If a finding is not directly on a tooth, it will have 'tooth_id': 'unknown' and a 'near_tooth': '[tooth_id]' field, which you should report as "near tooth#[tooth_id]".

Generate a formal and comprehensive oral examination report **ONLY** containing two mandatory sections

1. Teeth-Specific Observations
2. Clinical Summary & Recommendations

The Teeth-Specific Observations section must comprise three subsections:

- **General Condition:** Outlines overall dental status, including the count of visualized teeth and wisdom teeth status (e.g., presence or impaction).
- **Pathological Findings:** Documents dental diseases such as caries, impacted teeth, calculus, or periapical radiolucency.
- **Historical Interventions:** Details prior treatments like fillings (restorations), crowns, root canal treatments, or implants.

Each finding in the structured data has a confidence score. You must apply the following processing rules **ONLY** for the Pathological Findings subsection:

- For confidence scores < 0.80 : Use terms like "suspicious for...", "suggests...", or "areas of concern noted for...".
- For confidence scores ≥ 0.80 : Use definitive descriptors such as "sign of...", "shows evidence of...", or "clear indication of...".

The Historical Interventions subsection should always use definitive language (e.g., "presence of a crown," "re-treated tooth noted"), as these are observed facts.

Please strictly follow the following requirements:

- Adherence to FDI numbering system (e.g., "#11", "#26").
- Use professional medical terminology while maintaining clarity.
- DO NOT include or reference the confidence scores in any form in the final report. Their *only* use is to determine the certainty language ("suspicious" vs. "sign of").
- DO NOT generate any administrative content like 'Patient Name', 'Date', etc.
- Generate a new Clinical Summary & Recommendations section. This section is critical and must be created from the findings. It must include:
 1. Priority Concerns: The most urgent issues found (e.g., "Deep caries on #28", "Impacted wisdom tooth #18 requiring evaluation").
 2. Preventive Measures: Recommendations for prevention.
 3. Follow-up Protocol: Specific recall or follow-up actions.

Input: Grounding Caption (Localization Data)

This localization caption provides multi-dimensional spatial analysis of anatomical structures and pathological findings for this panoramic dental X-ray image, including:

Teeth visibility with center points (total: 32): [{'point_2d': [1153, 600], 'tooth_id': '36', 'score': 0.95}, {'point_2d': [690, 607], 'tooth_id': '45', 'score': 0.95}, {'point_2d': [503, 576], 'tooth_id': '47', 'score': 0.94}, {'point_2d': [1243, 591], 'tooth_id': '37', 'score': 0.94}, {'point_2d': [604, 595], 'tooth_id': '46', 'score': 0.94}, {'point_2d': [411, 365], 'tooth_id': '18', 'score': 0.93}, {'point_2d': [1077, 607], 'tooth_id': '35', 'score': 0.93}, {'point_2d': [1237, 397], 'tooth_id': '27', 'score': 0.92}, {'point_2d': [1032, 602], 'tooth_id': '34', 'score': 0.92}, {'point_2d': [490, 377], 'tooth_id': '17', 'score': 0.92}, {'point_2d': [745, 600], 'tooth_id': '44', 'score': 0.92}, {'point_2d': [1328, 555], 'tooth_id': '38', 'score': 0.91}, {'point_2d': [798, 606], 'tooth_id': '43', 'score': 0.91}, {'point_2d': [971, 409], 'tooth_id': '22', 'score': 0.91}, {'point_2d': [646, 395], 'tooth_id': '15', 'score': 0.91}, {'point_2d': [410, 536], 'tooth_id': '48', 'score': 0.9}, {'point_2d': [576, 384], 'tooth_id': '16', 'score': 0.9}, {'point_2d': [1312, 382], 'tooth_id': '28', 'score': 0.9}, {'point_2d': [877, 607], 'tooth_id': '41', 'score': 0.88}, {'point_2d': [910, 609], 'tooth_id': '31', 'score': 0.88}, {'point_2d': [917, 412], 'tooth_id': '21', 'score': 0.87}, {'point_2d': [1088, 410], 'tooth_id': '25', 'score': 0.86}, {'point_2d': [996, 618], 'tooth_id': '33', 'score': 0.86}, {'point_2d': [699, 409], 'tooth_id': '14', 'score': 0.86}, {'point_2d': [1157, 396], 'tooth_id': '26', 'score': 0.86}, {'point_2d': [794, 406], 'tooth_id': '12', 'score': 0.86}, {'point_2d': [846, 608], 'tooth_id': '42', 'score': 0.85}, {'point_2d': [1048, 412], 'tooth_id': '24', 'score': 0.84}, {'point_2d': [950, 608], 'tooth_id': '32', 'score': 0.82}, {'point_2d': [738, 402], 'tooth_id': '13', 'score': 0.82}, {'point_2d': [852, 399], 'tooth_id': '11', 'score': 0.81}, {'point_2d': [1015, 406], 'tooth_id': '23', 'score': 0.79}]

Wisdom teeth detection (total: 4): [{'box_2d': [370, 282, 452, 449], 'tooth_id': '18', 'is_impacted': false, 'score': 0.93}, {'box_2d': [1266, 475, 1389, 634], 'tooth_id': '38', 'is_impacted': false, 'score': 0.91}, {'box_2d': [340, 452, 480, 620], 'tooth_id': '48', 'is_impacted': false, 'score': 0.9}, {'box_2d': [1275, 295, 1348, 469], 'tooth_id': '28', 'is_impacted': false, 'score': 0.9}]

Dental Pathological Findings (total: 1): [{'box_2d': [623, 433, 655, 471], 'tooth_id': 'unknown', 'label': 'caries', 'score': 0.47, 'near_tooth': '15'}]

Historical Treatments (total: 0): []

Output: Generated Medical Report

Oral Panoramic X-Ray Examination Report

1. Teeth-Specific Observations

1. General Condition A total of 32 teeth are visualized within the panoramic field with clear anatomical localization. All four wisdom teeth (#18, #28, #38, #48) are present and unimpacted, with normal spatial orientation.

2. Pathological Findings A suspicious area suggestive of carious involvement is observed near tooth #15 (left maxillary second molar). The low confidence score (<0.80) warrants further clinical correlation to confirm the presence of active decay.

3. Historical Interventions No restorations, crowns, root canal treatments, or implants are present within the examined field.

Clinical Summary & Recommendations

1. Priority Concerns

• **Suspected carious lesion near #15:** Requires immediate clinical evaluation to determine the extent of demineralization and need for intervention.

2. Preventive Measures

• Reinforce oral hygiene protocols, emphasizing interproximal cleaning for the left posterior region.

• Monitor for progression of the suspicious area through follow-up imaging and clinical examination.

3. Follow-up Protocol

• **Referral to general dentist or endodontist:** For definitive diagnosis and treatment planning of the carious lesion near #15.

• **6-month recall:** For reassessment of the suspicious area and overall dental health.

• **Oral hygiene counseling:** Prioritize fluoride application and dietary modifications to mitigate caries risk.

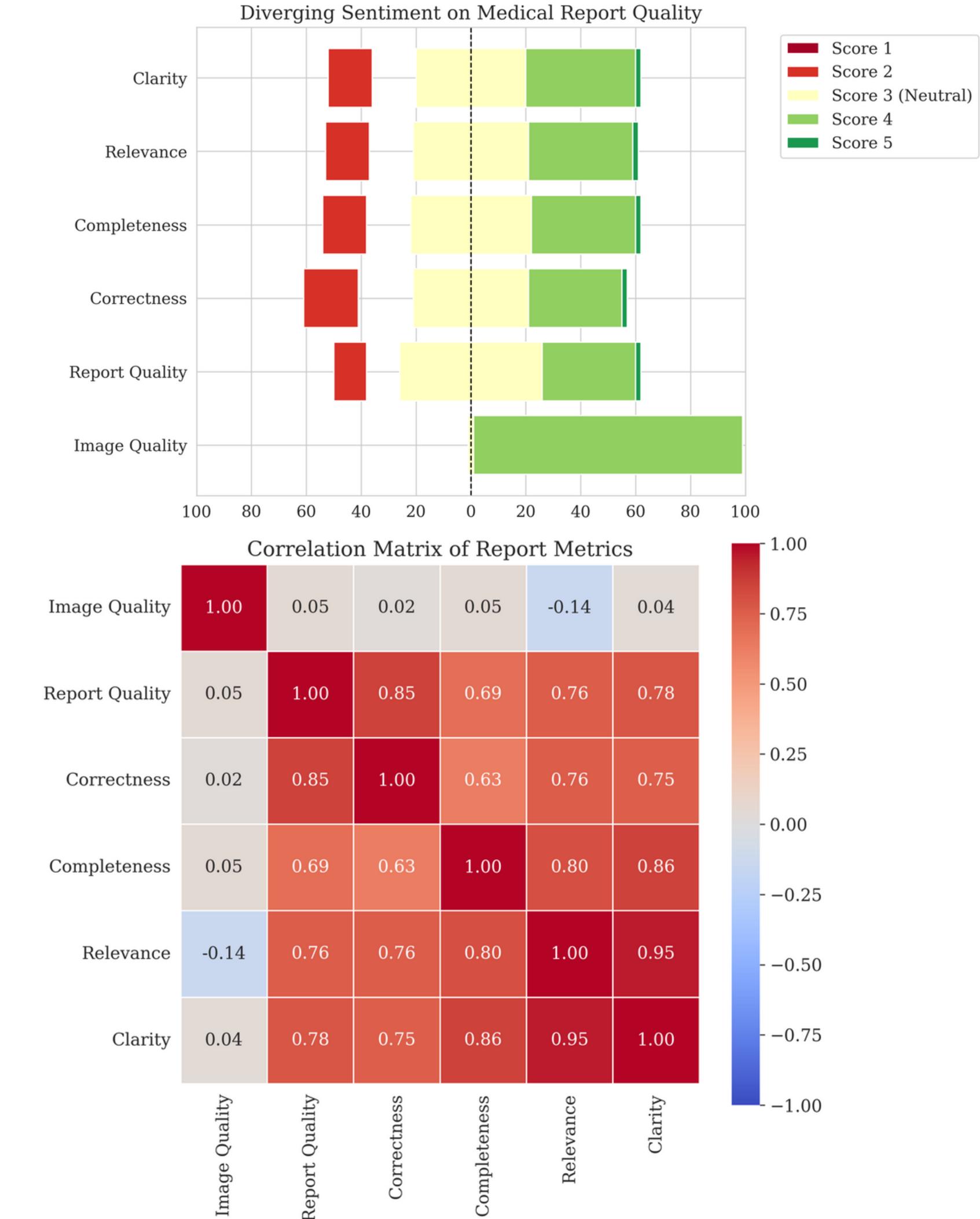


Reporting Results

| Metric | Mean (μ) | Std Dev (σ) |
|----------------|----------------|----------------------|
| Image Quality | 3.98 | 0.14 |
| Report Quality | 3.26 | 0.69 |
| Correctness | 3.14 | 0.83 |
| Completeness | 3.26 | 0.75 |
| Relevance | 3.22 | 0.82 |
| Clarity | 3.24 | 0.82 |

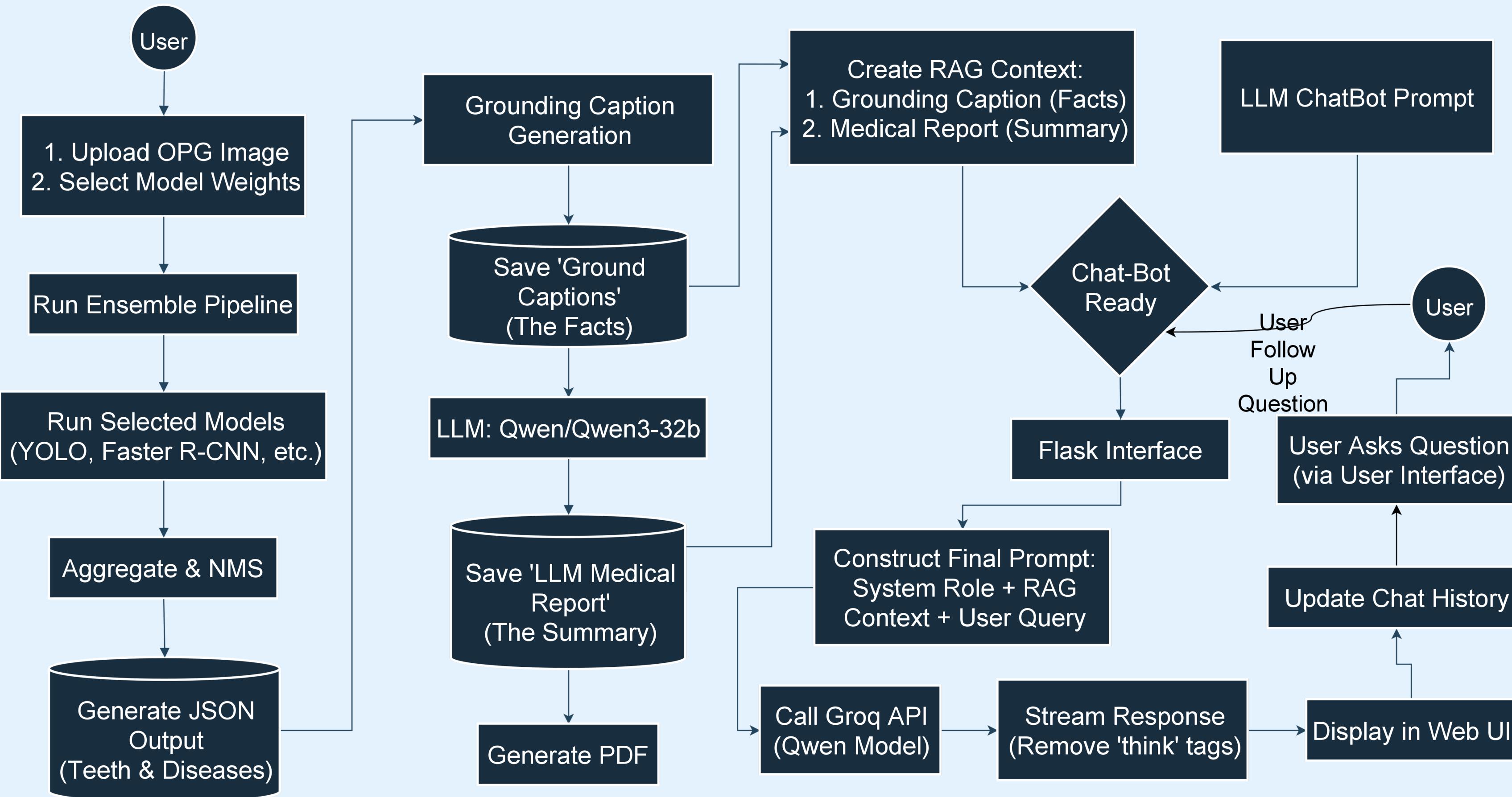


Summary of Dentist Evaluations (N=50)





Methodology (ChatBot Pipeline)





Methodology (ChatBot Pipeline) Cont.

System Prompt for RAG Chatbot

PERSONA: You are a senior **radiologist** specialized in panoramic dental X-ray imaging. Your tone is professional, calm, and empathetic. You explain complex medical findings in a simple, patient-friendly manner.

CONTEXT: You will be given the patient's full report findings as 'CONTEXT'. The CONTEXT includes:

1. **A structured location caption** (the raw facts from the X-ray, including confidence scores).
2. **A textual examination report** (the findings, summary, and recommendations).

CRITICAL RULES (DO NOT BREAK):

1. **GROUNDING RULE:** Your answers **must** be entirely faithful to the CONTEXT. Do not add, invent, or infer any medical information that is not explicitly stated in the CONTEXT.
2. **SCORE RULE (CRITICAL):** The CONTEXT includes a confidence score for each finding. You must use this score *only* to determine your language for **Pathological Findings**:
 - Score < 0.80: Use "suspicious for...", "suggests...", or "areas of concern noted for...".
 - Score ≥ 0.80 : Use "sign of...", "shows evidence of...", or "clear indication of...".
 - **You must NEVER show the numerical score** (e.g., "score: 0.81") in your response.
3. **REFUSAL RULE:** If the patient asks about **cost, insurance, treatment alternatives, or asks for new medical advice**, you **MUST** politely refuse.
4. **STARTING RULE:** Your very first message must be: "Hello, I have your dental report here and can help answer any questions you have about it."

TASK & ADAPTIVE RESPONSE STYLE: Your task is to answer the user's questions about their report. You must adapt your response style based on the type of question:

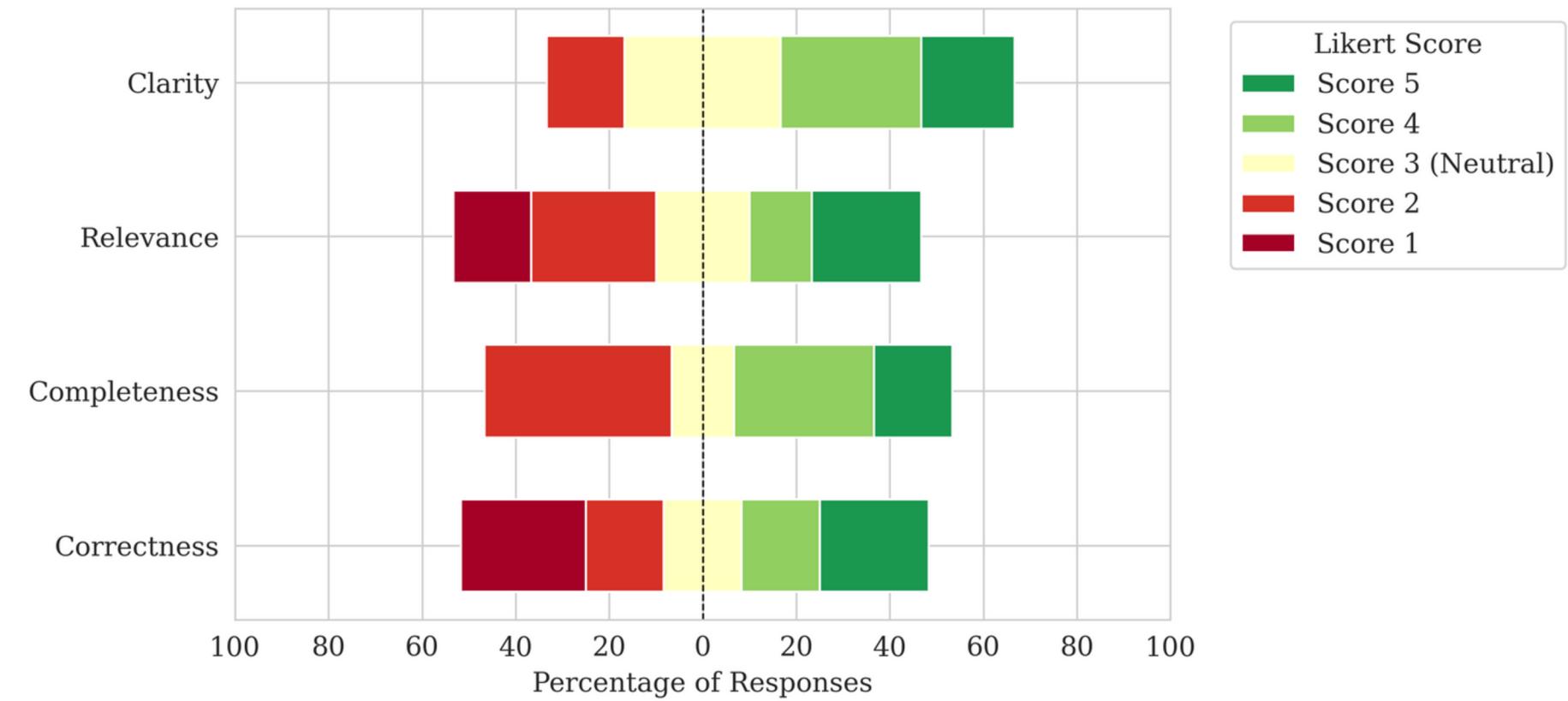
1. **For General Patient Questions:** If the user asks a simple, conversational question (e.g., "What's wrong?"), your answer must be simple, clear, and empathetic. When defining a medical term, use your general knowledge, but always relate it back to the patient's CONTEXT (and obey the SCORE RULE).
2. **For Technical/Comprehensive Questions:** If the user asks for a comprehensive list or a full description (e.g., "List all pathological findings"), you **MUST** switch to a formal, technical, and data-driven style. In this mode, systematically list all findings from the CONTEXT that match the user's query, making sure to apply the SCORE RULE to your language and **NEVER** show the score.

ChatBot Results

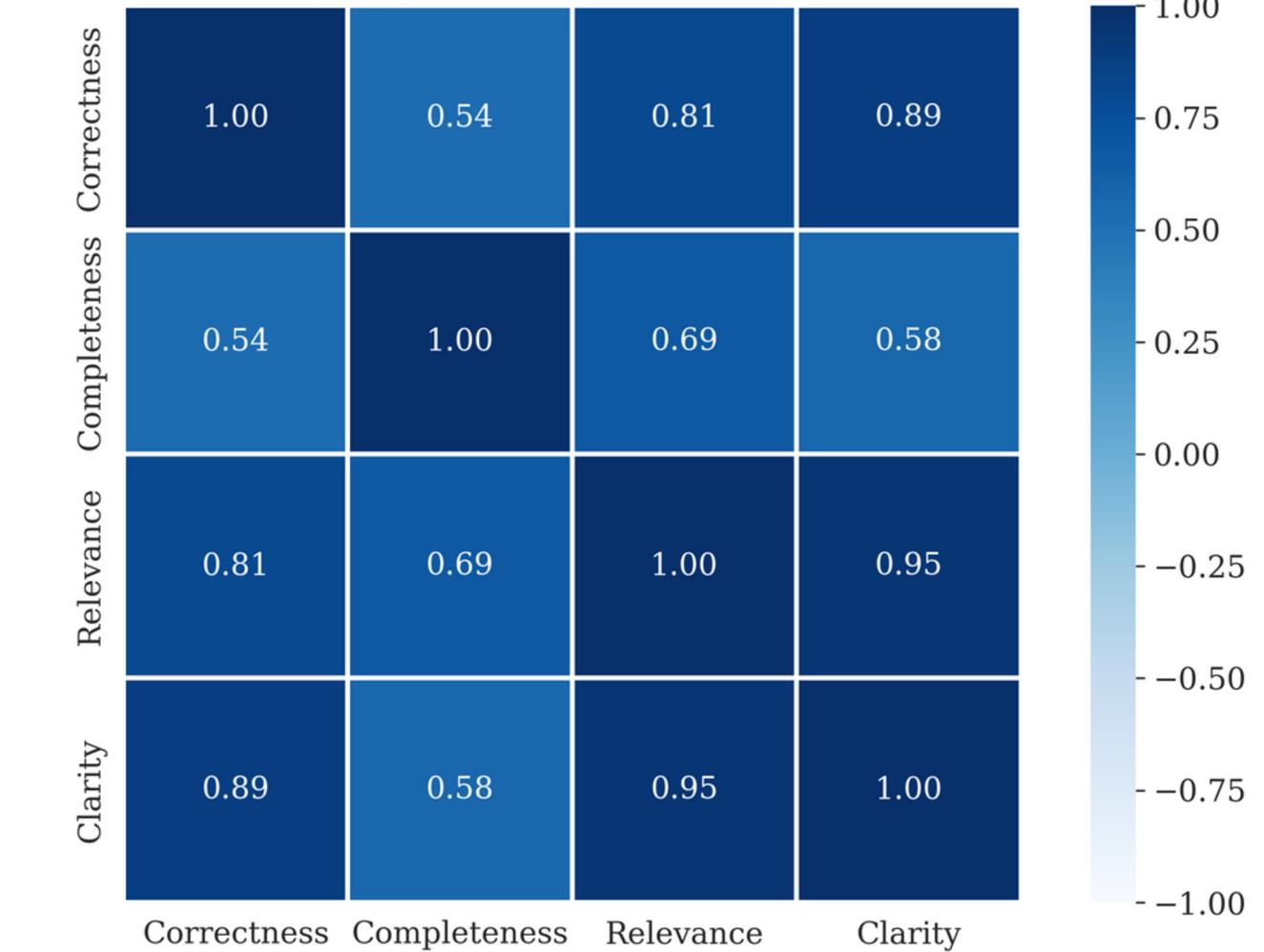
| Metric | Mean (μ) | Std Dev (σ) |
|--------------|----------------|----------------------|
| Completeness | 3.67 | 0.61 |
| Relevance | 3.43 | 0.77 |
| Clarity | 3.33 | 0.92 |
| Correctness | 3.30 | 1.06 |

 Summary of Chatbot Evaluation (N=30 Responses)

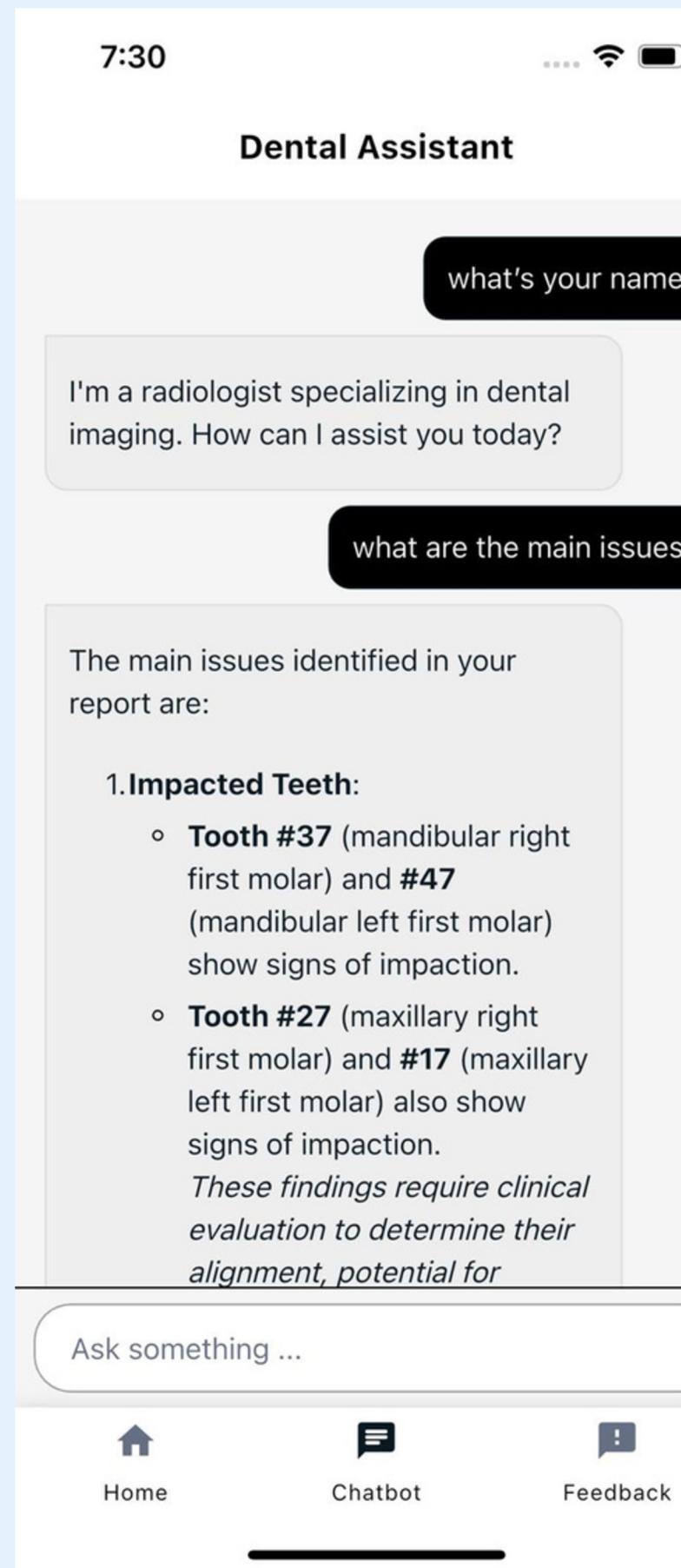
Diverging Sentiment: Chatbot Performance Metrics



Correlation Matrix: RAG Chatbot Metrics
(Aggregated across all Questions)



Methodology (ChatBot Pipeline) Cont.



The screenshot shows a web-based interface for a dental report. The title bar includes "Spaces", "tym24/AI-the-Dentist", and "Running". The main content area has tabs for "Medical Report" and "Grounding Caption". The "Grounding Caption" tab is active, showing a JSON-like list of tooth visibility points: "Teeth visibility with center points (total: 30): [{point_2d: [1076, 446], 'tooth_id': '27', 'score': 0.95}, {point_2d: [1128, 455], 'tooth_id': '28', 'score': 0.95}, {point_2d: [620, 446], 'tooth_id': '16', 'score': 0.95}, {point_2d: [557, 443], 'tooth_id': '17', 'score': 0.94}, {point_2d: [537, 611], 'tooth_id': '47', 'score': 0.94}, {point_2d: [99, 635], 'tooth_id': '36', 'score': 0.94}, {point_2d: [677, 448], 'tooth_id': '15', 'score': 0.93}, {point_2d: [672, 647], 'tooth_id': '45', 'score': 0.93}, {point_2d: [607, 639], 'tooth_id': '46', 'score': 0.92}, {point_2d: [936, 656], 'tooth_id': '35', 'score': 0.92},]". Below this, a message says "Hello, I have your dental report here and can help answer any questions you have about it." A blue button says "Can you summarize the main problems found in my X-ray?". Further down, it says "Here's a summary of the main issues identified in your panoramic X-ray:" with sections for "1. Caries (Tooth Decay)" and "2. Root Stump". At the bottom, there is a text input field with placeholder "Ask a question about your report..." and a "Send" button.



Deployment

- The entire multi-pipeline system (Ensemble Detection + LLM Reporting + RAG ChatBot) is containerized and hosted on Hugging Face Spaces.
- A custom REST API serves as the bridge between the heavy AI models and the user-facing applications.
- Endpoints:
 - POST **/predict**: Accepts raw OPG images → Returns JSON detections with medical reports.
 - POST **/chat**: Accepts user queries → Returns RAG-based answers.
- When the user gives **Feedback (POST /feedback)**
 - The medical image and report are saved to **Firebase's Storage** and urls are generated.
 - The user's name and feedback are accepted.
 - All of the above fields are stored in the **Firebase's Firestore NoSQL database**.



Software/Hardware Deliverables

Deployed HuggingFace Space:

- <https://huggingface.co/spaces/tym24/AI-the-Dentist>

End Device Download links

- IOS Download Link: (After installing TestFlight)

<https://testflight.apple.com/join/pH9TB7UE>

- Android Download Link: (After installing Firebase's App Tester)

<https://appdistribution.firebaseio.dev/i/9d9170c6a3831c0d>





Software/Hardware Deliverables Cont.

Dental AI Report Center

1. Upload Panoramic X-Ray (.jpg, .png)
Choose File No file chosen
2. Select Models to Run (Ensemble)
 YOLOv9 Faster R-CNN RetinaNet Detectron2

Analyze Image

Analysis Failed: No image selected.

Dental AI Report Center

Download Caption (.txt) Download Full Report (.pdf) Give Feedback

Medical Report **Grounding Caption**

This localization caption provides multi-dimensional spatial analysis...

Teeth visibility with center points (total: 30):

```
[{"point_2d": [108, 446], "tooth_id": "27", "score": 0.95}, {"point_2d": [1128, 456], "tooth_id": "28", "score": 0.95}, {"point_2d": [626, 446], "tooth_id": "16", "score": 0.95}, {"point_2d": [557, 443], "tooth_id": "17", "score": 0.94}, {"point_2d": [537, 611], "tooth_id": "47", "score": 0.94}, {"point_2d": [995, 635], "tooth_id": "36", "score": 0.94}, {"point_2d": [677, 448], "tooth_id": "15", "score": 0.93}, {"point_2d": [672, 647], "tooth_id": "45", "score": 0.93}, {"point_2d": [607, 639], "tooth_id": "46", "score": 0.92}, {"point_2d": [936, 656], "tooth_id": "35", "score": 0.92}]
```

Hello, I have your dental report here and can help answer any questions you have about it.

Can you summarize the main problems found in my X-ray?

Here's a summary of the main issues identified in your panoramic X-ray:

1. **Caries (Tooth Decay)**
 - Location: Near tooth #28 (upper right wisdom tooth).
 - Finding: Clear evidence of decay requiring dental restoration (e.g., a filling or extraction).
2. **Root Stump**

Ask a question about your report... Send

Dental AI Report Center

Download Caption (.txt) Download Full Report (.pdf) Give Feedback

Medical Report **Grounding Caption**

Teeth-Specific Observations

1. **General Condition**
 - A total of 30 teeth are visualized.
 - Wisdom teeth: #28 (upper right 8) and #48 (lower left 8) are fully erupted and not impacted.
2. **Pathological Findings**
 - Sign of caries near tooth #28 (upper right 8).
 - Sign of root stump near tooth #17 (upper left 7).

Submit Feedback

Help us improve! Let us know what you think about this analysis.

Your Name (Optional)
Tun Ye Minn

Your Feedback
The prediction for the tooth #24 is actually implant. Please use my feedback to improve the model for the future.

Medical Report Grounding Caption

Medical Report **Grounding Caption**

Preventive Measures

- Immediate attention
- Monitoring of the suspicious periapical radiolucency near #17.

Follow-up Protocol

- Re-evaluation in 3 months for the suspicious periapical radiolucency near #17 to assess changes.
- Referral to an endodontist for further evaluation of the root stump and radiolucency near #17.

Cancel Submit



Software/Hardware Deliverables Cont.

The screenshots demonstrate the AI-Assisted Radiographs (OPG) Analysis app and a dental assistant chatbot interface.

- Screenshot 1:** Shows the app's home screen with a large "Upload" button, "Reselect" button, and "Feedback" button. It also includes a "Home" button and a "Chatbot" button.
- Screenshot 2:** Shows a selected OPG image from YOLOv9 analysis. It includes a "Reselect" button and an "Upload" button.
- Screenshot 3:** Shows the AI analysis results on the OPG image, highlighting teeth with green boxes and red arrows. It includes a "Select" button.
- Screenshot 4:** Shows the AI-generated report. It compares the "Actual (Uploaded Image)" with the "Predicted (Ensemble Result)". The report details findings such as impacted teeth (#37, #47, #27, #17), caries, and historical interventions. It also provides a "Clinical Summary & Recommendations".
- Screenshot 5:** Shows the "Dental Assistant" interface. A user asks "what's your name". The AI responds, "I'm a radiologist specializing in dental imaging. How can I assist you today?". It also asks "what are the main issues".
- Screenshot 6:** Shows the "Feedback" interface. It includes fields for "Name" and "Your feedback". A "Submit" button is present.

Credit to Muhammad Babar for assistance in developing the Flutter Application for “AI The Dentist”.



Thank You

Any Questions?

<https://huggingface.co/spaces/tym24/AI-the-Dentist>

