

$$\begin{aligned}
 (1) \text{MRD1} &= \text{PN}_{\text{MRD1}} \times R \\
 (2) \text{MRD2} &= \text{PN}_{\text{MRD2}} \times R \\
 (3) \text{PF} &= \text{MRD1} + \text{MRD2} \\
 (4) \text{UER} / \text{LER} &= \text{PN}_{\text{UER} / \text{LER}} \times R \\
 (5) \text{UEL} / \text{LEL} &= \text{PN}_{\text{UEL} / \text{LEL}} \times R \\
 (6) \text{SN} / \text{ST} / \text{IN} / \text{IT} &= \text{PN}_{\text{SN} / \text{ST} / \text{IN} / \text{IT}} \times R^2 \\
 (7) \text{SA}_{\text{TOTAL}} &= \text{SN} + \text{ST} + \text{IN} + \text{IT} \\
 (8) \text{MPLD}_{\text{N}0/15/30/45/60/75} &= \text{PN}_{\text{N}0/15/30/45/60/75} \times R \\
 (9) \text{MPLD}_{\text{T}105/120/135/150/165/180} &= \text{PN}_{\text{T}105/120/135/150/165/180} \times R
 \end{aligned}$$

Figure S1 Example image in which the measured pixel values were converted to the actual distances. This image has been published with the participant's consent. MRD, margin reflex distance; PF, palpebral fissure; UER, upper eyelid retraction; LER, lower eyelid retraction; UEL, upper eyelid length; LEL, lower eyelid length; SN, superior-nasal scleral area; ST, superior-temporal scleral area; IN, inferior-nasal scleral area; IT, inferior-temporal scleral area; SA_{TOTAL} , total scleral area; MPLD, mid-pupil lid distance; R, the millimeter: pixel ratio.

Table S1 Performance of the eye detection model on 2 different datasets

Parameters	CelebFaces attributes dataset	Dataset consisting of 148 participants
Recall	0.875	0.887
Specificity	0.999	0.992
Accuracy	0.996	0.985

Table S2 The results of 4-fold cross-validation in 1862 participants

Items	Eyelid		Cornea	
	Dice	IoU	Dice	IoU
Fold 1	0.936	0.884	0.946	0.900
Fold 2	0.947	0.903	0.951	0.910
Fold 3	0.946	0.901	0.951	0.910
Fold 4	0.943	0.895	0.953	0.912
Mean	0.943	0.896	0.950	0.908

IoU, Intersection over Union; Dice, dice coefficient.

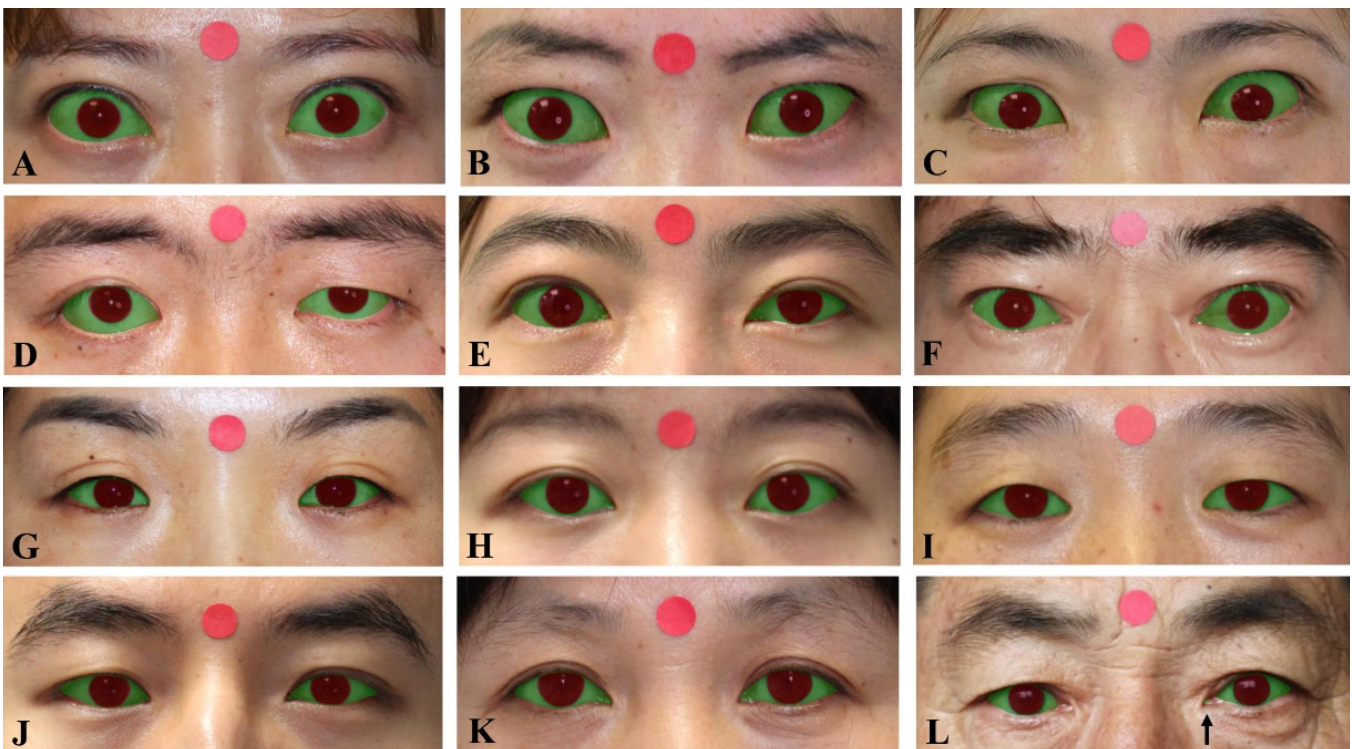


Figure S2 Representative results of segmentation for the eyelid and cornea in patients with TAO and healthy participants. (A-F) Patients with TAO. (G-L) Healthy participants. The black arrow in the last image (L) shows the incomplete segmentation of the eyelid contour in the inner canthus. These images are published with the participants' consent. TAO, thyroid-associated ophthalmopathy.

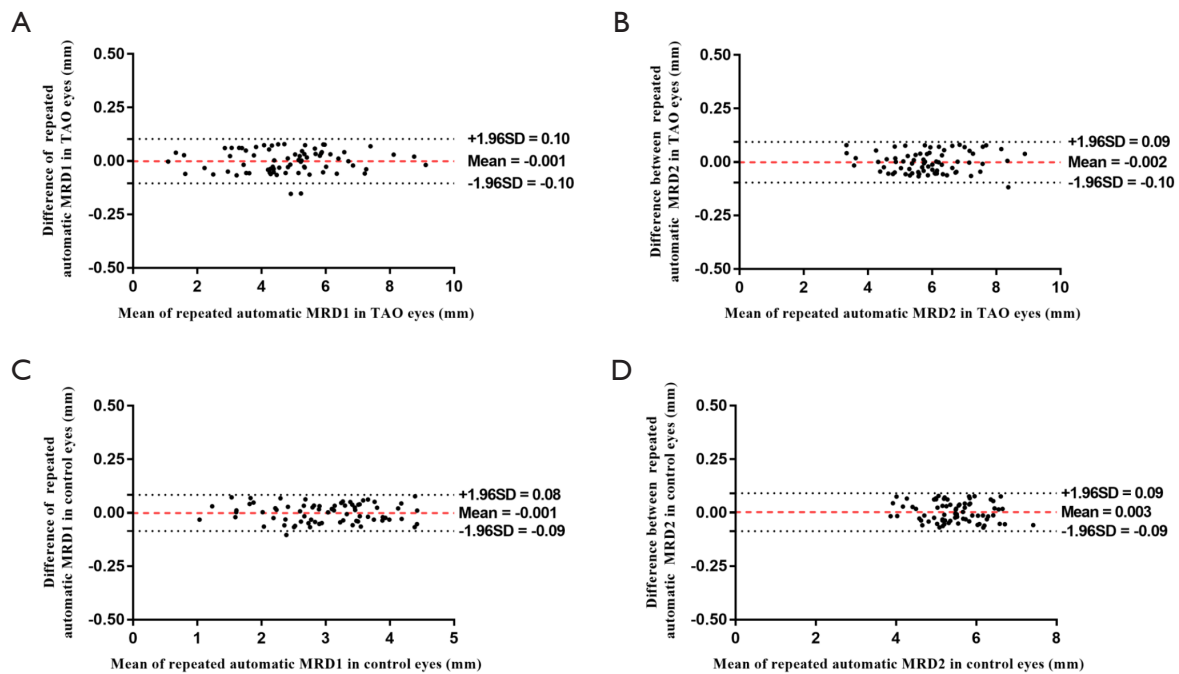


Figure S3 The Bland-Altman plots of 2 repeated automatic MRDs in patients with TAO and control participants. TAO, thyroid-associated ophthalmopathy; MRD, margin reflex distance.