Completeness of METADATA Reporting in AI Dental Research: Scoping Review Protocol

Authors

Author Name	Institutional Email	Affiliations	ORCID
Julien Issa	julien.issa@student.ump.edu.pl	-Department of Diagnostics, Chair of Practical Clinical Dentistry, Poznań University of Medical Sciences, Poznań, Poland. -Doctoral School, Poznań University of Medical Sciences, Poznań, Poland.	0000-0002-6498-7989
Akhilanand Chaurasia	akhilanandchaurasia@kgmcindia.edu	King George's Medical University, India	0000-0002-8356-9512
Nicola Alberto Valente	nicola.valente@unica.it	-Division of Periodontics, School of Dental Medicine, Department of Surgical Sciences, Faculty of Medicine and Surgery, University of Cagliari, Cagliari, Italy -College of Dentistry, American University of Iraq Baghdad	0000-0003-1403-5274
Mahsa Amanabi	mahsa_amanabi@berekeley.edu	University of California Berkeley, School of Public Health	0000-0001-5030-6911
Marwa Baraka	marwa.baraka@alexu.edu.eg	Lecturer of Pediatric Dentistry, Alexandria University, Egypt	0000-0001-7259-5515

Manal Hamdan	manal.hamdan@marquette.edu	-Assistant Professor and Predoctoral Director of Oral and Maxillofacial Radiology - Department of Surgical Sciences, Diagnostic Sciences Division,Marquette University School of Dentistry	0000-0003-4081-7675
Antonin Tichy	antonin.tichy@med.uni-muenchen.de	-Clinic for Conservative Dentistry and Periodontology, Munich, Germany - Institute of Dental Medicine, First Faculty of Medicine of the Charles University and General University Hospital, Prague, Czech Republic	0000-0002-6260-9992
Falk Schwendicke	falk.schwendicke@med.uni-muenchen.de	Department of Conservative Dentistry and Periodontology, LMU Hospital, LMU, Munich, Germany.	0000-0003-1223-1669
Sergio E. Uribe	sergio.uribe@rsu.lv	-Department of Conservative Dentistry and Oral Health, Riga Stradins University, LV-1007 Riga, Latvia - Baltic Biomaterials Centre of Excellence (BBCE), Headquarters at Riga Technical University, LV-1658 Riga, Latvia & Institute of Stomatology, RSU, Riga	0000-0003-0684-2025

Abstract

Introduction: Artificial intelligence (AI) in dentistry can improve the diagnosis and prediction of oral diseases such as caries, periodontitis, endodontics, and oral cancer. The effectiveness of AI models depends on the quality of data and metadata, which describe data attributes, configurations, and contexts critical to the reproducibility and validity of research results. However, inconsistencies in metadata reporting hinder the development of robust AI models. Only 1.5% of dental articles share data, while 32.6% adhere to FAIR principles, highlighting the need for standardized metadata practices. Comprehensive metadata reporting ensures that AI models perform equitably across different populations and settings.

Objective: This scoping review aims to identify current metadata reported in artificial intelligence-based dental research, identify gaps, characterize current reporting practices, and inform the development of METADENT, a reporting guideline for dental research metadata.

Methods: A comprehensive search of three electronic databases (PubMed, IEEE Xplore, and ArXiv) will be conducted to identify published studies on AI applications in dentistry using a specific search strategy. Independent reviewers will screen the titles and abstracts of the collected studies against predetermined inclusion criteria. Studies that meet the criteria will undergo a full-text review before final selection. Data from selected studies will be extracted and duplicated by a team of researchers. Disagreements will be resolved by consensus with a third researcher. We will analyze the reported metadata using descriptive statistics, gap analysis, and comparative analysis. Results will be presented in tables and graphs. A narrative synthesis integrating quantitative and qualitative findings will be presented, and implications for future research and standardized metadata reporting guidelines will be discussed.

Keywords: Metadata, Artificial Intelligence, Deep-learning models, Datasets.

Introduction

Artificial intelligence (AI) enables machines to perform tasks typically requiring human intelligence (Schwendicke et al. 2020). In dentistry, AI is being explored to support or enhance oral disease diagnoses such as caries (Mohammad-Rahimi et al. 2022), periodontitis (Tariq et al. 2023), endodontics (Ahmed et al. 2023), oral cancer (Abdul et al. 2024) among others (Nagi et al. 2020)

AI models' effectiveness relies on data and metadata quality (Adeoye et al. 2023; Zhang et al. 2023; Kitamura et al. 2024). Metadata, which describes and provides context for data, is crucial for reproducibility, generalizability, and validity in AI research (Leipzig et al. 2021). However, inconsistent metadata reporting in AI dental research can limit the development of robust, predictive models (Uribe et al. 2022). Inadequate metadata can complicate model transparency, applicability, and clinical utility issues (Norori et al. 2021). Comprehensive metadata reporting helps evaluate AI algorithms' performance, biases, and cross-setting effectiveness. A critical analysis by Uribe et al. (2022) of compliance with the FAIR principles—Findable, Accessible, Interoperable, Reusable—in AI dental research identified a substantial shortfall in standardized metadata practices. Their review showed that only 1.5% of dental research articles shared data, with an average FAIR compliance level of 32.6% (Uribe et al. 2022).

Data and analytical complexities exacerbate the challenges in AI dental research. (Schwendicke et al. 2022) The dental, oral, and craniofacial research community increasingly relies on extensive datasets, including routinely collected textual records, images, claims, and prospective large-scale biological datasets (Arsiwala-Scheppach et al. 2023). However, data protection, intellectual property rights, and technical complexities often limit data availability for re-analysis and peer review, introducing potential bias risks (Norori et al. 2021). Since the FAIR principles state that data should be as open as possible and as closed as necessary (Uribe et al. 2022), sometimes the data cannot be shared, but the metadata can always be shared. Metadata is essential to prevent algorithmic bias (Akter et al. 2021), allowing researchers to identify and mitigate biases, ensuring AI models are trained on representative datasets and perform equitably across populations and settings.

A consensus-driven checklist for AI studies in dentistry has been developed to address complexities (Schwendicke et al. 2021). However, there is a knowledge gap regarding the metadata that should be reported in AI dental research, preventing the establishment of best practices and standards. This scoping review aims to investigate the current state of metadata reporting in AI dental research and assess the completeness of specific metadata elements. To achieve these objectives, we will comprehensively search relevant databases to identify AI studies in dental research. We will extract and analyze the reported metadata to address our research questions. Our findings will provide insights into the current state of metadata reporting, highlight gaps or inconsistencies, and identify areas for improvement to increase transparency, reproducibility, and generalizability. We will also provide recommendations for improving metadata reporting in AI dental research to promote best practices and facilitate knowledge sharing and collaboration.

Review question

What metadata is currently being reported in AI dental research, and how complete and consistent is the reporting of metadata elements?

Aims

1. Identify whether metadata is currently being reported in AI dental research.
2. Determine what specific metadata elements are currently being reported in AI dental research.
3. Assess the consistency of metadata reporting in AI dental research.
4. Assess the completeness of metadata reporting in AI dental research.

Inclusion criteria

Participants

Studies reporting and testing AI applications in dentistry published between January 2019 and December 2024.

Concept

Identify and extract the metadata currently reported in AI dental research.

Context

The scoping review will be limited to studies on humans.

Types of sources

We will collect published research reports available in three main databases: one medical (PubMed), one focused on engineering (IEEE Xplore), and one for preprints (ArXiv). We will search these databases for any AI dental-related paper on diagnosis or detection, treating or predicting dental diseases, or administrative tasks such as completing clinical records, segmenting teeth, or other maxillofacial structures.

Methods

The proposed scoping review will be conducted using the JBI methodology for scoping reviews (Peters et al. 2015) and PRISMA- ScR(Transparent Reporting of Systematic Reviews and Meta-analyses extension for Scoping Reviews) Checklist (Tricco et al. 2018).

Search strategy

The search strategy will aim to locate published and preprinted studies. A three-step search strategy will be utilized in this review. First, an initial limited search of MEDLINE (PubMed) change as appropriate was undertaken to identify articles on the topic. The text words in the titles and abstracts of relevant articles and the index terms used to describe the articles were used to develop a full search strategy for reporting the names of the relevant databases/information sources. The search strategy, including all identified keywords and

index terms, will be adapted for each included database and information source. The reference list of all included sources of evidence will be screened for additional studies. Studies published in any language change as appropriate will be included. Studies published since 2019 will be included, as more than 95 percent of the dental articles related to AI research have been published between 1990 and 2024.

Category	Search Terms
Artificial Intelligence	"artificial intelligence"[Title/Abstract], "neural network"[Title/Abstract], "CNN"[Title/Abstract], "machine"[Title/Abstract] AND "learning"[Title/Abstract], "deep"[Title/Abstract] AND "learning"[Title/Abstract], "generative"[Title/Abstract] AND "model"[Title/Abstract], "GAN"[Title/Abstract], "variational autoencoder"[Title/Abstract]
Imaging	"panoramic"[All Fields], "panoramics"[All Fields], "intraoral"[All Fields], "intraorally"[All Fields], "periapical"[All Fields], "periapically"[All Fields], "periapicals"[All Fields], "bite*"[All Fields], "radiog*"[All Fields], "radiol*"[All Fields]
Dentistry	"caries"[Title/Abstract], "periodontal"[Title/Abstract], "periodon*"[All Fields], "Dentistry"[Mesh], dental[TIAB]

Justification for Database Selection

Data will be collected electronically from three key databases: PubMed, IEEE Xplore, and ArXiv, supplemented by manual searches of the recovered papers.

- PubMed: PubMed is the most widely used database in dentistry and dental research.(Yahya Asiri et al. 2020)
- IEEE Xplore: IEEE Xplore is a leading source for technical literature in engineering and technology.
- ArXiv: ArXiv hosts preprints across various scientific fields, including AI.

Study/Source of Evidence and Selection

After the search, all identified citations will be collated and uploaded to Paperpile. Paperpile will automatically remove duplicates and manually verify them by the review team. A pilot test will be conducted to ensure consistency in the screening process. Titles and abstracts will be independently screened by two or more reviewers against the inclusion criteria.

Screening Process

1. **Pilot Testing**: A sample of 50-100 titles and abstracts will be used for a pilot test to calibrate the reviewers. Discrepancies will be discussed and resolved to ensure a uniform understanding of the inclusion criteria.

2. **Initial Screening**: At least two reviewers will independently screen the titles and abstracts of all identified studies. Studies not meeting the inclusion criteria will be excluded at this stage.
3. **Full-Text Screening:** Potentially relevant sources will be retrieved in full text and imported into Paperpile. Two or more independent reviewers will thoroughly assess the full text of selected citations against the inclusion criteria. Reasons for excluding sources of evidence in full text that do not meet the inclusion criteria will be meticulously recorded and reported in the scoping review.

Conflict Resolution: Any disagreements between the reviewers at each stage of the selection process will be resolved through discussion. A third reviewer will be consulted to decide if a consensus cannot be reached.

Data Management: The included studies' citation details and full texts will be managed using Paperpile. Extraction forms will be designed to capture relevant information systematically.

Documentation and Reporting: The search results and the study inclusion process will be thoroughly documented and reported in the final scoping review. This will include a detailed PRISMA flow diagram (Page et al., 2021) to illustrate the selection process.

Data extraction

General information from each study (DOI, journal, year of publication, country, authors, institution, aim, and type) will be reported first. Then, the data will be extracted in three phases by two or more independent reviewers:

First, the **completeness of the report** will be examined against the Schwendicke, F., Singh, T., Lee, J.-H., Gaudin, R., Chaurasia, A., Wiegand, T., Uribe, S., Krois, J., IADR e-oral health network and the ITU WHO focus group AI for Health, 2021. Artificial intelligence in dental research: Checklist for authors, reviewers, readers. J. Dent. 107, 103610.

As follows, extracting if it is (1) reported, (2) not reported, (3) unclear, or (NA) not applicable. See **Table 1**.

Then, the **completeness of metadata** will be assessed by extracting the proposed items by Gebru, et al (2018) to fill the **Table 2**.

Finally, the details from Uribe et al. about the completeness of the metadata from AI dental research in available datasets will be extracted for any included paper, see **Table 3**.

Two or more independent reviewers will use a draft extraction form (see Appendix) to extract data from papers included in the scoping review. The data extracted will include specific details about the author, study location, year of publication, aim, type of data, sample size, and metadata.

Data management

The data will be extracted using a Google form, exported to a CSV file, and analyzed using the R statistical package. The cleaned data will be stored in a shared folder and published in the Zenodo repository under a CC BY-SA license.

Data analysis and presentation

Descriptive analysis

We will calculate the frequency and percentage of studies reporting each metadata category and summarize the data to highlight the most and least frequently reported elements. In addition, we will summarize the characteristics of the included studies, such as author information, study location, year of publication, type of data, and sample size. These characteristics are presented using descriptive statistics and visualizations such as bar graphs and pie charts to provide a clear overview of the data.

Gap Analysis

The gap analysis will focus on identifying and categorizing gaps in metadata reporting by comparing the reported metadata to a predefined set of essential elements. These gaps will be presented in tables that illustrate areas needing more reporting, helping to identify specific areas where metadata reporting needs improvement.

Comparative analysis

We will conduct a comparative analysis to examine metadata reporting practices across AI tasks, dental areas, and pathology. Cross-tabulations will identify significant differences in reporting practices, providing insight into how different study designs and data types influence metadata reporting.

Visual Presentation

The analysis results are presented visually using tables to summarize quantitative data on metadata reporting frequency and study characteristics. In addition, bar graphs, pie charts, and other visualizations will illustrate key findings and comparisons. The study selection process will be detailed in a PRISMA flowchart showing the number of records identified, screened, excluded, and included at each stage.

Narrative synthesis

The narrative synthesis will integrate quantitative and qualitative findings to provide a comprehensive overview of metadata reporting practices in AI dental research. This synthesis will discuss the findings' implications for future research and the development of standardized metadata reporting guidelines. By collecting and organizing as much metadata as possible, the study aims to provide a detailed understanding of current metadata reporting practices and identify areas for improvement.

Funding

SEU acknowledges financial support from the European Union's Horizon 2020 research and innovation program under grant agreement No 857287 for the Baltic Biomaterials Centre of Excellence and from The Latvian Council of Science, project No lzp-2022/1-0047, "IEVA Project."
JI is a participant of the STER Internationalization of Doctoral Schools Program from NAWA Polish National Agency for Academic Ex-change No. PPI/STE/2020/1/00014/DEC/02.

Conflicts of interest

The authors declare no conflict of interest. Falk Schwendicke is a cofounder of dentalXrai, a startup focusing on AI-based x-ray analytics in dentistry. The present work was fully independent of any such activities.

References

Abdul NS, Shivakumar GC, Sangappa SB, Di Blasio M, Crimi S, Cicciù M, Minervini G. 2024. Applications of artificial intelligence in the field of oral and maxillofacial pathology: a systematic review and meta-analysis. BMC Oral Health. 24(1):122.

Adeoye J, Hui L, Su Y-X. 2023. Data-centric artificial intelligence in oncology: a systematic review assessing data quality in machine learning models for head and neck cancer. Journal of Big Data. 10(1):1–25.

Ahmed ZH, Almuharib AM, Abdulkarim AA, Alhassoon AH, Alanazi AF, Alhaqbani MA, Alshalawi MS, Almuqayrin AK, Almahmoud MI. 2023. Artificial Intelligence and Its Application in Endodontics: A Review. J Contemp Dent Pract. 24(11):912–917.

Akter S, McCarthy G, Sajib S, Michael K, Dwivedi YK, D'Ambra J, Shen KN. 2021. Algorithmic bias in data-driven innovation in the age of AI. International Journal of Information Management. 60:102387.

Arsiwala-Scheppach LT, Chaurasia A, Müller A, Krois J, Schwendicke F. 2023. Machine Learning in Dentistry: A Scoping Review. J Clin Med Res. 12(3). http://dx.doi.org/10.3390/jcm12030937.

Kitamura FC, Prevedello LM, Colak E, Halabi SS, Lungren MP, Ball RL, Kalpathy-Cramer J, Kahn CE Jr, Richards T, Talbott JF, et al. 2024. Lessons Learned in Building Expertly Annotated Multi-Institution Datasets and Hosting the RSNA AI Challenges. Radiol Artif Intell. 6(3):e230227.

Leipzig J, Nüst D, Hoyt CT, Ram K, Greenberg J. 2021. The role of metadata in reproducible computational research. Patterns (N Y). 2(9):100322.

Mohammad-Rahimi H, Motamedian SR, Rohban MH, Krois J, Uribe SE, Mahmoudinia E, Rokhshad R, Nadimi M, Schwendicke F. 2022. Deep learning for caries detection: A systematic review. J Dent. 122:104115.

Nagi R, Aravinda K, Rakesh N, Gupta R, Pal A, Mann AK. 2020. Clinical applications and performance of intelligent systems in dental and maxillofacial radiology: A review. Imaging Sci Dent. 50(2):81–92.

Norori N, Hu Q, Aellen FM, Faraci FD, Tzovara A. 2021. Addressing bias in big data and AI for health care: A call for open science. Patterns (N Y). 2(10):100347.

Schwendicke F, Marazita ML, Jakubovics NS, Krois J. 2022. Big Data and Complex Data Analytics: Breaking Peer Review? J Dent Res. 101(4):369–370.

Schwendicke F, Samek W, Krois J. 2020. Artificial Intelligence in Dentistry: Chances and Challenges. J Dent Res. 99(7):22034520915714.

Schwendicke F, Singh T, Lee J-H, Gaudin R, Chaurasia A, Wiegand T, Uribe S, Krois J, IADR e-oral health network and the ITU WHO focus group AI for Health. 2021. Artificial intelligence in dental research: Checklist for authors, reviewers, readers. J Dent. 107:103610.

Tariq A, Nakhi FB, Salah F, Eltayeb G, Abdulla GJ, Najim N, Khedr SA, Elkerdasy S, Al-Rawi N, Alkawas S, et al. 2023. Efficiency and accuracy of artificial intelligence in the radiographic detection of periodontal bone loss: A systematic review. Imaging Sci Dent. 53(3):193–198.

Uribe SE, Sofi-Mahmudi A, Raittio E, Maldupa I, Vilne B. 2022. Dental Research Data Availability and Quality According to the FAIR Principles. J Dent Res. 101(11):1307–1313.

Zhang Z, Zhang X, Ichiji K, Bukovský I, Homma N. 2023. How intra-source imbalanced datasets impact the performance of deep learning for COVID-19 diagnosis using chest X-ray images. Sci Rep. 13(1):19049.

Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD. 2021. The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. BMJ, 372, n71.

Peters MD, Godfrey CM, Khalil H, McInerney P, Parker D, Soares, CB. 2015. Guidance for conducting systematic scoping reviews. International journal of evidence-based healthcare, 13(3), 141–146.

Tricco AC, Lillie E, Zarin W, O'Brien KK, et al. 2018. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Annals of internal medicine, 169(7), 467–473.

Appendices

General information for each paper

1. DOI
2. Journal
3. Year
4. Country
5. Authors
6. Institution
7. Aim
8. Type: diagnostic, treatment, prognostic, non-dental disease-related (for instance. Segmentation of dental structures)

Table 1. Completeness of reporting

Item No	Reporting
10	**Title**: Define that any kind of AI was used, specify which one and for which focus and problem.
11	**Abstract**: Present a structured summary of the study's aim, methods, results, and conclusion.
12	**Introduction**: Sum up the clinical background and need of AI solution; achievements and limitations so far; goal of the study; hypothesis (if needed).
13	**Study Design**: Assist the reader in understanding your study by providing an overview about the study goal, data characteristics, modeling techniques, evaluation, and scope.
14	**Data**: Give details towards the source of data for training and testing, in- and exclusion criteria, sampling framework, fit to target population, heterogeneity, partitioning, and if and where it can be accessed (or why not).
14 a	**Sampling**: Provide inclusion and exclusion criteria, case definition, image type and quality, data source(s)/centers, sampling strategy and information towards heterogeneity.
14 b	**Data Protection:** Provide information on how data protection requirements were fulfilled.
14 c	**Missing Data:** Explain how missing data was handled.
14 d	**Data Processing**: Lay out how data processing (extracted, transposed, loaded, preprocessed) was performed.
15	**Reference Test:** Explain how the reference test was generated, including case definition, grading schemes, test thresholds,calibration and unification strategies for multiple labels.
16	**Sample Size:** If your study is hypothesis-testing, provide information on how your arrived at your test dataset sample size.
17	**Model**: Provide detailed information on model inputs, outputs, intermediate layers, pooling, normalization, regularization, and activation, as well as software packages and hardware used. The structure of the model may be presented.
17 a	**Model Parameters**: Describe how the model parameters were initialized.
18	**Training**: Describe the training procedures including data augmentation techniques, criteria used for stopping the training, hyperparameters, and hyperparameter search strategy. For neural networks, at least the learning rate schedule, optimization method, batch size, dropout rates, regularization parameters (if any) and number of epochs should be provided.
19	**Justify the Best-Performing Model:** Describe the method and model metric to select the final model and evaluate it against the hold-out test set.
20	**Evaluation**: Describe the primary outcome and outcome metric. Consider further outcomes with relevance to your question.
21	**Uncertainty**: Describe how uncertainties in the model results (comparisons, subgroups) are reflected on.
22	**Explainability**: Lay out how explainability, trustworthiness, and transparency were assessed.
23	**Results**: Provide information on the flow of data, including those in- and excluded, and data partitions into training, validation, and test datasets. Characterize the dataset.
23 a	**Performance Metrics and Data Partitions:** The final model's performance on the test partition should be provided in detail and benchmarked against current technical standards.

	Provide uncertainty estimates. Provide information to understand incorrect predictions and explainability.
24	**Discussion**: Provide a summary, a strengths and limitations sections, a section on findings and their implications, and one on future directions.
25	**Other**: Provide information towards authorship and registration, study protocol and potential conflicts of interest.

Table 2. Minimal Metadata. Present, Not Present, Unavailable, Not Applicable.

Section	Item	Explanation	Status
Motivation	Purpose of the Dataset	The reason for creating the dataset, including the specific task or gap it aims to address.	P/NP/U/NA
	Who Created the Dataset	Information about the team, research group, or organization responsible for creating the dataset.	P/NP/U/NA
	Who Funded the Dataset	Details about the funding source(s) for the creation of the dataset, including grants or sponsors.	P/NP/U/NA
Composition	Description of Dataset Instances	A detailed description of the data instances, such as documents, images, or other types of data.	P/NP/U/NA
	Number of Instances	The total number of instances in the dataset.	P/NP/U/NA
	Sample Representativeness	Whether the dataset is a sample of a larger set and if it is representative of the larger population.	P/NP/U/NA
	Data Content	Information on what data each instance consists of, whether raw or processed features.	P/NP/U/NA
	Labels/Targets	Label or target associated with each instance.	P/NP/U/NA
	Missing Information	Any missing data in the instances, and reasons for the missing information.	P/NP/U/NA
	Relationships Between Instances	Details on whether and how relationships between instances are made explicit.	P/NP/U/NA
Collection Process	Data Acquisition Method	The method used to acquire the data, whether directly observable, reported, or inferred.	P/NP/U/NA
	Collection Mechanisms	The procedures, tools, or technologies used to collect the data, including any validation processes.	P/NP/U/NA
	Sampling Strategy	The strategy used to select samples from a larger set, if applicable.	P/NP/U/NA
	Involvement and Compensation of Data Collectors	Information on who was involved in data collection and how they were compensated.	P/NP/U/NA
	Timeframe of Data Collection	The period over which the data was collected and whether it aligns with the creation timeframe.	P/NP/U/NA
	Ethical Reviews	Any ethical reviews conducted for the data collection process, including outcomes and documentation.	P/NP/U/NA
Preprocessing/Cleaning/Labeling	Description of Preprocessing/Cleaning/Labeling	Details of any preprocessing, cleaning, or labeling done on the data, such as tokenization or filtering.	P/NP/U/NA

	Whether Raw Data Was Saved	Information on whether the raw, unprocessed data was saved for future use.	P/NP/U/NA
	Availability of Preprocessing Software	Whether the software used for preprocessing/cleaning/labeling is available and how it can be accessed.	P/NP/U/NA
Uses	Previous Uses of the Dataset	Information on whether the dataset has been used for any tasks already, and if so, details about those tasks.	P/NP/U/NA
	Potential Uses of the Dataset	Other possible tasks or applications for which the dataset could be used.	P/NP/U/NA
	Risks or Harms in Future Uses	Any potential risks or harms associated with future uses of the dataset, including ethical concerns.	P/NP/U/NA
	Tasks the Dataset Should Not Be Used For	Any specific tasks or applications for which the dataset is not suitable.	P/NP/U/NA
Distribution	Distribution Method	How the dataset is distributed (e.g., via website, API) and any associated distribution methods.	P/NP/U/NA
	Licensing	Information on any licensing requirements or intellectual property terms associated with the dataset.	P/NP/U/NA
	Third-Party Restrictions	Any restrictions imposed by third parties on the use of data within the dataset.	P/NP/U/NA
	Regulatory Restrictions	Any legal or regulatory restrictions that apply to the dataset or its distribution.	P/NP/U/NA
Maintenance	Dataset Support/Hosting/Maintenance	Details on who is responsible for supporting, hosting, and maintaining the dataset.	P/NP/U/NA
	Contact Information	Information on how to contact the owner, curator, or manager of the dataset.	P/NP/U/NA
	Update Process	Details on how updates to the dataset will be handled, communicated, and by whom.	P/NP/U/NA
	Retention Limits	Any limits on how long data associated with the dataset instances can be retained.	P/NP/U/NA
	Support for Older Versions	Whether older versions of the dataset will be supported and how this will be communicated.	P/NP/U/NA
	Extension Mechanisms	Information on how others can extend, augment, or contribute to the dataset, and how contributions are managed.	P/NP/U/NA

Table 3. Metada from AI dental research

Item	Form full text	Field Name	Data Type	Description
Year of dataset publication		Year_Publication	Integer	Year the dataset was published
What are the main areas of the dataset/research? (Select all that apply)		Dataset_Focus	Multiple Choice	Main research areas of the dataset
Associated with a publication or paper?		Paper_Link	Yes/No	Is the dataset associated with a publication?
Country of origin (if not available, write NA)		Country_Origin	Text	Country dataset was collected in (or NA if unavailable)
DOI of the associated publication		Paper_DOI	Text	DOI of the associated publication (if applicable)
Data collection period		Start_Date	Date	Start date of dataset collection
Source of data acquisition (site) (multiple choices)		Acquisition_Source	Multiple Choice	Where images were acquired
Reason for image acquisition (multiple choices)		Acquisition_Reason	Multiple Choice	Reason images were acquired
Imaging modality (multiple choices)		Imaging_Modality	Multiple Choice	Type of imaging used
Please indicate whether the following dataset characteristics are reported	[Ethical approval for dataset publication]	Ethical_Approval	Yes/No/Not Sure	Was ethical approval stated for dataset publication?
	[Participant consent]	Informed_Consent	Yes/No/Not Sure	Was informed consent from participants stated?
	[Inclusion or exclusion criteria stated]	Inclusion_Criteria	Yes/No/Not Sure	Were inclusion/exclusion criteria reported?
	[Segmentations]	Segmentations	Yes/No/Not Sure	Were image segmentations included?
	[Lesion feature or image size annotations]	Lesion_Annotations	Yes/No/Not Sure	Were annotations for lesions/features included?
	[Ground truth or gold standard method described]	Ground_Truth_Method	Text	How ground truth/gold standard was established
	[Anonymisation strategy]	Anonymization_Strategy	Yes/No/Not Sure	Was an anonymization strategy described?
	[Image acquisition device (e.g. Sirona, Germany)]	Acquisition_Device	Text/Not Sure	Image acquisition device used (if reported)

	[License type of the dataset]	Dataset_License	Text/Not Sure	License type applied to the dataset
	[Image processing]	Image_Processing_Adjustment	Yes/No/Not Sure	Were any image processing or adjustments reported?
	[Gender ratio (males/females)]	Gender_Ratio	Text/Not Sure	Gender ratio of participants (males/females)
	[Ethnicity]	Ethnicity_Reported	Yes/No/Not Sure	Was ethnicity reported?
	Does the dataset include annotations?	Annotations_Included	Yes/No	Does the dataset include annotations?
	Number of annotators	Num_Annotators	Integer (or 999)	Number of annotators
	Type of Annotation (pixel-wise, box, label, etc)	Annotation_Type	Text	Type of annotation
About the annotators	[Is described the calibration or training of the annotators?]	Annotator_Calibration_Described	Yes/No	Was annotator training/calibration described?
	[Is any metric related to the calibration of annotators reported (kappa, ICC, etc)?]	Annotator_Calibration_Metric	Yes/No	Was any calibration metric reported?
	[Is the age of annotators reported?]	Annotator_Age	Text/Not Sure	Age of annotators (if reported)
	[Is the experience or qualifications of the annotators described?]	Annotator_Experience	Text/Not Sure	Description of annotators' experience (if reported)
	[Is the reporting of mechanisms/strategies to deal with disagreements included in the study?]	Disagreement_Strategies	Yes/No	Were strategies for dealing with disagreements reported?
	[Is the software used for annotations described in the study?]	Annotation_Software	Text/Not Sure	Software used for annotations (if reported)
How was the ground truth / gold standard established in the study?			Text/Not Sure	
Is the Number of patients in the dataset reported?			Yes/No	
Number of patients in the dataset		Num_Patients	Integer	Number of patients in the dataset
Is the Number of images in the dataset reported?			Yes/No	

Number of images in the dataset		Num_Images	Integer	Number of images in the dataset
Comments? (add any additional or relevant information)		Comments	Text	Any additional relevant information