Peradeniya University
Research Excellence Showcase

PURES

Development of a Novel Teleconsultation Software for Dentistry - Oral Assessment and Screening Interactive System (OASIS)

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Introduction: OASIS is a web-based and mobile-responsive software designed for dental teleconsultations facilitating patient data management and enabling the uploading of oral cavity images and test reports. The software allows seamless sharing of entries with specialists for obtaining referrals and provisional diagnoses.

Aim: Gather, manage, and transmit patient data in a useful manner, enabling its integration into predictive models for the early detection of oral cancers.

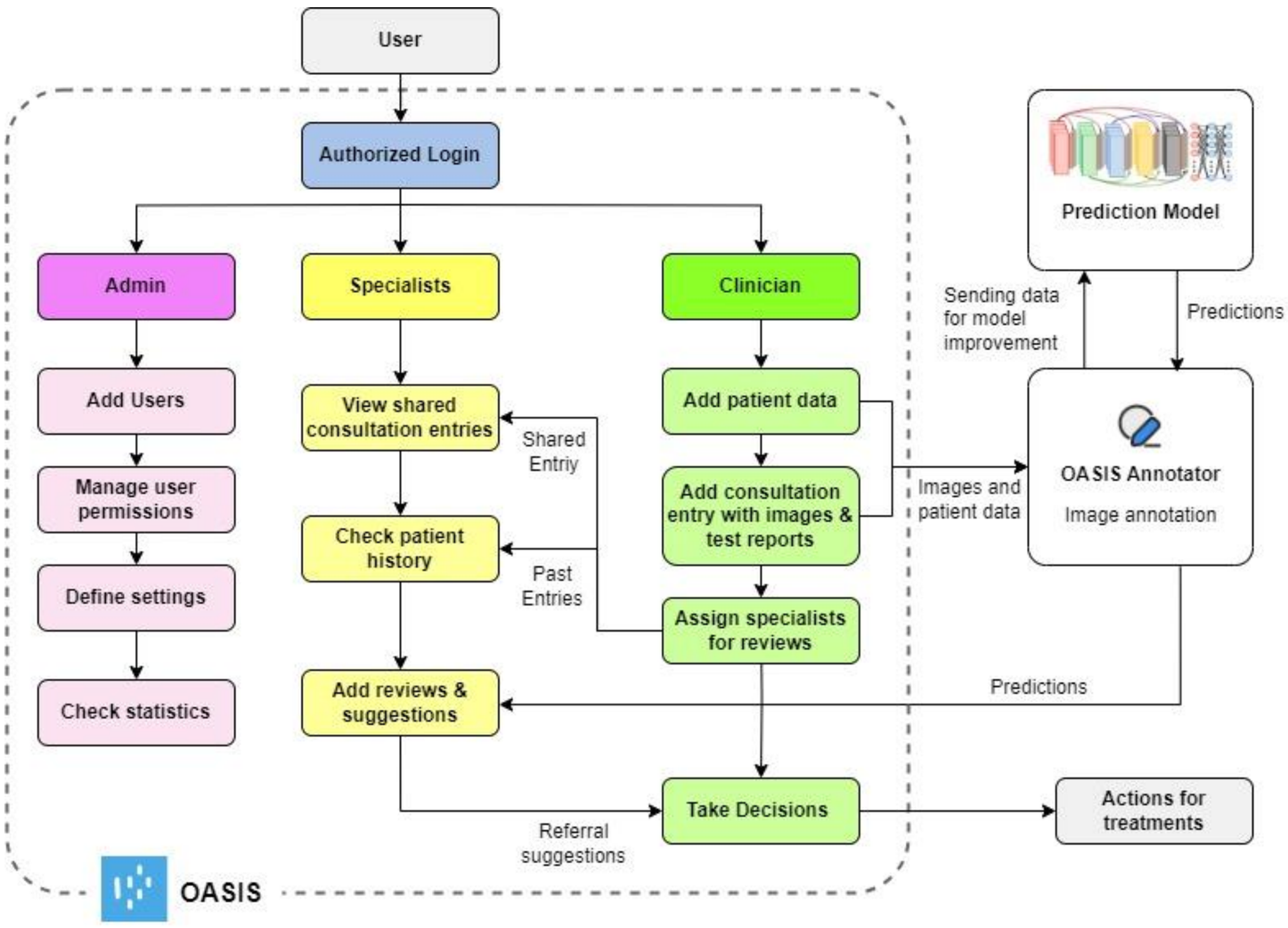

Figure 1: Dataflow of the application

Table 1: Users and their features

User	Features
Admin	• Add clinicians and assign permissions • Manage user inputs • Generate statistics and reports
Clinicians	• Add and manage patient data • Add consultation entries with oral cavity images with lesion annotations and test reports • Share consultation entries with one or more specialists • Generate and download patient reports from entries
Specialists	• View shared entries and patients' past records • Add referral or review suggestions • Assign more specialist to review shared entries

Security Features:

- Secure server access is restricted to authorized users approved by the administrator
- Permission-based access & data management authorization
- Specialists/clinicians can view only shared data, not entries added by others

Expandability:

- Utilize aggregated patient data for trend analysis and oral disease insights
- Enhance cancer prediction and referral suggestions through ML and AI integration

Developments:

The OASIS software is developed by a group of students from the Engineering Faculty at the University of Peradeniya. Its purpose is to meet the needs of dental doctors in Sri Lanka. The development utilized the MERN stack and is currently hosted on the engineering faculty's servers. While the software is still under development, no pilot trial has been conducted at this stage.

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Database of Annotated White Light Images for Oral Cancer Detection: Leveraging OASIS-Annotator a Web-Based Tool for Image Annotation

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Introduction: A white light image database of oral cavities derived from the Sri Lankan population with comprehensive annotations, and a user-friendly annotation tool. This publicly available database contains 3942 high-quality images classified into healthy, benign, oral potentially malignant disorders (OPMD), and oral cancer (OCA) categories

Methodology

Ethical approval – Adhered to ethical standards specified by the Declaration of Helsinki, the ethical clearance was obtained from the ethics review committee, Faculty of Dental Sciences, University of Peradeniya, Sri Lanka (ERC/FDS/2022/03).

Image collection –

Subjects	Patients attending to the Teaching hospital Peradeniya, and the bystanders and relatives
Collected by	Dental surgeons in the clinic supervised by oral medicine specialists
Image conditions	Using mobile phones, under the natural light/light source of the dental chair
Images labeled, categorized, and annotated by	Two mid-career dental surgeons, supervised by two oral medicine specialists

Annotation Tool

The OASIS-Annotator (Oral Assessment and Screening Interactive System - Annotator) is a specialized and customized tool developed with the purpose of facilitating image viewing, annotation, and download. With the OASIS-Annotator, users are able to navigate through the extensive image collection and annotate them by applying customized labels according to their research requirements.

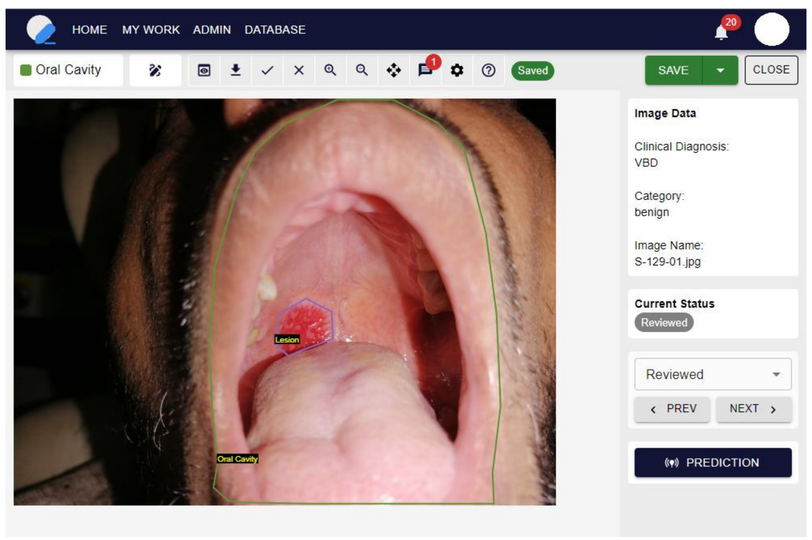

Figure 1. – Annotator Tool

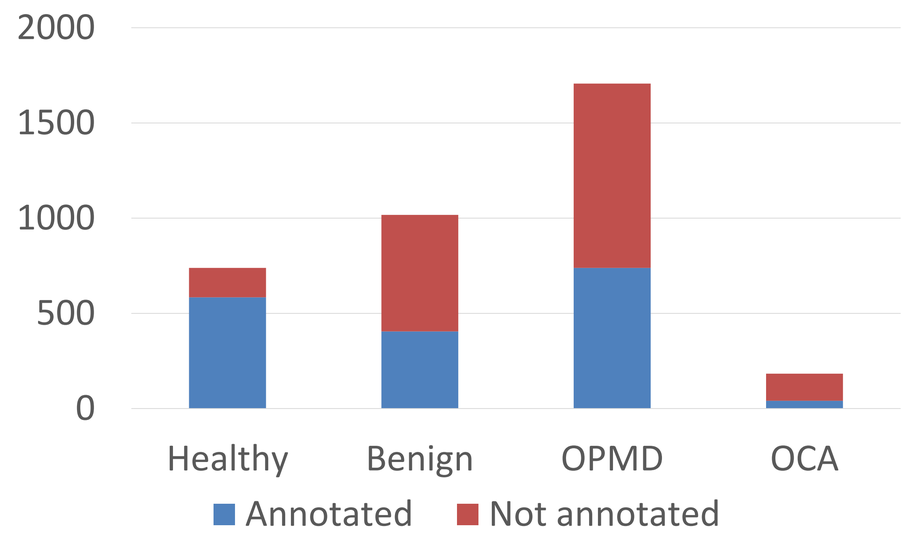

Figure 2. – Breakdown of the current image database

Conclusion - This comprehensive white light image database of the oral cavity derived from the Sri Lankan population with annotations holds great potential for advancements in ML and AI algorithms to develop automated tools for early diagnosis. This will ultimately lead to improved clinical outcomes through minimizing diagnostic and treatment delays, and provide resolutions for socioeconomic inequalities in oral cancer diagnosis.

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