Machine Learning for Child Oral Health: An Scoping Review

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Purpose

- Machine learning is a branch of data science which uses an analysis method giving computers the ability to learn without human instruction.
- Training data such as radiographs, treatment records, and/or experimental parameters are imputed into the system allowing the model to make diagnoses or predictions.
- ML can be used in dentistry to organize the large quantities of data generated in the clinics each day. Allowing predicting and detecting diseases more efficient and accurate.

Objective

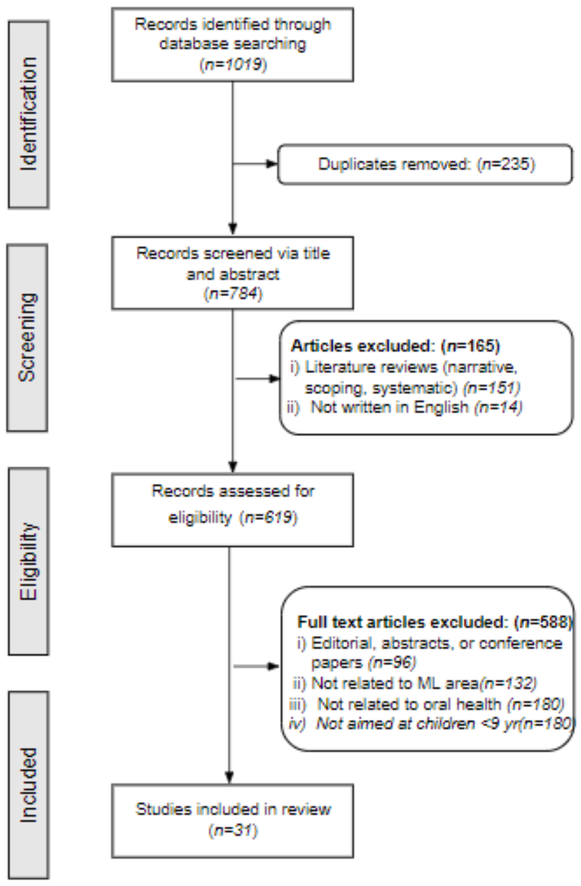
Tooth decay in children is the most common chronic childhood disease and it can be prevented by early detection. We aimed to provide a map of the current evidence on machine learning (ML) in child oral health and provide insight for future research.

Methods

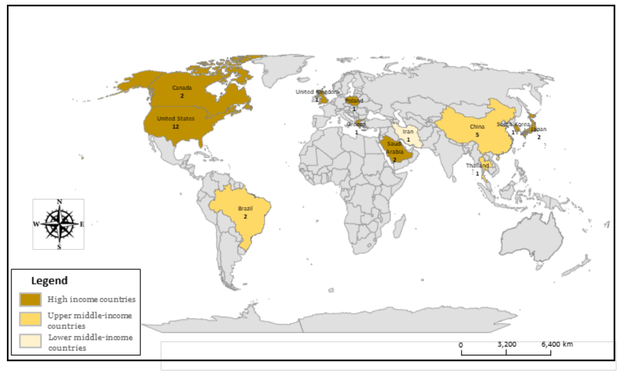
A scoping review was conducted by using Medline, Web of Science, EBSCO Dentistry & Oral Science Source, the Cochrane Library, and Scopus.
Articles in which an ML model was assessed for the diagnoses, prediction, or management of any condition in children (0- 9 years old) in any year were included.
Data were extracted for year of publication, geographical location, age, number of subjects, disease condition, type of study, and ML algorithms.

Results

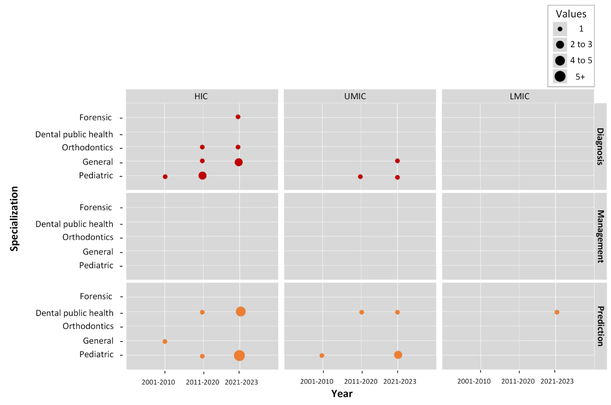
Article Selection



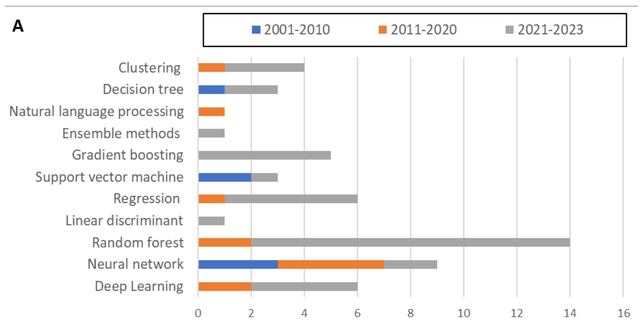
Global Distribution



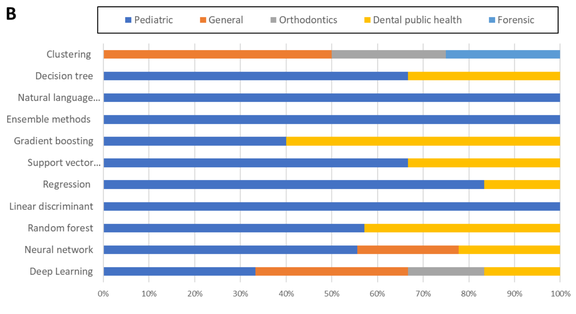
Time Trend



Type of Algorithms



Algorithms According to Specialties



Conclusion

- The aim was to map the current evidence on machine learning in child oral health
- HIC and UMIC contributed most publications
- Prediction and diagnosis are the most common categories of ML models
- The most common ML algorithm used were neural networks
- ML algorithms such as gradient boosting, random forest, and regression algorithms have emerged in more recent years.
- ML algorithms hold great importance to the dental field potentially assisting dental providers to complete their diagnosing and predicting of oral health manifestations with high accuracy.
- Dental professionals, such as pediatric and general dentists, can use these models to increase their proficiency and decrease clinical errors.

Limitations

- Our scope was relatively narrowed from the literature available on the topic due to our age limitation.
- Does not include data published in a language other than English, so our findings may be affected by that exclusion criteria.

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