Supplemental materials

# Machine learning-assisted algorithm for parameter setting in refractive surgery

Supplementary Table 1 The initially constructed features

Supplementary Table 2 The redundant features for the Cap/Flap Thickness

Supplementary Table 3 The redundant features for the Ablation Zone

Supplementary Table 4 The key features for the Cap/Flap Thickness after two-layer feature selection.

Supplementary Table 5 The key features for the Ablation Zone after two-layer feature selection.

Supplementary Table 1 The initially constructed features

| Features |
|---|
| Ocular(Binary) |
| Sex(Binary) |
| Age((continuous) |
| UCVA |
| DS Spherical Power/(D) |
| Intraocular Pressure/(mmHg) |
| Corneal Curvature K1/(D) |
| Corneal Curvature K2/(D) |
| Km/(D) |
| Central Corneal Thickness/(μm) |
| Operative Refractive Power |
| Corneal Curvature Radius/(D) |
| Preoperative Corneal Anterior Surface Curvature |
| A C Depth/(mm) |
| WTW/(mm) |
| Surgical Fee/(CNY) |
| Surgical Technique(4 categories) |
| Wear contact lenses(4 categories) |
| History Infetious Disease(Binary) |
| History Immune Disease(Binary) |
| History Glaucoma Or Retinal Disorder(Binary) |
| Rm(Front)/(D) |
| K1(Front)/(D) |
| K2(Front)/(D) |
| Km(Front)/(D) |
| Axis(Front)/(°) |
| Astig(Front)/(D) |
| Rper(Front)/(mm) |
| Rmin(Front)/(mm) |
| Rm(Back)/(D) |
| K1(Back)/(D) |

Supplementary Table 1 The initially constructed features. (Continued)

| Features |
| --- |
| K2(Back)/(D) |
| Km(Back)/(D) |
| Axis(Back)/(°) |
| Astig(Back)/(D) |
| Rper(Back)/(mm) |
| Rmin(Back)/(mm) |
| Pupil Center/(mm) |
| Pupil Center_x/(mm) |
| Pupil Center_y/(mm) |
| Pachy Apex/(mm) |
| Thinnest Location/(mm) |
| Thinnest Location_x/(mm) |
| Thinnest Location_y/(mm) |
| K Max/(D) |
| K Max_x/(mm) |
| K Max_y(mm) |
| Cornea Volume/(mm3) |
| Chamber Volume/(mm3) |
| Angle/(°) |
| Pupil Dia/(mm) |
| Total 51 features |

Supplementary Table 2 The redundant features for the Cap/Flap Thickness

| The pair of redundant features | Redundant features | The value of MIC |
|---|---|---|
| ('Rm(Front)', 'Km(Front)') | 'Km(Front)' | 0.9620085706163779 |
| ('Rm(Back)', 'Km(Back)') | 'Km(Back)' | 0.956250496531069 |
| ('Pupil Center', 'Thinnest Location') | 'Thinnest Location' | 0.9164002235953471 |
| ('Pupil Center', 'Pachy Apex') | 'Pupil Center' | 0.9436120098286908 |
| ('Rmin(Front)', 'K Max') | 'K Max' | 0.9686694563968066 |
| ('DS Spherical Power', 'Operative Refractive Power') | 'Operative Refractive Power' | 0.8385765799384228 |
| ('Pachy Apex', 'Thinnest Location') | 'Thinnest Location' | 0.9067092555194269 |
| ('Km', 'Corneal Curvature Radius') | 'Corneal Curvature Radius' | 0.8856188346818944 |

Supplementary Table 3 The redundant features for the Ablation Zone

| The pair of redundant features | Redundant features | The value of MIC |
|---|---|---|
| ('Corneal Curvature Radius', 'Rm(Front)') | 'Rm(Front)' | 0.8287197075624902 |
| ('Rm(Back)', 'Km(Back)') | 'Km(Back)' | 0.956250496531069 |
| ('Pupil Center', 'Thinnest Location') | 'Thinnest Location' | 0.9164002235953471 |
| ('Pupil Center', 'Pachy Apex') | 'Pachy Apex' | 0.9436120098286908 |
| ('Corneal Curvature Radius', 'Km(Front)') | 'Km(Front)' | 0.8236044098042824 |
| ('Rmin(Front)', 'K Max') | 'K Max' | 0.9686694563968066 |
| (DS Spherical Power', 'Operative Refractive Power') | 'Operative Refractive Power' | 0.8385765799384228 |
| ('Km', 'Corneal Curvature Radius') | 'Km' | 0.8856188346818944 |

Supplementary Table 4 The key features for the Cap/Flap Thickness after two-layer feature selection.

| Category | Total number | Features |
|---|---|---|
| Pre-existing features | 7 | Age(continuous)<br>DS Spherical Power/(D)<br>Corneal Curvature K2/(D)<br>Central Corneal Thickness/(μm)<br>Preoperative Corneal Anterior Surface Curvature<br>A C Depth/(mm)<br>WTW/(mm) |
| Additive features | 2 | Wear contact lenses (4 categories)<br>History Glaucoma Or Retinal Disorder(Binary) |
| Left eye and right eye-specific features | 7 | Rper(Front)/(mm)<br>Rmin(Front)/(mm)<br>Rm(Back)/(D)<br>Astig(Back)/(D)<br>Rper(Back)/(mm)<br>Pachy Apex/(mm)<br>Cornea Volume/(mm3) |
| Total | 16 features | |

Supplementary Table 5 The key features for the Ablation Zone after two-layer feature selection.

| Category | Total number | Features |
|---|---|---|
| Pre-existing features | 8 | Sex<br>Age<br>UCVA<br>DS Spherical Power/(D)<br>Central Corneal Thickness/(μm)<br>Preoperative Corneal Anterior Surface Curvature<br>A C Depth/(mm)<br>WTW/(mm) |
| Left eye and right eye-specific features | 10 | K1(Front)/(D)<br>Axis(Front)/(°)<br>Astig(Front)/(D)<br>Rper(Front)/(mm)<br>Rm(Back)/(D)<br>Astig(Back)/(D)<br>Pupil Center_y/(mm)<br>Thinnest Location_x/(mm)<br>K Max/(D)<br>Pupil Dia/(mm) |
| Total | 18 features | |