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Supplemental information

**Comparison of deep learning systems
and cornea specialists in detecting
corneal diseases from low-quality images**

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Supplementary Information

- 1. Figure S1. Performance of the NDLS and PEDLS in high-quality images from the external test dataset.** a, Receiver operating characteristic curves of the NDLS and PEDLS for classifying keratitis, other corneal abnormalities, and normal cornea in high-quality images. b, Confusion matrixes of the NDLS and PEDLS in high-quality images. NDLS, new deep learning system. PEDLS, previously established deep learning system.
- 2. Figure S2. Visualization of the separability of embedding features learned by the NDLS and PEDLS in the external text dataset.** a, Low-quality images. b, High-quality images. NDLS, new deep learning system. PEDLS, previously established deep learning system.
- 3. Figure S3. Flow diagram of the development and assessment of the NDLS.** NDLS, new deep learning system. NEH, Ningbo Eye Hospital.
- 4. Table S1. Comparison of the PEDLS with the NDLS in high-quality images.**

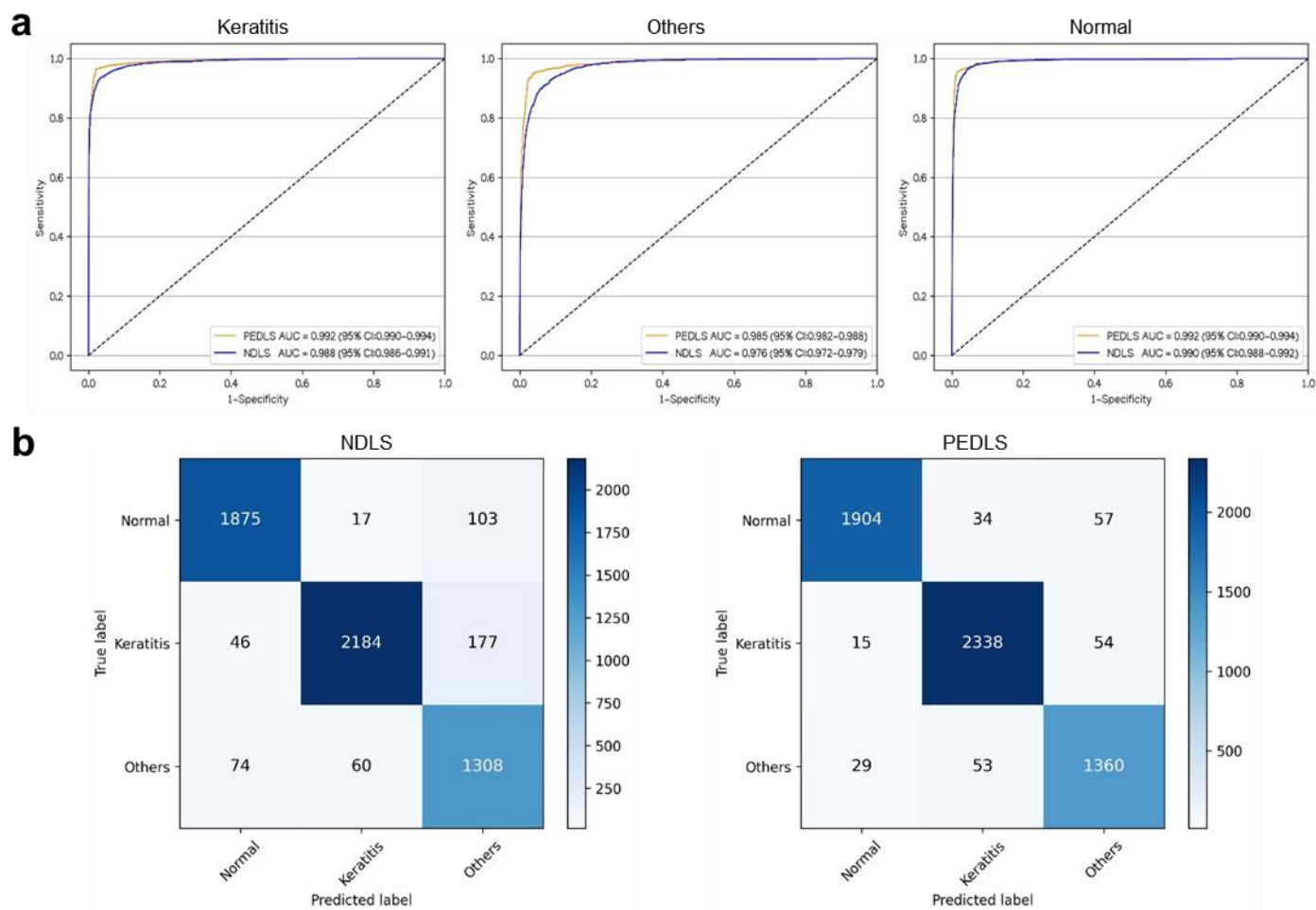
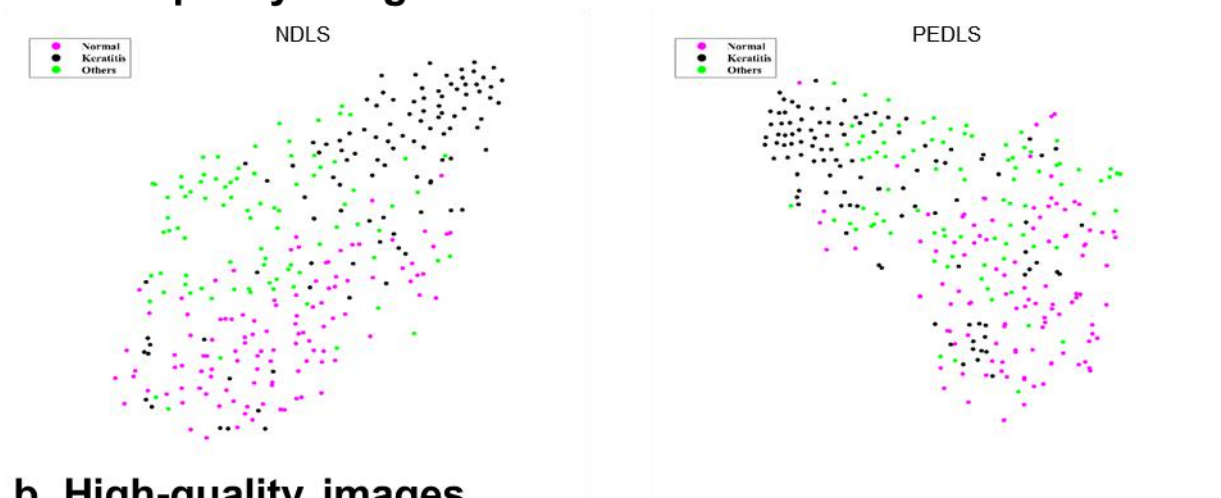


Figure S1. Performance of the NDLS and PEDLS in high-quality images from the external test dataset. a, Receiver operating characteristic curves of the NDLS and PEDLS for classifying keratitis, other corneal abnormalities, and normal cornea in high-quality images. b, Confusion matrixes of the NDLS and PEDLS in high-quality images. NDLS, new deep learning system. PEDLS, previously established deep learning system.

a. Low-quality images



b. High-quality images

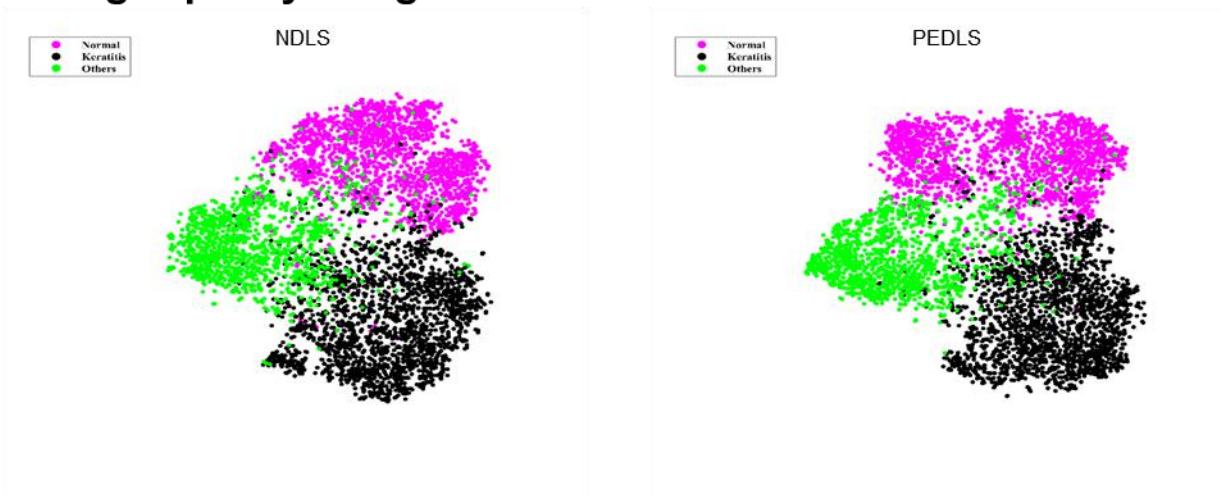


Figure S2. Visualization of the separability of embedding features learned by the NDLS and PEDLS in the external text dataset. a, Low-quality images. b, High-quality images. NDLS, new deep learning system. PEDLS, previously established deep learning system.

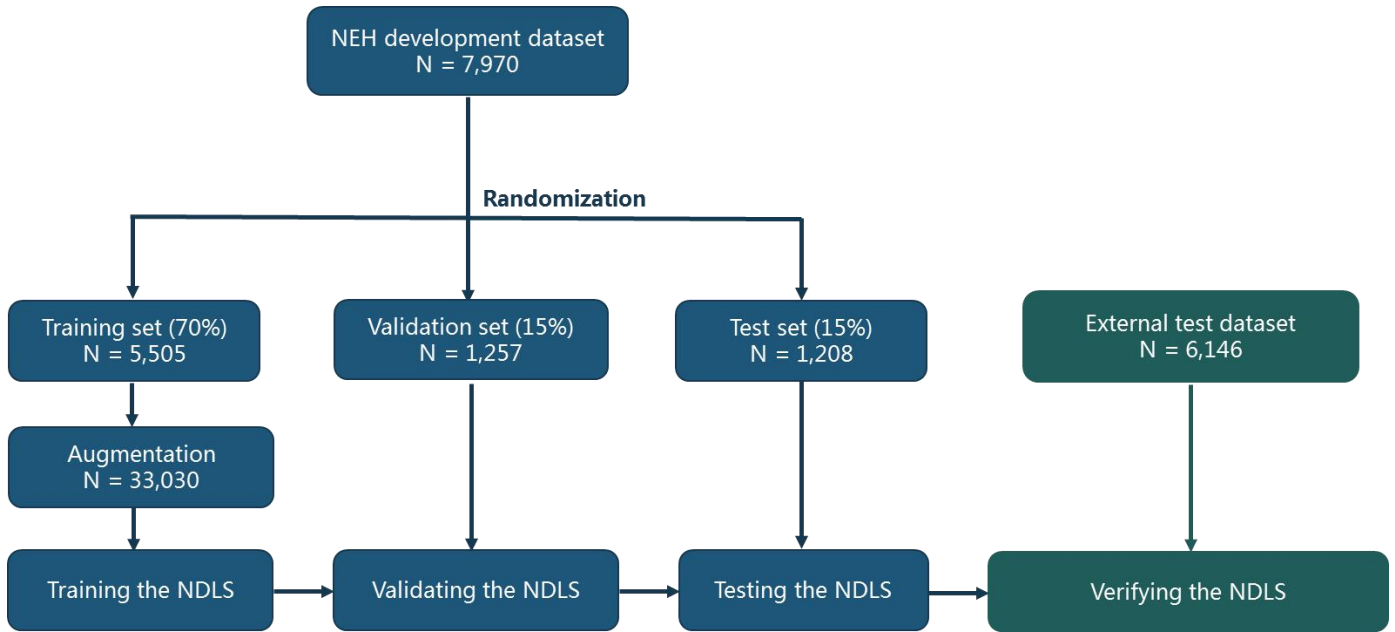


Figure S3. Flow diagram of the development and assessment of the NDLS. NDLS, new deep learning system. NEH, Ningbo Eye Hospital.

Table S1. Comparison of the PEDLS with the NDLS in high-quality images.

One-vs.-Rest Classification	PEDLS	NDLS	<i>P</i>
Keratitis vs. others + normal			
Sensitivity (95% CI)	97.1% (96.5-97.8)	90.7% (89.6-91.9)	<0.001
Specificity (95% CI)	97.5% (96.9-98.0)	97.8% (97.3-98.3)	0.348
Accuracy (95% CI)	97.3% (96.9-97.7)	94.9% (94.3-95.4)	<0.001
Others vs. keratitis + normal			
Sensitivity (95% CI)	94.3% (93.1-95.5)	90.7% (89.2-92.2)	<0.001
Specificity (95% CI)	97.5% (97.0-97.9)	93.6% (92.9-94.4)	<0.001
Accuracy (95% CI)	96.7% (96.2-97.2)	92.9% (92.3-93.6)	<0.001
Normal vs. keratitis + others			
Sensitivity (95% CI)	95.4% (94.5-96.4)	94.0% (92.9-95.0)	0.005
Specificity (95% CI)	98.9% (98.5-99.2)	96.9% (96.3-97.4)	<0.001
Accuracy (95% CI)	97.7% (97.3-98.1)	95.9% (95.4-96.4)	<0.001

“Others” denotes other corneal abnormalities. “Normal” denotes normal cornea. NDLS, new deep learning system. PEDLS, previously established deep learning system. CI, confidence interval.