INPLASY PROTOCOL

Corresponding author:
Shuaa Alharbi

shuaa.s.alaharbi@qu.edu.sa

Author Affiliation:
Qassim University

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None declared.

Toward the Identification of Applications of Artificial Intelligence for Dental Image Detection: Systematic Review

Alharbi, SS[1]; Alhasson, HF[2].

Review question / Objective: The purpose of this systematic review is to understand and compare the current applications of machine learning in the care of dental patients. This will enable us to assess their diagnostic and prognostic accuracy. As part of the study, we will identify areas of development for ML applications in the dental care field. In addition, we will suggest improvements to research methodology that will facilitate the implementation of ML technologies in services and improve clinical treatment guidelines based on the results of future studies.

Condition being studied: This study rationally focused on reviewing the current state of Artificial Intelligence (AI) in dentistry and state-of-the-art applications, including the recognition of teeth cavities, filled teeth, crown predictions, oral surgery, and endodontic therapy.

INTRODUCTION

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state of Artificial Intelligence (AI) in dentistry and state-of-the-art applications, including the recognition of teeth cavities, filled teeth, crown predictions, oral surgery, and endodontic therapy.

METHODS

Search strategy: The literature in this study was selected and identified by performing a thorough search of electronic databases like Science Direct, PubMed (MIDLINE), arXiv.org, MDPI, Nature, Google Scholar, Scopus and Wiley Online Library published over the past two decades (January 2013-August 02, 2022). This selection was based on the most popular diagnosis applications in dentistry, such as teeth segmentation, detection of dental caries, detection of filled teeth, detection of prostheses, detection of dental implants, and detection of endodontic treatment.This review was conducted in accordance with PRISMA guidelines for preferred reporting items for systematic reviews and meta-analyses of diagnostic test accuracy studies.

Participant or population: N/A.

Intervention: N/A.

Comparator: N/A.

Study designs to be included: This review was conducted in accordance with PRISMA guidelines for preferred reporting items for systematic reviews and meta-analyses of diagnostic test accuracy studies.

Eligibility criteria: Full-length articles were retrieved from the journals. As part of the screening process, the two authors organize a focus group in order to ensure that the eligibility criteria and inclusion criteria are met. A list of the titles, authors, dates of publication, places of publication, and full abstracts of the literature obtained through the above-mentioned search protocol was imported into Microsoft Excel. Using the software, duplicates were removed from the list of literature and remaining article abstracts were screened using eligibility criteria. The required

articles for this review study were selected in two stages. The first stage was the selection of articles based on the title and abstracts related to our research topic. The preliminary search yielded 5228 articles that were appropriate to address the study's aim, then due to duplication, 4012 articles were removed. Hence, the two authors retrieved 1216 articles at the second stage of selection. In the next stage, they followed a criterion to include research papers. For the purposes of the review, all authors were satisfied with the exclusion and inclusion of papers. In order to avoid missing relevant literature, criteria were devised after a focus group consisting of the two authors above reviewed preliminary papers.

Information sources: Publicly available databases.

Main outcome(s): The recognition of dental images is advancing over time, and more layered CNN are being introduced to accomplish significant results. Moreover, the acquisition of big data indicates a need for the substantial productivity of deep CNN technologies. A standardized technique is required in order to enhance comparability and robustness between studies due to the significant variety of image databases and the types, outcomes, and framework of NN.

Quality assessment / Risk of bias analysis: Throughout all of the studies, AI has been assessed for its diagnostic accuracy in a variety of specific areas of dentistry. QUADAS-2, a commonly used tool in the literature for risk of bias assessment, was used to assess the risk of bias.

Strategy of data synthesis: Main characteristics of included caries and teeth targeted studies were used to group the extracted data according to its depth. They were also grouped based on their validation metrics used and their values that allowed direct comparison of data between studies. As part of the study, all outcome measures were extracted and analyzed in a standard format, including a complete definition of accuracy regardless

of the measure used by the included papers to document this.

Subgroup analysis: N/A.

Sensitivity analysis: N/A.

Language restriction: No.

Country(ies) involved: Saudi Arabia.

Keywords: Dental Diseases; Dental Radiography; Diagnosis; Neural Networks; Deep Learning Model; Machine Learning Model; Systematic Review.

Contributions of each author:
Author 1 - Shuaa S. Alharbi.
Email: shuaa.s.alharbi@qu.edu.sa
Author 2 - Haifa F. Alhasson.
Email: hhson@qu.edu.sa