ABSTRACT

Keratoconus affects approximately one in 2,000 individuals worldwide. It is typically associated with the decrease in visual acuity. Given its wide prevalence, there is an unmet need for the development of new tools that can diagnose the disease at an early stage in order to prevent disease progression and vision loss. The aim of this study is to develop and test a machine learning algorithm that can detect keratoconus at early stages. We applied several machine learning algorithms to detect keratoconus and then tested the algorithms using real world medical data, including corneal topography, elevation, and pachymetry parameters collected from OCT-based topography instruments from several corneal clinics in Japan. We implemented 25 different machine learning models in Matlab and achieved a range of 62% to 94.0% accuracy. The highest accuracy level of 94% was obtained by a support vector machine (SVM) algorithm using a subset of eight corneal parameters with the highest discriminating power. The proposed model may aid physicians in assessing corneal status and detecting keratoconus, which is otherwise challenging through subjective evaluations, particularly at the preclinical and early stages of the disease. The algorithm can be integrated into corneal imaging devices or used as a stand-alone-software for cornea assessment and detecting early stage keratoconus.

This project develops an eye hospital website where the patients can consult keratoconus specialist and can detect whether they are keratoconus affected, suspected or normal. This project also aims to propose an effective technique for earlier detection of keratoconus disease using Machine learning algorithms andend-to-end deployment using Django.