

CLAIMS

What is claimed is:

1. A product comprising one or more tangible computer-readable non-transitory storage media comprising computer-executable instructions operable to, when executed by at least one computer processor, enable the at least one computer processor to cause a computing device to implement a lensometer to:

process, by the lensometer, an image of an object captured via a lens of eyeglasses, the image of the object captured by an image-capturing device via said lens when the lens is between the image-capturing device and the object;

determine by the lensometer a first distance, the first distance is between the image-capturing device and the object when the image of the object is captured by the image-capturing device;

determine by the lensometer a second distance, the second distance is between the lens and the object when the image of the object is captured by the image-capturing device; and

determine by the lensometer one or more optical parameters of said lens based on the first distance, the second distance, and the image of the object captured via the lens.

2. The product of claim 1, wherein the instructions, when executed, cause the computing device to determine the one or more optical parameters of said lens based on a magnification between at least one imaged dimension of said object in the image and at least one respective reference dimension of said object.

3. The product of claim 2, wherein the instructions, when executed, cause the computing device to determine a spherical power of said lens based on said magnification.

4. The product of claim 2, wherein the instructions, when executed, cause the computing device to determine a cylindrical axis of said lens based on a maximal magnification axis of a plurality of axes in said image, at which a magnification between said imaged dimension and said reference dimension is maximal.

5. The product of claim 4, wherein the instructions, when executed, cause the computing device to determine a cylindrical power of said lens based on said maximal magnification axis and a minimal magnification axis of the plurality of axes in said image, at which a magnification between another imaged dimension and another respective reference dimension of said object is minimal.

6. The product of claim 5, wherein the instructions, when executed, cause the computing device to determine the cylindrical power of said lens based on a first magnification at said minimal magnification axis, and a second magnification at said maximal magnification axis.

7. The product of claim 2, wherein the instructions, when executed, cause the computing device to determine the one or more optical parameters of said lens based on said magnification, and another magnification of at least one dimension in an image of a calibration object having known dimensions, the image of the calibration object is captured not via the lens.

8. The product of any one of claims 1-7, wherein the second distance is half of the first distance.

9. The product of any one of claims 1-7, wherein the instructions, when executed, cause the computing device to process an image of a graphical display comprising a first object and a second object, the image of the graphical display comprising a first image of the first object captured by the image-capturing device via the lens, and a second image of the second object captured by the image-capturing device not via the lens, the instructions, when executed, cause the computing device to determine at least one of the first distance and the second distance based on the second image of the second object, and to determine the one or more optical parameters of said lens based on the first image of the first object.

10. The product of claim 1, wherein the second distance comprises a distance between said object and said lens when temple arms of said eyeglasses are extended to a plane of said object.

11. The product of claim 1, wherein the instructions, when executed, cause the computing device to process a plurality of images of said object captured via said lens at a respective plurality of first distances, while the second distance is constant, to determine an extremum magnification image of said plurality of images, in which a magnification between an imaged dimension of the object and a reference dimension of the object is extremum, and to determine the one or more optical parameters of said lens based on said extremum magnification image.

12. The product of claim 1, wherein the instructions, when executed, cause the computing device to process a plurality of images of said object captured via said lens at a respective plurality of second distances, while the first distance is constant, to determine an extremum magnification image of said plurality of images, in which a magnification between an imaged dimension of the object and a reference dimension of the object is extremum, and to determine the one or more optical parameters of said lens based on said extremum magnification image.

13. The product of claim 1, wherein the instructions, when executed, cause the computing device to determine at least one distance of the first distance or the second distance, based on acceleration information corresponding to an acceleration of said image-capturing device.

14. The product of claim 1, wherein the instructions, when executed, cause the computing device to instruct a user to place the image-capturing device and the lens such that a distance between the image-capturing device and the lens is half of the first distance.

15. The product of claim 1, wherein the instructions, when executed, cause the computing device to determine the first distance, based on one or more three-dimensional (3D) coordinates of said object.

16. The product of claim 1, wherein the instructions, when executed, cause the computing device to determine the first distance based on said object and at least one dimension in said image of a calibration object having known dimensions.

17. The product of claim 1, wherein the instructions, when executed, cause the computing device to determine the second distance based on said first distance, and one or more dimensions of a frame of said eyeglasses.

18. The product of claim 1, wherein the instructions, when executed, cause the computing device to determine a pupillary distance between a first lens of said eyeglasses and a second lens of said eyeglasses.

19. The product of claim 18, wherein the instructions, when executed, cause the computing device to process an image of an object comprising a first element and a second element, the image comprising a first imaged element of said first element captured via said first lens and a second imaged element of said second element captured via said second lens; and to determine the pupillary distance between said first and second lenses, based on at least a first distance between said first and second elements, and a second distance between said first imaged element and said second imaged element.

20. The product of any one of claims 1-7, wherein the instructions, when executed, cause the computing device to trigger a display device to display said object.

21. The product of claim 20, wherein instructions, when executed, cause the computing device to calibrate a display size of said object on said display device.

22. The product of any one of claims 1-7, wherein the object comprises a circularly symmetric or rotationally symmetric object.

23. The product of any one of claims 1-7, wherein the instructions, when executed, cause the computing device to trigger the image-capturing device to capture the image of said object.

24. A mobile device configured to determine one or more optical parameters of a lens of eyeglasses, the mobile device comprising:

an image-capturing device to capture an image of an object via said lens when the lens is between the image-capturing device and the object; and

a lensometer configured to:

determine a first distance, the first distance is between the image-capturing device and the object when the image of the object is captured by the image-capturing device;

determine a second distance, the second distance is between the lens and the object when the image of the object is captured by the image-capturing device; and

determine the one or more optical parameters of said lens based on the first distance, the second distance, and the image of the object captured via the lens.

25. The mobile device of claim 24 configured to determine the one or more optical parameters of said lens based on a magnification between at least one imaged dimension of said object in the image and at least one respective reference dimension of said object.

26. The mobile device of claim 24, wherein the lensometer is configured to process an image of a graphical display comprising a first object and a second object, the image of the graphical display comprising a first image of the first object captured by the image-capturing device via the lens, and a second image of the second object captured by the image-capturing device not via the lens; to determine at least one of the first distance and the second distance based on the second image of the second object; and to determine the one or more optical parameters of said lens based on the first image of the first object.

27. The mobile device of claim 24 configured to determine at least one of the first distance and the second distance based on the image captured by the image-capturing device.

28. The product of claim 1, wherein the instructions, when executed, cause the computing device to determine at least one of the first distance and the second distance based on sensor information from a sensor.

29. A method to be performed by a lensometer implemented by a computing device, the method comprising:

processing by the lensometer an image of an object captured via a lens of eyeglasses, the image of the object captured by an image-capturing device via said lens when the lens is between the image-capturing device and the object;

determining by the lensometer a first distance, the first distance is between the image-capturing device and the object when the image of the object is captured by the image-capturing device;

determining by the lensometer a second distance, the second distance is between the lens and the object when the image of the object is captured by the image-capturing device; and

determining by the lensometer one or more optical parameters of said lens based on the first distance, the second distance, and the image of the object captured via the lens.

30. The method of claim 29 comprising determining the one or more optical parameters of said lens based on a magnification between at least one imaged dimension of said object in the image and at least one respective reference dimension of said object.